SECTION 27 00 00
BASIC COMMUNICATIONS REQUIREMENTS
Construction Specifications

PART 1 GENERAL

1.1 SUMMARY

A. This section includes general administrative and procedural requirements for Division 27, and is intended to supplement, not supersede, the general requirements specified in Division 00.

B. The requirements described herein include the following:

1. References
2. Definitions
3. System Description and Project Conditions
4. Submittals
5. Quality Assurance
6. Delivery, Storage, and Handling
7. Scheduling
8. Warranty
9. Product Substitutions
10. Project Management and Coordination Services
11. Permits and Inspections
12. Field Quality Control
13. Project Closeout and Record Documents

C. Related Items

1. General and Supplementary Conditions: General provisions of the Prime Contract and Divisions 00 and 01 apply to Division 27.
2. Earthwork: Trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, pullboxes, vaults, etc. Refer to Division 31 - Earthwork.
3. Selective Demolition: Nondestructive removal of materials and equipment as indicated, for reuse or salvage. Also dismantling materials and equipment made obsolete by these installations. Refer to Division 02 - Existing Conditions.
4. Concrete Work: Forming, steel bar reinforcing, cast-in-place concrete, finishing and grouting as required for underground conduit encasement, light pole foundations, pullbox slabs, vaults, housekeeping pads, etc. [Also includes setting of floor boxes

in existing concrete slabs, saw-cutting of existing slabs and grouting of conduits in saw-cut.] Refer to Division 03 - Concrete.

5. Miscellaneous Metal Work: Fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of pathways, equipment, cabling, etc. Refer to Division 05 - Metals.

6. Miscellaneous Lumber and Framing Work: Wood grounds, nailers, blocking, fasteners, and anchorage for support of materials and equipment. Refer to Division 06 - Wood, Plastics, and Composites.

7. Moisture Protection and Smoke Barrier Penetrations: Membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls. Tape and make vapor tight penetrations through vapor barriers at slabs on grade. Refer to Division 07 - Thermal and Moisture Protection.

8. Access Panels and Doors: Required in walls, ceilings, and floors to provide access to pullboxes, and other serviceable equipment. Refer to Division 08 - Openings; also, Division 05, Metals.

9. Painting: Include surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, etc. where indicated as field painted in this Division. Refer to Division 09 - Finishes.

10. Consult other Divisions and Sections, determine the extent and character of related work, and coordinate Work of Division 27 with that specified elsewhere to produce a complete and operable installation.

11. Section 270526, “Communication Grounding and Bonding”

12. Section 270528, “Communication Building Pathways”

13. Section 270533, “Communication Building Pathways – Conduits and Boxes”

14. Section 270536, “Communication Building Pathways – Cable Tray”

15. Section 270543, “Communication Underground Pathways”

16. Section 270811, “Communication Twisted Pair Testing”

17. Section 270821, “Communication Optical Fiber Testing”

18. Section 271100, “Communication Equipment Rooms”

19. Section 271313, “Communication Backbone ISP Twisted Pair Cabling”

20. Section 271314, “Communication Backbone OSP Twisted Pair Cabling”

21. Section 271323, “Communication Backbone ISP Fiber Optic Cabling”

22. Section 271324, “Communication Backbone OSP Fiber Optic Cabling”

23. Section 271513, “Communication Horizontal Twisted Pair Cabling”

24. Section 275113, “Event Annunciation System”

25. Section 275313, “Clock Systems”

26. Section 275319, “Distributed Antenna System”

27. Section 275323, “Emergency Responder Radio”

1.2 REFERENCES

A. General

1. Codes, standards, and industry manuals/guidelines listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Consider such codes and/or standards a part of this specification as though fully repeated herein.

2. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

3. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid unless otherwise specifically stated.

