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PROJECT: Indiana State University
Tech A Renovations for Built Environment
Offices

PROJECT NUMBER: 12014

DATE: February 24, 2013

PREPARED BY: Cari Rohrmayer

ADDENDUM

Number: THREE

This Addendum is issued in accordance with the provisions of "The General Conditions of the Contract for Construction," Article 1, "Contract Documents" and becomes a part of the Contract Documents as provided therein. This Addendum includes:

- A. Addendum Pages: ADD3-1 through ADD3-2 as prepared by MMS-A/E, Inc.
- B. Attachments: Questions and Answers
Spec Sections listed below

PART 1 - BIDDING & CONTRACT REQUIREMENTS

1.01 N/A

PART 2 - SPECIFICATIONS

2.01 270501- Updated, see attached
2.02 270010- Updated, see attached

PART 3 - DRAWINGS

3.01 N/A

PART 4 - GENERAL NOTES

4.01 N/A



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Questions & Answers

SOME QUESTIONS FROM ADDENDUM #02 HAVE BEEN AMMENDED BY THE ISU IT DEPARTMENT. PLEASE SEE BELOW, CORRECTED ANSWERS IN RED.

- Q11. During the previous phase of construction zip ties were used on the communication cabling in lieu of Velcro, is this acceptable for this phase as well?
A11. ~~Yes.~~ **Incorrect, please see attached specification 27 05 01.00 for proper cable tie usage**
- Q12. Spec section 27.00.10.00 paragraph 5 states the contractor must be factory certified. Does this mean that contractor must be a PCI (Panduit Certified Installer)?
A12. ~~No.~~ **Please reference attached specification.**
- Q13. Could you clarify what type of warranty is required for the Communication system?
A13. ~~One year after date of substantial completion.~~ **Incorrect, please see attached 27 00 10.00, Page 19, Item #1," Contractor shall provide a full "System Warranty" which shall cover all materials, labor and related product shipping expenses for a period of five years from the date of Owner acceptance."**
- Q14. Is it required that the technology contractor have an RCDD on staff?
A14. ~~No.~~ **Incorrect, please see attached 27 00 10.00, Page 8, Item K2," The Prime Contractor or his subcontractor responsible for this Section shall have a Registered Communications Distribution Designer (RCDD) on staff that will be ultimately responsible for this Project. The RCDD must have sufficient experience in this type project as to be able to lend adequate technical support to the field forces during installation, the warranty period, and any extended warranty periods or maintenance contracts."**

NEW QUESTIONS & ANSWERS:

- Q1. Clarify which light fixtures receive emergency ballasts.
A1. Provide for 4 fixtures. Architect and owner will coordinate with EC on site.
- Q2. Need size, type, and approved manufacturer for cable tray shown on T201.
A2. Match existing South Corridor tray dimensions approx. 24"w x 6"d. 'Cooper B-line wire mesh tray.
- Q3. On E200 in Conf. room there are two type A5 fixtures shown. Not referenced on finish schedule.
A3. Error. This should read 'A2'.

- Q4. On E200, in Admin Assistant, there is a fixture that looks like a 2x2 but is not defined as a type.
- A4. Provide one type A2, 2x4 fixture in lieu of what is shown.
- Q5. Please give an approved casework manufacturer for the stainless steel casework in TAM Supply.
- A5. "Kewanee", Research Collection or equal. Stainless tables to match, on casters, no casework below the tops.



Revised 04/27/2012

BASIC MATERIALS AND METHODS FOR COMMUNICATIONS

PART 1 MATERIALS AND METHODS

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
 - 1. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

- A. Section Includes:
 - 1. Basic materials, methods and installation guidelines applicable to the installation of all communication systems.
 - a) This Section is a “Common Work Results” Section that includes information that is applicable and “Related” to all Division 27 Sections.
- B. Related Sections
 - 1. All Division 27 Sections.
- C. Related Drawings
 - 1. All Technology (T-Series) Drawings

1.3 QUALITY ASSURANCE

- A. Welding
 - 1. Welding shall be performed by persons licensed by the authority having jurisdiction where the work is performed. This shall apply to all work which is routinely regulated by said authority.
- B. High Voltage Wiring
 - 1. High voltage wiring and connections shall be performed by persons licensed by the authority having jurisdiction where the work is performed. This shall apply to all work which is routinely regulated by same authority.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 RELATED OPERATIONS

- A. Welding
 - 1. Onsite welding, where it is necessary, shall not be performed without the express written consent of the owner’s representative. All project specifications governing welding shall apply, regardless of whether said specifications are referenced within the Division 27 specifications.
- B. High Voltage Wiring
 - 1. Review all high voltage provisions for This Contractor’s work with the Division 16 electrical contractor. Coordinate specific device termination, loading and circuiting requirements with the electrical contractor.



3.2 INSTALLATION OF COMMUNICATIONS SYSTEMS

A. General

1. All work installed in finished areas shall be concealed. All work installed in unfinished areas may be exposed at the discretion of the Owner's representative.
2. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, Any exceptions to be approved by Owner.
3. Install equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations.
4. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
5. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
6. Verify all dimensions by field measurements. Take measurements and be responsible for exact size and locations of all openings required for the installation of work. Figured dimensions are reasonably accurate and should govern in setting out work. Where detailed method of installation is not indicated or where variations exist between described work and approved practice, direction of the owner's representative on job shall be followed.
7. The symbols used to indicate the purpose of which the various outlets are intended are identified in the Legend.
8. If during construction it becomes apparent that certain minor changes in layout will affect a neater job or better arrangement, such alterations shall be made as part of the contract. Owner's review shall be obtained before making such changes.
9. Workmanship throughout shall conform to the standards of best practice. Marks, dents or finish scratches will not be permitted on any exposed materials, fixtures or fittings. Inside of panels and equipment boxes shall be left clean.
10. Use caution not to exceed the allowed bending radius for respective cables and not to compromise the integrity of the cables during installation by pulling cable management devices too tightly, damaging cables, etc. Raceway/Cabling bending radii shall be minimum as directed by cable manufacturer. Use pulling compound or lubricant, where necessary; compound must not deteriorate conductor or insulation.

B. Cable

1. General

- a) Provide color-coded jackets to identify runs of different systems.
 - 1) See related specifications and drawings for applicable color coding.
- b) Neatly route cables parallel, perpendicular and plumb to building architectural lines.
- c) Neatly comb out multiple cable bundled runs to remove tangling and crossing of cables within the bundles. Neatly dress all cable work and provide vertical and horizontal cable management (or other approved method) for properly dressing all work at racks, control panels, backboards etc. See detail(s) if applicable.
 - 1) To avoid Alien Crosstalk, do not cinch UTP cables into tight bundles.
- d) Plenum-rated wire ties shall be used wherever wire ties are permitted and wherever plenum rated cable is used.
- e) Wire ties shall never be used in a manner that causes deformation of the cable jacket, damage to the cable, or has any adverse affect on the usability, specifications or longevity of the cable(s) on which it is applied.



- f) Velcro type wire ties shall be used in non-plenum spaces; in equipment racks; in rack cabinets, and; in related equipment housing enclosures.
- 2. Support
 - a) All cables shall be supported/anchored every 5 feet (or less) and within 12" of device boxes, outlets, racks/cabinets and cable tray.
 - b) Use J-Hook type cable supports for all cables run outside of conduit or cable tray. Bridle rings shall not be used for Communications Technology cables.
 - c) Use separate J-Hook cable support systems for cables belonging to different systems and for cables carrying different operating levels. See Cable Separation guidelines in this section.
 - d) Loosely secure cables at each J-Hook.
 - e) Cables shall not be directly or indirectly supported by a suspended ceiling or any other surface, support, material or structure not permissible for this use by all applicable codes and standards.
 - f) Cable trays or messenger strand positioning
 - 1) Used to route cables in hallways
 - 2) Each must have a minimum twelve inches (12") vertical clear space above the top of the cable tray or messenger strand, and a minimum six inches (6") clear space below and on each side of the cable tray or messenger strand.
- 3. Cable Separation
 - a) Cables carrying signals of different nominal operating level shall be kept separated to reduce the risk of undesirable cross-talk interference between cables.
 - 1) As a general rule, for each 25dB of nominal level voltage difference between cables, Contractor shall provide an additional 6 inches of physical separation between the cables. For example: cables with a 25dB voltage difference shall be separated by at least 18 inches. As the difference increases the distance shall increase proportionally.
 - 2) This guideline shall be used to govern the separation of low voltage Communications Technology cabling from AC power circuits as well. For example: A Microphone line running parallel to a 480v power line shall be separated by nearly 27-30 inches.
 - 3) Provide greater separation than this guideline where the contractor believes and/or determines it is necessary to prevent or remedy interference between cables.
 - b) Keep length of parallel runs to a minimum. Cross cables of different nominal levels at 90 degrees.
 - c) Provide additional separation as necessary to prevent and remedy any crosstalk which:
 - 1) Adversely affects the performance and usability of the system, or;
 - 2) Exceeds specific crosstalk performance specified in individual specifications.
 - d) Contractor shall take all precautions necessary to keep low-voltage cable away from sources of EMI and RF interference. Where close proximity is absolutely necessary to satisfactory appearance, performance or installation of the Work, provide all necessary shielding necessary to ensure that ingress interference is minimal and has no negative impact of the Work.
- 4. Cable Termination
 - a) The cables terminating at a device outlet shall be left not less than 10 inches to facilitate installation and servicing of devices. Longer working lengths shall be provided as appropriate to the application.



- b) All termination types shall correctly match the cable and device termination point. Connectors of the appropriate type, size, color and rating shall be used to match with the mating equipment
- c) Tools as recommended by each specific connector manufacturer shall be used in attachment of all connectors.
- d) Spade connectors.
 - 1) Spade type connectors shall be used on cable ends where screw-type terminal connectors are used.
 - i) All spade connectors shall be insulated. Provide heat shrink type insulation where solder-type or non-insulated spade connectors are used.
 - 2) Spade connectors used shall be rated by the manufacturer for the gauge, insulation, type and stranding of the cable to which it is applied. Spade connectors shall be sized to exactly match the stud size and spacing of mating termination connector.
 - 3) Tools as recommended by the specific connector manufacturer shall be used in attachment of the connector to the cable.
 - 4) When spade connectors are the required to be used for audio circuits operating at $\leq +8\text{dBv}$ nominal, solder type spade connectors only shall be permitted.
 - 5) No more then two spade connectors shall be permitted under a single terminal. Fewer should be used when recommended by the specific manufacturer's equipment or connector.
- e) Wire Nuts
 - 1) Wire nuts shall not be used in any audio circuit, except when necessary in the following:
 - i) 25 Voltage Constant-Voltage loudspeaker circuits.
 - ii) 70 Voltage Constant-Voltage loudspeaker circuits.
 - 2) Wire nuts shall not be used in any time sensitive data or voice communications or remote control circuit.
 - 3) Wire nuts shall not be used in any circuit which radiates RF energy.
 - 4) Contractor must advise and gain prior approval of the Owner for any circuit which the Contractor desires to use wirenuts as the means of termination.
- f) Drain Wires, Non-insulated Ground Wires and Shields
 - 1) Drain or non-insulated ground conductors shall be insulated with appropriately sized heat-shrinkable insulated sleeving immediately upon exit from the jacket of the cable. Contractor shall use GREEN colored sleeving unless otherwise necessary to resolve specific color coding conflicts on a given cable. This methodology shall apply to ALL methods of termination, including inline connectors, device plates, direct equipment terminations etc... Sleeving shall be applied to twisted and braided shields once the internal conductors have been combed out or otherwise removed from the center of the shield.
 - 2) Wherever a cable contains a non-insulated conductor within a jacketed cable, the conductors, as they exit the manufacturer's jacket, shall have a piece of heat shrinkable sleeving applied equally over the jacket and the exposed insulated conductors. The length of this sleeving shall be 1" for all cable diameters of .250" or less. For cables diameters larger then .250" the length of the sleeving shall be approximately equal to 4 times the diameter of the cable jacket. Note: This added sleeving is recommended but not mandatory when cable termination occurs fully within the confines of a fully



- insulated and strain relieved connector. Black shall be used unless otherwise necessary for specific cosmetic or cable identification purposes.
- 3) A heat-gun of the appropriate temperature, size, type and rating for shrinking the tubing shall be used as recommended by the manufacturer of the sleeving used. Open flame (i.e. matches, cigarette lighters, torches) and direct metal conduction (i.e. soldering iron) methods to shrink the sleeving shall not be permitted. Sleeving which is burnt or otherwise marred shall be removed and replaced.
 - 4) There shall not be any non-insulated exposed conductors within a device backbox, junction box, or equipment rack/cabinet.
- g) Unused Conductors
- 1) Unused conductors shall not be “clipped” or removed from any jacketed cable. Conductors which are not required or used at the end of a jacketed cable shall be kept intact. Conductors shall be fully insulated from one and other to prevent shorts which could occur at either end of the cable. Conductor ends shall also be insulated to prevent shorts to other conductive materials which could come in contact with the conductor.
 - 2) Unused conductors shall be kept the same length as the longest conductor of the cable being used.
- h) Cable and Conductor Nicks
- 1) Attention shall be paid to the proper preparation of all cables and all conductors of these cables. There shall not be nicks to cable jackets, conductor insulation, or the conductors themselves.
 - 2) Special attention should be paid to nicked conductors. Should a conductor be nicked during preparation or termination the cable shall be reworked/replaced to remove the nick.
- i) Cut, Disconnected, or Not Terminated Cables
- 1) Any voice, data, or coaxial cable that is cut, disconnected, or not terminated at both ends shall be completely removed end to end. Any labels at either end shall be erased. Record drawings shall reflect the removal of these cables.

END OF SECTION 27 05 01.00



Revised 09/11/2012

GENERAL REQUIREMENTS FOR COMMUNICATIONS

PART 1 GENERAL REQUIREMENTS

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
 - 1. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

- A. The following items are additional requirements for Division 27 "Communications" Work.
- B. If after reviewing all documents and drawing there is any questions or doubt, or if a conflict or discrepancy is found between the documents and the drawings, contact the Owner in writing for clarification before proceeding. Clarification will be issued by Addendum.
- C. Each Item below has the Division 01 00 00 specification section number (in parenthesis) of the article where the base requirements are found. The additional requirements are to be considered additive to the Division 01 00 00 section and apply only to Division 27 work.
- D. Each Division 27 Specification Section may add additional requirements specific to that Section.