B. Codes: Perform work and furnish materials and equipment under Division 27 in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

1. California Code of Regulations (CCR):

a. Title 8, “Industrial Relations”

1. Chapter 3.22, “California Occupational Safety and Health Regulations (CAL/OSHA)”

b. Title 24, “California Building Standards Code”

1. Part 1, “California Building Standards Administrative Code”

2. Part 2, “California Building Code” (CBC)

3. Part 3, “California Electrical Code” (CEC)

4. Part 11, “California Green Building Standards Code” (CALGeen)”

2. Code of Federal Regulations (CFR) Title 47 “Telecommunication”, Chapter I “Federal Communications Commission (FCC)”:

a. Part 15, “Radio Frequency Devices and Radiation Limits”

b. Part 27, “Miscellaneous Wireless Communications Services”

c. Part 90, “Private Land Mobile Radio Services”

3. Other applicable national, state, and local binding building and fire codes

C. Standards: Perform work and furnish materials and equipment under Division 27 in accordance with the latest editions of the following standards as applicable:

1. Building Industry Consulting Services International (BICSI):

a. Telecommunications Distribution Methods Manual (TDMM)

b. Customer-Owned Outside Plant Design Manual

2. EIA testing standards

3. National Electrical Contractors Association (NECA):

a. ANSI/NECA 1, “Standard Practices for Good Workmanship in Electrical Construction”

4. Telecommunications Industry Association (TIA):

a. ANSI/TIA-568-C.0, “Generic Telecommunications Cabling for Customer Premises”

b. ANSI/TIA-568-C.1, “Commercial Building Telecommunications Cabling Standards - Part 1 General Requirements”

c. ANSI/TIA-568-C.2, “Balanced Twisted Pair Telecommunications Cabling and Components”

d. ANSI/TIA-568-C.3, “Optical Fiber Cabling Components”

e. ANSI/TIA-569-B, “Commercial Building Standard for Telecommunications Pathways and Spaces”

f. ANSI/TIA/EIA-598-B, “Optical Fiber Cable Color Coding”

g. ANSI/TIA-606-B, “Administration Standard for Telecommunications Infrastructure”

h. ANSI-TIA-607-B, “Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises”

i. ANSI/TIA-758-A, “Customer-Owned Outside Plant Telecommunications Infrastructure Standard”

j. ANSI/TIA-1005, “Telecommunications Infrastructure Standard for Industrial Premises”

1.3 DEFINITIONS

A. The definitions of Divisions 00 and 01 shall apply to Division 27 sections.

B. In addition to those definitions of Divisions 00 and 01, the following list of terms as used in this specification defined as follows:

1. “AFF”: Above Finished Floor

2. “As directed”: As directed or instructed by the Owner, or their authorized representative

3. “AHJ”: Authority Having Jurisdiction

4. “Cabling”: installed media ready for electronic or optical signal circuit use; a complete media connection comprised of cables, termination apparatus (patch panels, blocks, connectors), outlets, connecting media (path cord, crossconnects), labeling
5. “CBC”: California Building Code (CCR Title 24 Part 2)
6. “CCR”: California Code of Regulations
7. “CEC”: California Electrical Code (CCR Title 24 Part 3)
8. “Connect”: To install patch cords, equipment cords, crossconnect wire, etc. to complete an electronic or optical signal circuit
9. “Cord”: a length of cordage having connectors at each end. The term “Cord” is synonymous with the term “Jumper” and “Lead”
10. “Furnish”: To purchase, procure, acquire, and deliver complete with related accessories
11. “Identifier”: A unique code assigned to an element of the Telecommunications infrastructure that links it to its corresponding record
12. “Install”: To set in place, join, unite, fasten, link, attach, set up or otherwise connect together and test before turning over to the Owner, parts, items, or equipment supplied by contractor or others. Make installation complete and ready for regular operation
13. “IOR”: Inspector Of Record
14. “ISP”: Inside Plant
15. “NEC”: National Electrical Code (NFPA 70)
16. “NEMA”: National Electrical Manufacturers Association
17. “NFPA”: National Fire Protection Agency
18. “NIC”: Not In Contract (work or equipment)
19. “OFCI”: Owner-furnished contractor-installed; coordinate the integration of components furnished by the Owner; provide mounting hardware, cable, connectors, etc. to ensure proper integration of OFCI equipment
20. “OFE”: Owner Furnished Equipment
21. “OSP”: Outside Plant
22. “PDF”: portable document format (electronic file format / *.pdf)
23. “Pigtail”: a length of cordage having connectors at one end
24. “Provide”: To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation
25. “UL”: Underwriters Laboratories

1.4 SYSTEM DESCRIPTION AND PROJECT CONDITIONS

A. In circumstances where the Specifications and Drawings conflict, the Drawings shall govern quantity and the Specifications shall govern quality.