1.3 REQUIREMENTS

- A. (01 25 00 Substitution Procedures)
 - 1. Substitutions
 - a) All products provided as Work of this Project shall be in compliance with, and meet the physical, functional, and operational requirements of the products as outlined in Part II of each Division 27 specification Section.
 - b) Product Substitutions
 - 1) Substitution requests must be received by the Owner as required by Division 1.
 - 2) No substitutions will be accepted without prior approval. Only changes issued in an Addendum will be allowed.
 - 3) See Substitution Submission below.
 - c) Standard of Quality
 - 1) A Standard of Quality will be set by applying a Manufacturer and Catalog number to each item in Part II of each applicable specification section.
 - 2) A standard of quality item has the physical, functional, and operational attributes to provide the designed functionality.
 - 3) Additional approved manufacturer(s)
 - i) Listing as an additional approved manufacturer for an item is not an assurance that the manufacturer has products that meet the requirements; at minimum, the written description must be met along with any key attributes used in the Project design.
 - ii) When a listed "additional manufacturer" has a product that meets the written description and has the physical, functional, and operational attributes, that product may be used in place of the product that was listed as the standard of quality without submission for prior approval.



- (A) If such a substitution is made, the requirements for items by the “same manufacturer” shall be adhered to.
 - (1) Requirements for “system” type warranties requiring the same manufacturer or manufacturing “partnership” items for warranty application shall be adhered to.
 - (B) It will be the sole responsibility of the Contractor to provide adequate design compensation for fulfillment of the intent of the Specification for any change in Scope due to an “approved manufacturer’s” product change from this Section (i.e., required rack space, box size, support requirements, etc.).
 - (1) Adequate compensation shall be determined by the Owner.
 - 4) Where 2 or more Manufacturers and Catalog numbers are listed, one of the two products must be utilized. Item listed first is Owner’s preferred product.
- B. (01 25 13 Product Substitution Procedures)
- 1. Substitution Submission
 - a) Each item submitted must meet the physical, functional, and operational attributes of the Standard of Quality item.
 - b) All requests for substitutions shall be accompanied by a complete system brochure and/or individual product data sheets.
 - 1) Contractor shall state a reason for the substitution request (i.e. familiarity, availability, functionality, Brand specific training, Manufacturer’s warranty issue, etc.)
 - 2) Contractor shall provide comparison list of features, functions and specifications where proposed substitute product differs from specified product.
 - 3) Each request must reference the Specification Section number and paragraph and include a description of any deviation from the specified functional requirements of the equipment and/or system(s).
 - 4) A demonstration of the proposed equipment and/or system(s) may also be requested. This information must be submitted in compliance with Division 1 Section “Substitutions.”
 - c) Failure to provide all information may result in the substitute product being rejected.
 - d) Owner reserves the right to reject any substitute.
 - 2. Substitution Responsibility
 - a) Contractor shall be responsible for all additional costs, both direct and indirect, including costs for additional equipment, materials and labor necessary to properly integrate a substitute product, including additional costs which may be incurred by other trades, the Owner, Architect or Owner. (i.e., required rack space, box size, support requirements, etc.).
- C. (01 26 13 Requests for Interpretation)
- 1. Contradictions, discrepancies, or conflicts
 - a) This Contractor shall carefully study and compare the Contract Documents and shall at once report to the Authority as set forth in 01 31 00 “Project Management and Coordination” any error, inconsistency or omission discovered.
 - b) In the case of a contradiction, conflict, or discrepancy between Division 27 Sections and Divisions 0 and/or 1.
 - 1) Division 27 Specifications will be considered additive. It is not intended that Division 27 Sections supersede any legal or contractual requirements set forth in Division 0 or 1.



- c) In the case of a contradiction, conflict, or discrepancy between T Series Drawings and/or Division 27 Specification Sections
 - 1) If during the Bid period the Contractor discovers a contradiction, discrepancy, or conflict of information on any Drawing, between any two drawings, between Drawings and specification Sections, within any Division 27 Section, between related Sections, between individual parts of a Section, or within any part of any Section; the contradiction, discrepancy, or conflicting information shall be called to the attention of the Owner in writing and will be clarified by Addendum.
 - 2) A contradiction, discrepancy, or conflict of information that has not been clarified in writing at Bid time will be considered to be the more costly of the available options.
 - 3) If a contradiction, discrepancy, or conflict of information is discovered after award of Contract; the discrepancy or conflict will be submitted to the Owner in writing for evaluation. The result will be clarified by a Change Order. This Change Order will be of \$0 or will require a deduct to change the requirement to a less costly option if so decided by the Owner.
 - i) If Contractor performs any construction activity knowing it involves a recognized contradiction, discrepancy, or conflict in the contract documents without such notice to the Owner or Owner, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the cost required for correction.
- D. (01 31 13 Project Coordination)
 - 1. Coordination
 - a) Coordination shall commence immediately upon award of contract. Failure of this contractor in coordinating (including providing and extracting related information to and from other trades for review) in a timely manner, shall not result in any subsequent additional reimbursement, special allowances or additional construction time being made for any facet of the project. Work fabricated or installed before properly coordinating with all other trades shall be done at the Contractor's own risk.
 - b) Sequence, coordinate, and integrate installations of communications materials and equipment with the Division 26 electrical contractor any all other applicable trades for efficient flow of the Work.
 - c) The contract document drawings are an outline to indicate the approximate location and arrangement of required work. The drawings shall be followed as closely as possible in coordination and in execution of the work.
 - d) This contractor shall work in harmony with all building contractors and sub-contractors, so as not to cause any delays in pouring concrete, building masonry walls, etc. This contractor shall consult the Architectural, Plumbing, HVAC and Structural plans in all instances before installing his work so that his work will not interfere with those branches.
 - e) This contractor shall participate in coordination efforts and in preparation of coordination drawings prior to fabrication or installation of any equipment, materials, etc. Coordinate actual clearances of all installed equipment.
 - f) Conflicts in equipment and materials shall be corrected prior to installation. Should there be a conflict with the drawings of other trades, this contractor shall work with the trades to correct the conflict while coordinating the project (prior to installation). If the conflict cannot be resolved, refer the matter to the owner's representative for a final decision as to method or material. This contractor shall refer to drawings of all other trades for details, dimensions and locations of other work and route their work so as not to conflict with any other branch. Any work installed or equipment



placed in position by this contractor creating a conflict shall be readjusted to the satisfaction of the owner's representative at the expense of this contractor.

- g) Plans are diagrammatic indicating design intent and indicating required size, points of termination and, in some cases, suggested routes of raceways, etc. However, it is not intended that drawings indicate fully coordinated conduit routing, all necessary offsets, etc. All cable assemblies, etc. shall be run as straight as possible and symmetrical (perpendicular to or parallel with) with architectural items and in a consistent elevation. Work installed diagonal to building members shall not be permitted.
 - h) The Contractor shall coordinate his work with all other trades and locate equipment accordingly. This Contractor shall refer to coordination drawings of the other trades. Any communications work fabricated or installed before the above referenced coordination with all other trades shall be done at the respective contractors' risk.
 - i) It is intended that all apparatus be located symmetrical with architectural elements and shall be installed at exact height and locations as shown on architectural drawings. If a device height or location is in question it shall be the responsibility of this Contractor to immediately seek clarification from the Owner.
- E. (01 31 16 Multiple Contract Coordination)
- 1. Coordinate work with Division 26 Contractor (where applicable); prior to Division 26 Contractor's installation of outlet boxes, conduit, conduit stubs, raceways and any other provisions in support of Division 27 Contractor's work.
 - 2. Coordinate with all other Contractor's and the Owner, as applicable and necessary to ensure a clean, professional looking and operating systems.
- F. (01 31 19.16 Site Mobilization Meetings)
- 1. The Contractor shall fully inform himself regarding all peculiarities and limitations of space available for installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. Although the locations of equipment and conduit may be shown on the drawings in certain positions, the architectural details and conditions existing at the job site shall guide the Contractor, coordinating his work with that of others. Provide all offsets as required to provide a neat workmanlike arrangement
- G. (01 33 23 Shop Drawings, Product Data, and Samples)
- 1. Submittals required after Award of Contract but before starting Work include:
 - a) Complete BOM list
 - 1) BOM shall include the following information for each product:
 - b) Product Information Sheets "Datasheets": Include catalog information, sizing, and technical data on each item to be used on the Project.
 - 1) Each product datasheet must reference the specific paragraph for which the product is being submitted. Each product must be listed in the exact same order as it appears in the Section for which the products are being submitted.
 - i) Datasheets shall each include a clearly identifiable label applied in upper corner of each sheet that clearly references the specification section and drawing (as applicable) to which it applies. Labels shall be consistently affixed in the same location on all sheets unless the labels will obstruct pertinent technical information.
 - 2) All datasheets shall be original manufacture datasheets, first generation printed copies of manufacturer's electronic datasheet (i.e. printed copy of a PDF file), or high quality photocopy of original manufacturer's datasheets.
 - i) Fax versions of product datasheets or any photocopies thereof are not acceptable.



- ii) Submit original printing or “clean” reproductions.
- 3) Where datasheets depict multiple products, versions or options, the Contractor shall highlight (indicate with an arrow) all applicable model(s), version(s) and option(s) applying to the specific product the Contractor will be providing. Exact catalog number must be indicated. The submitted items must be from “approved materials” as specified in each Specification Section.
- 4) Product datasheets shall be “approved” by the Owner before delivery to the Project site. Any product not approved through the submittal process is at the sole risk of the Contractor.
 - i) A copy of “Approved” datasheets shall be included in O & M manual requirements
- 5) Required Information
 - i) Complete Bill of Materials (BOM) List
 - (A) The manufacturer’s name (Brand) and full model number shall be used. (Distributor and Contractor assigned names and model numbers are unacceptable).
 - ii) Manufacturer Product Datasheet for each product.
 - (A) Product datasheets shall be manufacturer originals, or first generation printed versions of manufacturer’s official electronic product sheets.
 - (B) Manufacture model shall be highlighted on each sheet.
 - (C) Datasheets shall be organized to match the order and organization of this section

2. Submission Format

- a) Submit Shop Drawings and Product Data Sheets in a bound form
 - 1) Submittals shall be supplied in an appropriately sized 3-ring binder(s). Separate binders shall normally be used for each Division 27 Contract.
 - 2) Manuals shall be bound in hard cover, 3 ring binders with clear plastic “pocket” covers to insert Project Information on the exterior of the Binder.
 - 3) Maximum individual Binder spine size shall be 3”; utilize multiple binders as required.
- b) Submittal Manuals shall include the information listed below and be assembled as follows:
 - 1) Binder shall be marked on the cover and spine with the following information
 - i) Project Information
 - (A) Title of Project
 - (B) Name and address of Owner, Contractor, Architect, Owner
 - (C) “Submittals for “ (specification Section(s)
 - (D) Date of Submittal
 - 2) Organization
 - i) The binder is subdivided into specification sections.
 - ii) Each Binder shall be organized as follows
 - (A) Master Tab 1: Project and contact information
 - (B) Master Tab 2: (First) Specification Section
 - (1) Section 1: Title Page
 - (2) Specification section name & number
 - (3) Contractor/Subcontractor Information Including:
 - (4) Name, address and phone
 - (5) Project manager name and phone
 - (6) Section 2: Bill of Materials
 - (7) Section 3: Product Datasheets



- (8) Section 4: 11 x 17 inch reduced scale versions of full size shop drawings. Drawings shall be folded, punched and inserted into the binder.
 - (C) Master Tab 3 through (x): Additional Specification Section(s)
 - (1) Repeat Sections 1-5 above for each Specification Section.
 - iii) Division 27 submittals may not be combined with submittals from any other Division.
 - 3) Full-size shop drawings shall be printed to scale and bound along the left edge of the drawings with the Title block on the right edge.
 - 4) The Contractor shall provide a record of shop drawings using AutoCAD Release 2000 or higher.
 - i) Detail drawings may be submitted in Visio 2000 format.
3. Submission
- a) Provide minimum of (5) copies of all submittal items.
 - 1) Two copies of all Submittals will be retained by the Owner.
 - 2) Three copies will be returned.
 - i) One copy of approved Submittals will be required to prepare Record Drawing for the O&M (Owner's) Manual.
 - ii) One Copy for the Project site
 - iii) One Copy for the Contractor's records
 - 3) Provide additional quantities as may be required by other applicable sections (including Division 1), as requested by the Owner, and as required by the Contractor for its own purposes.
 - b) Timetable
 - 1) Contractor shall make all Submittal submissions as soon as practical after award of Contract.
 - 2) Provide submittals in adequate time so as not to negatively impact the completion of the project or the schedule of other trades.
 - i) Contractor shall allow a minimum of 2 weeks in its schedule for the Owner's review of submittals.
4. Review of shop drawings does not relieve the Contractor of responsibility for correct ordering of material and equipment. Contractor review should ensure that equipment will fit in available space.
- a) PARTIAL OR INCOMPLETE SUBMITTALS WILL BE REJECTED PRIOR TO FULL REVIEW.
 - b) Unacceptable submittal items:
 - 1) Fax copies of datasheets
 - 2) Datasheets that are not legible.
 - 3) Datasheets that do not clearly depict and/or enumerate all specification requirements.
 - 4) Non-manufacture datasheets (i.e. from a distributor)
 - 5) HTML web page printouts that are not the manufacturer's official product datasheet.
 - 6) Identification of products by Contractor or Distributor assigned part numbers, catalog numbers or private label brand names.

H. (01 41 13 Codes)

1. Building Codes:

- a) National Electrical Code (NFPA 70)
- b) Life Safety Code (NFPA 101)
- c) Uniform Building Code (Or adopted State Code)



- d) Federal Communications Commission (FCC) Part 68
 - e) State specific agencies:
 - 1) Administrative Building Council
 - 2) State Board of Health
 - 3) State Fire Marshal
 - f) Local Codes (City, County, etc.)
 - g) Local Utility Company requirements
- I. (01 41 26 Permits)
- 1. Contractor shall obtain and pay for all permits or certificates of inspection and approval required for his branch of the work.
 - a) Permits shall be posted in a prominent place at the building site properly protected from weather and physical damage.
- J. (01 42 16 Definitions)
- 1. Wherever the words "Contractor", "This Contractor" or "Subcontractor" appears in Division 27 specifications, it shall refer to the Division 27 Communications Contractor (or Subcontractor of the Communications Contractor where applicable).
 - 2. A reference to Owner shall be referring to the Owner's Representative involved in the design of the System(s). The Owner may or may not be affiliated with the Architect and or Engineer for the Project. All information exchanged between the Contractor(s) and the Owner shall be within the information exchange process of the Project. (i.e. through a Construction Manager, General Contractor, Architectural Firm, etc.)
 - 3. Wherever the words "Designer", "Consultant" or "Engineer" appears in Division 27 specifications or its related drawings, it shall be interpreted to mean the specifying authority responsible for the creation of the Division 27 specifications and related drawings.
 - 4. Wherever the word "Install" appears on the drawings or in these Division 27 specifications it shall mean to supply all labor, tools and incidental materials necessary to handle, store, mount, terminate, program, configure and adjust product as necessary to fulfill project requirements.
 - 5. Wherever the word "Provide" appears on plan drawings or in Division 27 specifications, it shall be interpreted to mean that the Contractor shall "Furnish and Install", including all necessary accessories, miscellaneous materials and labor necessary to render the respective system fully operational.
 - 6. Wherever the word "Work" appears in Division 27 specifications or on communication technology drawings, it shall be interpreted to mean any and all labor, materials, accessories, services, etc. necessary to fulfill project requirements.
 - 7. Wherever the word "Furnish" appears on the drawings or in these Division 27 specifications it shall mean to supply the specified labor or specified product (context dependant), including all associated shipping, storage and warranty expenses.
 - 8. Wherever the words "Site", "Project Site", or "Premises" appears in Division 27 specifications or its related drawings, it shall be interpreted to mean all real estate, buildings and structures where work will be performed and where products will be installed and reside.
 - 9. Wherever the phrase "or Approved equal" appears in Division 27 specifications or its related drawings, the contractor shall interpret this to mean that pre-bid approval of specific models of equipment is required before submission of the Contractor's bid.