1.5 SUBMITTALS

A. Submit required submittals in the quantities and formats as required under the general contract. In the absence of requirements, provide as described in the following with reference to quantity and format.

B. Failure to comply with requirements in part or whole shall constitute grounds for rejection.

C. Resubmittals: For resubmittals, provide a cover letter with the resubmittal that lists the action taken and revisions made to each product in response to the Engineer's submittal review comments. Lack of this actions-taken cover letter shall constitute grounds for non-review and/or rejection of resubmittal packages.

D. Submittal Description: Product Data

1. Obtain written approval from the Engineer for the product data submittal prior to materials and equipment purchase order and prior to installation.

2. Quantity and Media: Submit product data as described in Division 01. In the absence of requirements given, submit product data submittal as directed as an electronic submittal via approved means (e.g., email, e-transmit).

3. Format and Organization – Electronic Submittal:

a. File format shall be PDF, either as a single compiled PDF file or as a PDF portfolio. PDF files should be produced from original electronic media, not scans of printed media. If scans from prints are the only option, annotate electronically, not on the prints prior to scanning.

b. Pages should be letter size (8.5" x 11")

c. Organize the Content in the following order:

1. Cover

2. Table of Contents (TOC)

3. Statement of compliance

4. Product information

5. Seismic calculations (as required)

d. Clearly and precisely indicate the submitted product and accessories by part number using an electronic annotation (arrow, rectangle, oval, etc.). Where the product data presents "part number builds", list the exact part number of the submitted products and accessories.

e. Add page numbers in numerical order with no gaps to each page that correctly correspond to the TOC.

4. Content:

a. Cover: Include a cover that clearly displays the following information:

1. Owner name

2. Project name and address

3. Submittal name (e.g., “Product Data Submittal for Telecommunications Equipment Rooms”)

4. Project submittal number

5. Contractor’s submittal number (discretionary)

6. Submittal date; format: Month Day, Year (e.g., “January 1, 2013”)

7. Specification section numbers included in the submittal (e.g., “Section 271100”)

8. Contractor name and contact information

b. Table of Contents (TOC): Include a TOC that lists materials by section number, article and paragraph number. Add a brief product description (what it is, size or color or other optional features), manufacturer and part number. List the submittal page number per product. Example heading for TOC:

Section	Article	Paragraph	Description	Manufacturer	Part #	Page #

c. Statement of Compliance: Include a “Statement of Compliance” letter or memorandum on the submitter’s company letterhead from the highest ranking employee assigned to this project stating the submittal has been reviewed (quality control check) and is in full compliance with the requirements of the contract documents, and listing the submittal’s contents. Wet sign (and stamped, if applicable) the letter.

d. Product Information: Include manufacturer's technical data, product literature, "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary) that clearly describe the product’s characteristics, physical and dimensional information, electrical performance data, materials used in fabrication, material color and finish, and other relevant information such as test data, typical usage examples, independent test agency information, and storage requirements. Include products listed in the specifications, at a minimum. Include relevant products that will be installed, which are not listed in the specifications.

e. Seismic Calculations: Include structural calculations for anchorage and seismic restraint of floor-mounted equipment (such as racks, frames, cabinets), wall-mounted equipment (such as video display equipment, etc.), and overhead-mounted equipment (such as cable tray, overhead cable support, etc.) in conformance with CBC, Section 1601A. Calculations shall be based on fully loaded equipment and support systems. Calculations shall demonstrate that the equipment and support systems will remain attached to the mounting surface during and after

experiencing seismic forces in conformance with the CBC. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Obtain approval from the structural engineer of record for the calculations.