10. Wherever the phrase “or Equal from”, or “or Equal by” appears in Division 27 specifications or its related drawings, the Contractor shall interpret this to mean that the Contractor may supply any product manufactured by the given list of manufacturer’s meeting or exceeding the overall quality, functional, technical performance, construction, finish and general fit and fitness as the “Standard of Quality” design product. The final authority as to whether a product is equal shall remain with the Owner. Pre-bid approval is highly recommended.
 11. Wherever the phrase “Additional Approved Manufacturer(s)” appears in Division 27 specifications or its related drawings, the Contractor shall interpret this to mean that the Contractor may supply any product manufactured by the given list of manufacturer’s meeting or exceeding the overall quality, functional, technical performance, construction, finish and general fit and fitness as the basis of design product. The final authority as to whether a product is equal shall remain with the Owner.
 12. Wherever the phrase “Standard of Quality” appears in Division 27 specifications or its related drawings, the Contractor shall interpret this to mean that the listed Manufacturer and Catalog number for each item has the physical, functional, and operational attributes to provide the designed functionality.
 13. Substantial Completion:
 - a) The point at which the following has been completed:
 - 1) All specified work, and;
 - 2) All punch-list items that affect the full and complete use of the system, and;
 - 3) Successful acceptance testing by the Owner, and;
 - 4) Successful inspection and demonstration of the work to the Owner’s representative, and;
 - 5) Contractor’s delivery of a request for “Letter of Substantial Completion”
 - i) The request shall include the Specification Section(s) completed, confirmation of completion of the items listed above, and the requested Substantial Completion date (no more than 7 calendar days prior to this Letter).
 - 6) Contractor has received a Letter of substantial Completion for the Owner.
 14. Nominal Operating Levels: The standard signal voltage/power reference level which a manufacturer has designed its product’s inputs and outputs to operate at to achieve the manufacturer’s specified performance levels.
 15. Wherever the words “This Division” appears in Division 27 specifications or its related drawings, it shall be interpreted to mean these Division 27 specifications and all of its related drawings.
 16. Wherever the words “Low Voltage”, or “Low-Voltage” appears in Division 27 specifications or its related drawings, it shall be interpreted to mean less than or equal to 70.7 volts, AC or DC.
 17. Wherever the words “High Voltage”, or “High-Voltage” appears in Division 27 specifications or its related drawings, it shall be interpreted to mean greater than 70.7 volts, AC or DC.
- K. (01 43 00 Quality Assurance)
1. Quality Assurance
 - a) Requirements
 - 1) Contractor shall have a minimum five (5) years experience in the installation of Communication Technology system(s) of similar size, type, scope and contract value.
 - 2) The Prime Contractor or his subcontractor responsible for this Section shall have a Registered Communications Distribution Designer (RCDD) on staff



that will be ultimately responsible for this Project. The RCDD must have sufficient experience in this type project as to be able to lend adequate technical support to the field forces during installation, the warranty period, and any extended warranty periods or maintenance contracts. If in the opinion of the Owner, the RCDD does not possess adequate qualifications to support the Project, the Owner reserves the right to require the Contractor to assign an RCDD who, in the Owner's opinion, possesses the necessary skills and experience required of this Project.

- 3) The lead technician(s) on the Project shall carry a current BICSI Technician Certificate or have five years of experience in projects of similar scope.
- 4) The lead technician(s) on the Project shall have a thorough understanding of the following:
 - i) American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 568B Commercial Building Telecommunications Cabling Standard.
 - ii) American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 569A Commercial Building Standard for Telecommunications Pathways and spaces.
 - iii) American National Standards Institute/Telecommunications Industry Association – ANSI/TIA/EIA 606 The Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - iv) American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
- 5) Contractor shall be a (factory trained) certified installer for all connectivity products.(cable and terminations).
 - i) This minimum requirement shall apply to each Division 27 section independently. If Contractor is incapable of meeting the percent of product value requirement for each section, Contractor shall use a Subcontractor that can meet the percent of product value requirement, in whole, for all products and work of that section for which This Contractor is not qualified.
 - ii) The specific Contractor or Subcontractor meeting the requirements for a specific section shall be responsible for the supply of the products, supplemental engineering services and submittals as well as performing all technical labor associated with the installation, training and warranty servicing of work of that section.
- 6) Contractor shall have substantial business operations located within a 100 mile radius of the project site with a full-time employee staff actively engaged in the supply, installation and service of systems and equipment of the type and scope herein specified.
- 7) Contractor shall have full-time employee service staff based within a 100 mile radius of the project site.
- 8) Contractor shall provide any additional information requested by the Owner as determined appropriate by the Owner to validate a Contractor's (or its Subcontractor's) ability to perform and warranty the specified work in the quality, manner and time frame required.
- 9) In the absence of a requirement to provide a performance bond the Designer reserves the right to require a financial disclosure of the Contractor and any Subcontractor for the purpose of aiding the Designer in determining the ability of the Contractor or Subcontractor to perform.



- 10) Designer reserves the right to disqualify the use of any Subcontractor that This Contractor plans to use if the Subcontractor fails to meet the quality assurance requirements. Should this occur, This Contractor shall be required to choose another Subcontractor that does meet these quality assurance requirements.
 - i) An equipment vendor not performing the technical labor associated with installation of the work of a given section shall not be considered a Subcontractor.
- 11) Superintendent/Project Manager
 - i) This Contractor shall furnish the services of an experienced superintendent/Project Manager who shall be constantly in charge of the work, together with the qualified Foremen and specialists as required to properly install, connect, adjust, start, operate and test the work involved.
 - ii) The superintendent's/Project Manager's qualifications shall be subject to the review and acceptance by the Owner/Owner. Unless the Owner/Owner grants prior special permission, the same communication Superintendent/Project Manager shall be utilized throughout the duration of the project and be responsible for the complete scope of the Contract.
- b) Documentation to be submitted upon request pre or post bid for evaluation includes:
 - 1) A complete material list by specification section for each specification section:
 - i) Include description, the manufacturer being used, and the manufacturer's part number.
 - ii) Submission of this list does not constitute acceptance by the Owner or relieve the Contractor from providing approved items in the proper quantities to fulfill the Scope of this Project.
 - 2) References:
 - i) A minimum of five reference accounts at which similar work, both in scope and design for each system specified, has been completed by the Contractor within the last four years.
 - (A) The list shall include contact names and telephone numbers for each.
 - (B) Each listed Project shall include a Summary of Work.
 - (C) Each listed Project shall include initial and final contract amounts.
 - (D) Each listed Project shall include initial Contract award date and completion date.
 - (E) Each listed Project shall identify the name of Contractor's project manager and lead technician responsible for the project.
 - 3) List of test equipment:
 - i) Proposed equipment for use in verifying the installed integrity of copper and fiber optic cable systems on this Project.
 - 4) Technical resume:
 - i) Provide experience of the Contractor's Superintendent/Project Manager and onsite installation supervisor (Foreman) who will be assigned to this Project.
 - 5) List of technical product training:
 - i) Training attended by the Contractor's personnel that will be working on this Project.
 - 6) Subcontractors list for Work of this Project.