E. Submittal Description: Shop Drawings

1. Prior to the start of work, submit shop drawings and obtain written approval for the shop drawings submittal.

2. Quantity and Media: Submit shop drawings as described in Division 01. In the absence of requirements given, submit shop drawings as an electronic submittal via approved means (email, e-transmit, FTP upload).

3. Format:

   a. Use the same sheet size as the contract drawings.

   b. Use the same title block as the contract drawings, modified to include contractor information.

   c. Text: 3/32” - 1/8” high when plotted at full size.

   d. Use identical symbols as those in the contract drawings.

   e. Screen background information.

   f. Plot system components (symbols, outlet, devices, pathways, cable routes, etc.) and text using a heavier line weight sufficient enough to stand out against background information.

   g. Scaling:

      1. Scale floor plans and reflected ceiling plans at 1/8”=1’-0”

      2. Scale enlarged room plans at 1/4”=1’-0”

      3. Scale wall elevations at 1”=1’-0”

      4. Scale rack elevations at 1”=1’-0”

4. Content:

   a. Cover Letter: Accompany each shop drawing submittal with a cover letter stating that the shop drawings have been thoroughly reviewed by the Contractor and are in full compliance with the requirements of the contract documents. Have the person who prepared the submittal sign (and stamped, if applicable) the cover letter and include a drawing index. Failure to comply with this requirement shall constitute grounds for rejection of submittal.

   b. Drawings: Shop drawing submittals shall consist of symbols list, point-to-point diagrams, block diagrams, riser diagrams, line diagrams, floor plans, reflected ceiling plans, enlarged room plans, wall and rack elevations, installation details, and other aspects of the system. Include detailed labeling examples for cables, outlets, termination apparatus, devices, equipment, etc.

c. Seismic Calculations: Include structural calculations for anchorage and seismic restraint of floor-mounted equipment (such as racks, frames, cabinets), wall-mounted equipment (such as video display equipment, etc.), and overhead-mounted equipment (such as cable tray, overhead cable support, etc.) in conformance with CBC, Section 1601A. Calculations shall be based on fully loaded equipment and support systems. Calculations shall demonstrate that the equipment and support systems will remain attached to the mounting surface during and after experiencing seismic forces in conformance with the CBC. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Obtain approval from the structural engineer of record for the calculations.

F. Submittal Description: As-Built Drawings

1. Quantity and Media: Submit as-built drawings as described in Division 01. In the absence of requirements given, submit as-built drawings as directed in writing as electronic files via approved media.

2. Format:

a. Use the same sheet size as the contract drawings.

b. Use the same title block as the contract drawings, modified to include contractor information.

c. Text: 3/32” - 1/8” high when plotted at full size.

d. Use symbols identical to the symbols shown on the contract drawings.

e. Screen background information.

f. Plot system components (symbols, outlet, devices, pathways, cable routes, etc.) and text using a heavier line weight sufficient enough to stand out against background information.

g. Electronic files shall be native format and plotted PDF files. The file names shall include the sheet number.

3. Content:

a. Submit as-built drawings that fully represent actual installed conditions and that incorporate modifications made during the course of construction.

b. Symbols List

c. Diagrams, such as (but not limited to) point-to-point diagrams, block diagrams, riser diagrams, line diagrams, and other diagrams that conceptually describe the system

d. Floor Plans and Reflected Ceiling Plans: Scale plans at 1/8”=1’-0”. Plans shall show:

1. Locations and identifiers of telecommunications outlets

2. Routes, types, sizes, and quantities of pathways (such as cable trays, conduits, hangers, and other pathways)

e. Enlarged Rooms Layouts: Applicable rooms: Entrance facilities, MDF, BDFs, IDFs. Room drawings shall show:

1. Floor layouts – scaled at either 1/4”=1’-0” showing dimensioned placement of equipment cabinets/frames, rack bays, etc.

2. Overhead layouts – scaled at either 1/4”=1’-0” showing dimensioned placement of overhead cable support (e.g., cable tray, cable runway, conduit sleeves, etc.)

3. Rack elevations – scaled at 1”=1’-0”, showing placement of termination apparatus and other equipment installed onto rack bays

4. Wall Elevations – scaled at 1”=1’-0”, showing dimensioned placement of termination apparatus (e.g., termination/crossconnect blocks)

G. Submittal Description: Operation and Maintenance (O&M) Manual

1. Quantity and Media: Submit O&M Manual as described in Division 01. In the absence of requirements given, submit one packaged O&M Manual set.

2. Format and Organization:

a. Include contents in a 3-ring binder with front cover and spine clear pockets for insertion of the cover information.

b. Cover shall include the following information:

1. Owner name

2. Project name and address

3. Manual name (e.g., “Operation and Maintenance Manual for Telecommunications Cabling System”)

4. Date; format: Month Day, Year (e.g., “January 1, 2014”)

5. Contractor name and contact information

c. Include a ToC at the beginning that lists the contents.

d. Include tabbed separators for improved navigation through the manual.

3. Content:

a. Instructions on making a warranty claim during the warranty period

b. Contact information during the warranty period

c. Contact information beyond the warranty period for maintenance and related service

d. As-built drawings, as described above, printed on tabloid size (17”x11”) paper and as electronic files – both native files and plotted PDF files

e. Product catalog/technical information sheets for each component provided under applicable section (typically, this is the {or similar to} the

accepted product data submittal), printed on letter size (8.5” x 11”) paper and as electronic files in PDF format

f. Warranty certificate from the manufacturer and the contractor, printed on letter size (8.5” x 11”) paper, wet signed as applicable

g. Manufacturer’s instructions for system or component use

h. Instructions and requirements for proper maintenance (according to the manufacturer) and as to maintain warranty

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. Five continuous years, minimum, design and manufacture of the materials and equipment specified herein.

2. Manufacturer(s) of products and equipment specified herein shall demonstrate that they have a quality assurance program in place to assure that the specifications are met. Include in the program, at a minimum, provisions for:

a. Incoming inspection of raw materials

b. In-process inspection and final inspection of the cable product

c. Calibration procedures of test equipment to be used in the qualifications of the product

d. Recall procedures in the event that out of calibration equipment is identified.

3. Conform to government standards on quality assurance for applications within these specifications.

B. Contractor Qualifications:

1. A current, active, and valid and C7 or C10 California State Contractors License

2. Five, minimum, continuous years of experience

3. Five, minimum, completed projects similar to scope and cost

4. Evidence of technicians qualified for the work

C. Materials

1. Materials, support hardware, equipment, parts comprising units, etc., shall be new, unused, without defects and of current manufacturer, materials

2. Use specified products and applications, unless otherwise submitted and approved in writing.

D. Regulatory Requirements

1. Work and materials shall conform to the latest rules of National Board of Fire Underwriters wherever such standards have been established and shall conform to the regulations of the State Fire Marshal, OSHA and the codes of the governing local municipalities. Work under Division 27 shall confirm to the most stringent of the applicable codes.

2. Provide the quality identified within these specifications and drawings when codes, standards, regulations, etc. allow Work of lesser quality or extent. The contract documents address the minimum requirements for construction.

E. Drawings

1. Follow the general layout shown on the drawings except where other work may conflict with the drawings.

2. Drawings for the work within this division are essentially diagrammatic within the constraints of the symbology applied.

3. The drawings do not fully represent the entire installation. Drawings indicate the general route for pathways and cables, and show general locations of outlets. The drawings might not expressly show every conduit, sleeve, hanger, etc., but a complete system is required.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Do not deliver products to the site until protected storage space is available.

2. Coordinate materials delivery with installation schedule to minimize storage time at jobsite.

3. Deliver materials in manufacturer's original, unopened, undamaged packaging and containers with identification labels (name of the manufacturer, product name and number, type, grade, UL classification, etc.) intact.

4. Immediately replace equipment damaged during shipping at no cost to the Owner, so as not to impact the construction schedule.