- i) List Scope of Work for each Subcontractor
 - ii) List References for each subcontractor
 - iii) Technical resume as described above for each subcontractor
 - iv) List of technical product training as described above for each subcontractor.
- 7) Each specification section may detail additional Quality Assurance requirements in the PART I, Quality Assurance paragraph.
- i) Submit each item identified in each Specification Section.
 - (A) Manufacturer Certification documentation as requested in each Section.
 - 8) Documentation substantiating the Contractor's factory authorization and warranty service status for all products specified and all other major products proposed for use by the Contractor.
 - 9) Financial Disclosure.
- c) Failure to supply a complete quality assurance submittal; failure to supply accurate references or references which yield favorable performance marks; or failure to supply other quality assurance information required shall be taken as a statement of the Contractor's inability to perform and shall be grounds for the Owner and/or Owner to reject the Contractor's bid.
- L. (01 62 00 Product Options)
1. The contract documents are prepared on the basis of a single specific product as the "design equipment," even though other manufacturers' names and models may be listed as acceptable, or equal. The first manufacturer make and model for each product is the "design equipment" or "Standard of Quality".
 - a) This section is designed to provide the Contractor with a minimum standard of quality and functionality for the products used for telecommunications infrastructure.
 - b) This standard will be considered in force for the original response as well as for any additions or changes to this Project. Due to this, there may be items listed in the Products section that are not required under the scope of this contract.
 - c) Project design is based on the "Standard of Quality" listed products' physical, functional, and operational attributes. The use of any product not listed as the Standard of Quality must be compared for full functionality to the listed Product.
 - d) When several materials, products or items of equipment are specified by name for one use, the first item shall be considered Owner's preferred product. Contractor may select any one of those specified for requested approval. It shall be the responsibility of the Contractor to provide an item that meets or exceeds the qualities and functional characteristics of the device specifically listed by brand name and model number.
 - e) The Contractor is responsible for any other ancillary changes required to meet the Project objectives when utilizing substitutions. Approval of items submitted during the submittal process does not relieve the Contractor of this responsibility.
 2. Product acceptability and substitutions are determined by criteria as required this section under "Substitutions".
 3. Materials installed shall be new, full weight and of the best quality. All similar materials shall be of the same type and manufacturer. All materials, apparatus and equipment shall bear the Underwriter's Laboratory, Inc. label where regularly supplied, or required by Code.
 4. In the event that a specified product is discontinued by the manufacturer and is no longer available for purchase, the Contractor shall provide replacement product of equal or greater value, performance and function. The replacement product shall be from the



same manufacturer as the specified equipment unless written approval to use an alternate manufacture is obtained from the Owner.

M. (01 65 00 Product Delivery Requirements)

1. Product Procurement

- a) The Contractor shall not procure, deliver or install any product until after the contractor's submittal has been reviewed by the Owner and the submittal has been returned to the Contractor's marked "No Exceptions", "Exceptions Noted" or "Exceptions Noted, Submit Record Copy" or "Approved". Advance procurement, delivery or installation of product prior to the return of submittal is entirely at the Contractor's own risk. Contractor should schedule its work and procurement accordingly.
- b) Prior to procurement of any equipment or materials, Contractor shall review the model numbers, compatibility and interoperability of all products.
- c) Prior to procurement, Contractor shall, through coordination with other trades and through field measurements and project site inspections, verify that products to be supplied can be physically installed as planned.
- d) No claim for additional payment will be considered for the return of any equipment determined incompatible, or procured without adhering to the aforementioned conditions, including claim for reimbursement of manufacturer's "restock" fees.
- e) Contractor shall factor all of these conditions into its bid and plan its scheduling and resource needs accordingly to ensure that all work shall be performed according to the Owner's schedule and requirements of this contract.

N. (01 66 00 Product Storage and Handling Requirements)

1. Product Delivery, Storage and Handling

- a) Receipt of materials
 - 1) The Contractor is responsible for receiving, handling, storing, and protecting all materials used on this Project until Substantial Completion.
- b) Upon request, submit a schedule of equipment and materials required to complete installation, quantity ordered, order date, and promised delivery date.
- c) Deliver equipment and materials in accordance with factory shipping requirements.
 - 1) Pack components in factory-fabricated protective containers.
 - 2) Units shall be delivered in sections of such size as will pass through available openings.
- d) Until ready for installation, store products in original factory containers.
 - 1) Products shall be stored in a clean, dry space and as additionally recommended by the product manufacturer.
 - 2) Keep products out of the weather and away from construction traffic and debris, including drywall finish dust.
 - 3) Do not exceed structural capacity of the floor or platform on which the products are stored.
- e) Until final acceptance of the system, protect all supplied products from damage resulting from moisture, fumes, dirt, dust and debris or any other source of potential damage.
- f) Handle all products with care before, during and after installation so as to prevent damage.
 - 1) Replace any products damaged prior to final acceptance with new replacement products.
 - i) Replacement shall be done at not charge to the owner.
 - 2) Contractor is responsible for the safety and good condition of the materials and equipment installed until final acceptance by the Owner.



- g) Save original product shipping containers and related packaging materials for major products until final acceptance.
 - 1) Prior to disposal, check with owner to determine if the owner wishes any of the packaging materials.
 - 2) Deliver specified packaging materials to the owner as requested.
- O. (01 71 00 Examination and Preparation)
 - 1. Examination of the Site
 - a) Contractor shall visit the Site to familiarize himself with the local conditions under which the work is to be performed and correlate his observations with the requirements of the Contract Documents. No allowance shall be made for claims for concealed conditions which the Contractor, in exercise or reasonable diligence in observations of the Site and review of the local conditions under which the work is to be performed, learned or should have learned of, unless otherwise specifically agreed by Owner and Owner in writing.
 - b) Before ordering any materials or doing any work, the Contractor shall verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement or size indicated in the drawings or specifications. Any discrepancies found shall be submitted in writing to the Project Manager and Owner for consideration before proceeding with the work.
 - c) This Contractor must verify all dimensions locating the work and its relation to existing work, all existing conditions and their relation to the work and all man made obstructions and conditions, etc. affecting the completion and proper execution of the work as indicated in the Contract Documents.
- P. (01 73 19 Installation)
 - 1. Work and workmanship
 - a) Provide all required labor, materials, equipment and Contractor's services necessary for complete installation of systems required to comply with the requirements of authorities having jurisdiction, as indicated on Drawings, and as specified.
 - b) Work shall be functional and complete in every detail, including any and all items required to complete the system, whether or not these items have been enumerated or shown on the Drawings.
 - c) Special attention shall be given to access to working and controlling parts. Adjustable parts shall be within easy reach. Removable parts shall have space for removal.
 - d) Each Contractor shall be fully knowledgeable of the details of all Work to be performed by other trades and take necessary steps to integrate and coordinate his Work with other trades.
 - e) Wherever tables or schedules show quantities of materials, they shall not be used as a final count. These figures serve only as a guide for the Contractor. Each Contractor shall be responsible for furnishing all materials on the Drawings or as specified.
 - f) The Consultant and Owner's Representative have full power to condemn or reject any Work, materials or equipment not in accordance with these Specifications and Construction Drawings or the manufacturer's specifications or drawings approved by the Owner or Consultant.
 - g) Work or equipment that is rejected shall be removed and replaced to the satisfaction of the Owner at the Contractor's expense. Work or equipment that is rejected shall be so stated in writing by the Owner or Consultant.



- h) Such decisions that the Owner or Consultant may make with respect to questions concerning the quality, fitness of materials, equipment, and workmanship shall be binding upon the parties thereto.
 - i) All Work shall fully comply with these specifications and related Drawings and all manufacturers recommended installation practices.
 - j) All Work shall be performed with the best practices of the trade for performance, functionality, safety, endurance, and aesthetics.
 - k) Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the schedule.
 - l) Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible, as appropriate to the application.
 - m) Set all equipment to accurate line and grade, level all equipment and align all equipment components.
 - n) Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from premises when no longer required.
 - o) No equipment shall be hidden or covered up prior to inspection by the owner's representative. All work that is determined to be unsatisfactory shall be corrected immediately.
 - p) All work shall be installed level and plumb, parallel and perpendicular to other building systems and components.
 - q) Install all equipment and materials in strict accordance with manufacturer's written instructions. Bring any conflicts between the manufacturer's written instructions and these specifications to the attention of the Designer for recommendations.
 - r) Upon completion of installation of equipment and communication circuitry, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with re-testing.
- Q. (01 73 29 Cutting and Patching)
- 1. Where demolition of existing surfaces are required by the Work, the same shall be restored to at least as good a condition as they were before.
 - 2. Contractor shall be responsible for painting, patching, repairing and replacing any building surface, furnishing, wall/floor/ceiling covering that is damaged or penetrated in the process of performing work on the project site.
 - 3. Additional work required to repair work performed under this Contract shall be at the expense of This Contractor.
 - 4. The Division 27 contractor shall do all cutting as required for the admission of Division 27 work. Unless directed otherwise in field, provide all related patching and painting to match surrounding methods, materials and colors. Any damage done by this contractor to the building during the progress of this contractor's work shall be made good at this contractor's expense. Perform cutting, fitting, and patching and materials as required to:
 - a) Uncover Work to provide for installation of ill-timed Work.
 - b) Remove and replace defective Work.
 - c) Remove and replace Work not conforming to requirements of the Contract Documents.
 - d) Remove samples of installed Work as specified for testing.
 - e) Install equipment and materials in existing structures.



- f) Upon written instructions from the owner's representative, uncover and restore work to provide for observation of concealed work by owner's representative or by inspection authority having jurisdiction.
 - g) During cutting and patching operations, protect adjacent installations (structure, finishes, furnishings, etc.). Where applicable, provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to system components and components of other trades.
 - h) Patch surfaces and building components using new materials matching existing materials and using experienced Installers. Refer to Division 1 for definition of experienced "Installer" or determine qualifications as directed in field by owner's representative.
 - i) Patching through fire rated walls and enclosures shall not diminish the rating of that wall or enclosure. All materials used for patching shall be installed to meet or exceed the smoke and fire rating of the respective surface being patched.
 - j) Neatly cut and drill all openings in walls and floors required for the installation. Secure approval of Owner's Representative before cutting and drilling in existing facilities. Neatly patch all openings cut.
 - k) Cutting and patching shall be held to a minimum by arranging with other contractors for all sleeves and openings before construction is started.
 - l) Provide factory-assembled watertight wall and floor seals, of types and sizes required; suitable for sealing around conduit, pipe, or tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
 - m) Pipe sleeves shall be fabricated from Schedule 40 rigid, heavy wall, full weight galvanized steel pipe; remove burrs. Use sleeves which are two standard sizes larger than conduit passing through respective sleeve.
 - n) Provide sleeve seals for piping which penetrates foundation walls below grade, exterior walls or roofs, caulk between sleeve and pipe with non-toxic, UL-classified caulking material to ensure watertight seal. Elsewhere modular provide mechanical type seals, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
 - o) Install standard Schedule 40 black steel pipe sleeves two sizes larger than pipes passing through floors, bearing walls, fire walls and masonry construction. Sleeves through walls shall be cut flush with both faces. Sleeves through floor shall extend one inch above floor top elevation. Pipes penetrating roof shall use a pipe curb assembly equal to Pate Co. Furnish and set all forms required in masonry walls or foundation to accommodate pipes.
5. Grout
- a) Provide non-shrink, nonmetallic grout, premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout, recommended for interior and exterior applications.
6. General Joint Sealer Application
- a) Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.
 - b) Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.



- c) Clean all affected surfaces, joints, etc. immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.
- d) Apply sealant primer to substrates as recommended by manufacturer. Protect adjacent areas from spillage and migration of sealant, using masking tape. Remove tape immediately after tooling without disturbing seal.
- e) Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
- f) Comply with recommendations of ASTM C 962 for use of elastomeric joint sealers.
- g) Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.
- h) Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
- i) Colors for exposed seals shall be as selected by the Owner's representative from manufacturer's standard colors.

7. Elastomeric Joint Sealers

- a) One-part, nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.
- b) One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes. Silicone Sealant shall be equal to the following:
 - 1) "Dow Corning 790", Dow Corning Corp.
 - 2) "Gesil N SCS 2600", General Electric Co.
 - 3) A/D Fire Protection Systems.

8. Acrylic-Emulsion Sealants

- a) One-part, non-sag, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications or interior and protected exterior locations involving joint movement of not more than plus or minimum 5 percent. Subject to compliance with requirements, provide one of the following:
 - 1) "Chem-Calk 600", Bostik Construction Products Div.
 - 2) "AC-20", Pecora Corp.
 - 3) "Sonolac", Sonneborn Building Products Div.
 - 4) "Tremco Acrylic Latex 834", Tremco, Inc.

R. (01 74 16 Site Maintenance)

- 1. During the progress of the work, the Contractor shall clean up after his men and leave the premises and all portions of the building in which he is working in a clean and safe condition. This cleaning shall occur on a daily basis.

S. (01 74 23 Final Cleaning)

- 1. Clean all parts of the apparatus and equipment. Exposed parts, which are to be painted, shall be cleaned of cement, plaster and other materials and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all corners and cracks scraped out.

T. (01 77 16 Final Closeout Review)



1. Project Closeout
 - a) Contractor shall meet all provisions of Substantial completion as defined earlier in this section and in each related section.
 - b) Final Payment
 - 1) Final payment of contract will not be made until receipt, review and acceptance, by the owner's representative, of all of the following:
 - i) Substantial Completion
 - ii) Completion of all punch-list items.
 - iii) Approved submittals, including shop drawings;
 - iv) Owner's manuals;
 - v) Record documentation;
 - vi) Certification of warranty;
 - vii) Certificate of final acceptance signed by the Owner and the Owner;
 - viii) Copies of all training sign-in sheets, signed by owner's representative;
 - ix) Signed delivery receipt indicating that the owner has received all training recordings produced to-date;
 - x) All additional applicable closeout provisions of Division 1;
 - c) 100% of all closeout documents shall be supplied within 30 calendar days following the substantial completion.
- U. (01 77 19 Closeout Requirements)
1. Acceptance Testing
 - a) Upon the Designer's receipt of and approval of the Contractor's pre-test submittal, the Contractor shall contract the Designer to schedule acceptance testing. Contractor shall allow not less than 10-business days of advance notice to the Owner.
 - b) In the presence of the Owner, the Contractor shall demonstrate the presence of all specified products, cabling and installation methods. The Contractor shall demonstrate the operation of the system (and any requested sub-component thereof) and shall be prepared to make any electronic, physical or software related adjustments to the system or any of its sub-components to the satisfaction of the Owner, as required to achieve full compliance with the specifications.
 - c) The contractor shall have available at the project site all test equipment, cables, tools and personnel necessary to demonstrate full compliance with these specifications as determined necessary by the designer.
 - d) During the acceptance testing the Contractor shall have a clean and fresh copy of the contractor's most up-to-date as-built record documentation, printed to scale.
 - e) This Contractor shall provide all required labor services required to completely verify and test the systems in the presence of the Owner.
 - f) Verify that each system, as a whole system, meets these Specifications and complies with all applicable standards.
 - g) Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense.
 - h) Should the Owner be required to return to the project site to perform acceptance testing more than once for any system the Contractor shall be responsible for all costs, up to \$1500 per day, plus travel and expenses, for each return trip to the project site. Payment of this may be required before final payment will be authorized.
 2. Supplemental Engineering Services
 - a) This Contractor is responsible for all supplemental engineering services specifically outlined in these specifications and otherwise required for the completion of the



work specified. Contractor shall estimate its costs accordingly, taking into account all information provided.

- b) In the event that the Owner is required to provide additional services as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents, or if the Owner is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Owner's expenses in connection with such additional services shall be paid by the Contractor and may either be deducted from any monies owed to the Contractor, or billed to the contractor, entirely at the discretion of the Owner. The contractor shall be billed at prevailing hourly rates.
 - c) In the event that the Owner is required to provide additional services as a result of substitution of equivalent materials or equipment by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Owner is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Owner's expenses in connection with such additional services shall be paid by the Contractor. Costs will be calculated based upon the Owners prevailing rates.
- V. (01 78 13 Completion and Correction List)
- 1. Owner shall be furnished with a certificate of final inspection and approval prior to final acceptance of this branch of the work.
- W. (01 78 36 Warranties)
- 1. Warranty Period
 - a) Specified materials and workmanship provided shall be fully guaranteed by the Contractor for one year from the transfer of title via notice of substantial completion against any defects in materials or workmanship.
 - i) Extended (additional) warranty(ies) may be required and will be identified in the individual Specification Section and will be considered additive to this base Contractor Warranty.
 - ii) Requirements for Manufacturer's Warranties, required by a Specification Section, shall run concurrent to this base Warranty by the Contractor but may exceed the Contractor's Warranty Period.
 - 2) Manufacturer's Warranties shall also begin on Substantial Completion; not on purchase of equipment or delivery of equipment to the site.
 - b) The Warranty shall begin upon Substantial Completion.
 - 1) Note: Delivery of closeout documents is not a conditional requirement to commencement of the warranty.
 - 2. This warranty shall in no manner cover equipment that has been damaged or rendered unserviceable due to negligence, misuse, acts of vandalism, or tampering by the Owner or anyone other than employees or agents of the Contractor.
 - a) The Contractor's obligation under its warranty is limited to the cost of repair of the warranted item or replacement thereof, at the Contractor's option.
 - b) Insurance covering said equipment from damage or loss is to be borne by the Contractor until full acceptance of equipment and services.
 - 3. Individual specification sections may have additional warranty requirements for the work in that section. The warranty above will cover all materials and work where not covered by an extended warranty listed in the individual specification section.
 - 4. Warranty Coverage
 - a) Specified materials and workmanship provided shall be fully guaranteed by the Contractor against any defects in materials or workmanship.



- 1) Contractor shall provide a full "System Warranty" which shall cover all materials, labor and related product shipping expenses for a period of five years from the date of Owner acceptance.
 - i) Supplied products with manufacturer's warranties of less than the System Warranty term shall be extended by the Contractor for the full specified term
 - 2) During this period the Contractor will remedy (at no cost to the owner) any problem with the system, or any of its related components that is the result of defective materials, settings, workmanship, or loss or programming.
 - 3) Any defective items or work shall be removed and replaced at the Contractor's expense to the satisfaction of the owner's representative and the Owner.
 - 4) During the Warranty Period, the Contractor shall respond by phone within four (4) business hours of notice by the owner of a problem. Within (1) business day or (72) contiguous hours, whichever ever comes first, the Contractor shall have qualified personnel onsite to remedy the problem if the problem cannot be quickly be remedied over the phone.
 - i) The contractor shall make available to the owner on-call emergency response service labor to the Owner. Cost for emergency service labor during the warranty period shall not exceed the Contractor's published emergency service rates, or two-times its standard rate, whichever is lower.
 - 5) The period of the Contractor warranty(ies) for any items herein are not exclusive remedies, and the Owner has recourse to any warranties of additional Scope given by the Contractor to the Owner and all other remedies available by law or in equity.
 - 6) Additional Warranty requirements may be added by an individual Specification Section.
 - i) Scope of these extended (additional) warranty(ies) will be identified in the individual Specification Section and will be considered additive to this base Contractor Warranty.
 - ii) Requirements for Manufacturer's Warranties, required by a Specification Section, shall run concurrent to this base Contractor Warranty by the Contractor.
 - (A) Manufacturer's Warranties shall also begin on Substantial Completion; not on purchase of equipment.
- X. (01 78 39 Project Record Documents)
1. Project Record Document requirements for Division 27 "Communications" shall be described in Section 27 01 00 "Operation and Maintenance of Communications Systems".
- Y. (01 79 00 Demonstration and Training)
1. Training
 - a) Proper operation in many cases is a function of adequate training of key users on new systems.
 - 1) Each Division 27 section may specify special Training requirements.
 - i) Training requirements will be for a quantity of hours, allow for multiple trips.
 - 2) If no special requirements are specified in the individual section, allow for 4 hours and 2 trips to provide basic overview, operation and maintenance information.
 - 3) Each Specification Section will indicate any training criteria specific to that Section.



- 4) Train Owner's maintenance personnel on the procedures and schedules involved in operating, general troubleshooting, and preventative maintenance of the system.
- 5) All training sessions shall be audio and video recorded. Recordings shall be supplied in DVD formats and playable on standard consumer grade reproduction equipment. Recordings do not need to be professionally edited but shall have intelligible audio and a clear image of the subject trainer and any supplemental visual content critical to the training.
- 6) Recordings shall be turned over and signed for by an owner's representative at the end of each training session.
- 7) Contractor shall require all attendees to sign-in for each training session. The sign-in form shall summarize the training to be conducted, specification section and subsection being trained on, as well as the starting time and duration of training. Following training, a representative of the owner shall sign the form, acknowledging the same. Contractor shall retain the original copy of these forms and turn over a photo copy of the form to the owner's representative as evidence of training. Training conducted without this official record of training shall not be considered as part of the Contractor's training obligation.
 - b) Schedule training with the Owner's representative, at least 14 days in advance.
 - c) Contractor shall assume training will be conducted in a minimum of (2) separate sessions, on non-contiguous days and will require separate trips to the project site, and should be bid accordingly.
 - d) Owner shall have the right to use its allocated training for a period of 365 calendar days following acceptance of the system.

END OF SECTION 27 00 10