B. Storage and Protection

1. Store materials in clean, dry, ventilated space free from temperature and humidity conditions (as recommended by manufacturer) and protected from exposure to harmful weather conditions.

2. Comply with manufacturer's storage requirements for each product. Comply with recommended procedures, precautions or remedies as described in the MSDS as applicable.

3. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.

4. Storage outdoors covered by rainproof material is not acceptable.

5. Provide heat where required to prevent condensation or temperature related damage.

C. Handling

1. Handle materials and equipment in accordance with manufacturer's written instructions. Handle with care to prevent damage, breakage, denting, and scoring.

2. Do not install damaged materials and equipment. Replace damaged equipment at no cost to the Owner.

1.8 SCHEDULING

A. Unless otherwise specified, the construction schedules of the Sections within Division 27 may be combined into a single, overall schedule.

B. Do not proceed without written approval from the Owner or Owner's Representative for schedule of this Work.

1.9 PROJECT MANAGEMENT AND COORDINATION

A. Project Management and Coordination Services

1. Provide a project manager for the duration of the project to coordinate this Work with other trades. Coordination services, procedures and documentation responsibility include, but are not limited to, the items listed in this section.

2. Review of Shop Drawings Prepared by Other Subcontractors:

a. Obtain copies of shop drawings for equipment provided by others that require telecommunication service connections or interface with work.

b. Thoroughly review other trades' shop drawings to confirm compliance with the service requirements contained in the Division 27 contract documents. Document discrepancies or deviations as follows:

1. Prepare memo summarizing the discrepancy

2. Submit a copy of the specific shop drawing, indicating via cloud, the discrepancy

c. Prepare and maintain a shop drawing review log indicating the following information:

1. Shop drawing number and brief description of the system/material

2. Date of the review

3. Name of the individual performing the review

4. Indication if follow-up coordination is required

3. Should existing conditions prohibit construction progress as submitted and approved, coordinate the adjusted installed locations with the other contractors (AV, electrical, etc).

B. Concurrent Installation

1. The network will be installed concurrent with the work of Division 27. Coordinate your work with the Owner's/network integrator's work. For example, coordinate scope and dates for rack and cabling (terminations) readiness to allow the network integrator to plan and schedule installation of the network equipment (for example, access switches).

C. Role of the Engineer

1. The Owner has retained the Engineer's services through construction. During construction, the Engineer will work with and assist the Contractor as follows (in general):

a. Review product data and shop drawings submittals for general compliance with the contract drawings and specifications.

b. Provide interpretation and clarification of project contract documents

c. Reply to (and 'process') relevant Requests for Information (RFIs)

d. Review changes as they arise, and confirm that the proposed solutions maintain the intended functionality of the system.

e. Interpret field problems for Owner, and translate between Owner and Construction Team.

f. Review the testing procedures to confirm compliance with industry-accepted practices.

g. Observe the work for general compliance with the contract documents and to ensure that the installation meets the design intent of the system, and report progress to the Owner.

1.10 WARRANTY

A. As a minimum, warrant products and labor provided will, under normal use and service, be free from defects and faulty workmanship for period of 5 years from the date of acceptance. During the warranty period the entire system shall be kept in operating condition at no additional material or labor costs to the Owner. Also refer to specific sections for additional warranty requirements that supersedes the project's minimum warranty.

B. Render service within 24 hours of system failure notification. Note deviations or improvements to this service at the time of bid and obtain written acceptance from the Owner, or Owner's Representative.

C. Manufacturers of the major system components shall maintain a replacement parts department and provide testing equipment when needed. Provide complete replacement parts within 24 hours during the warranty period.

D. Conformance to certain government standards on quality assurance may be required for some applications outlined in these specifications.

PART 2 PRODUCTS

2.1 GENERAL

A. Materials used shall present no environmental or toxicological hazards as defined by current industry standards and shall comply with OSHA and EPA standards, other applicable federal, state, and local laws.

B. Product numbers are subject to change by the manufacturer without notification. In the event a product number is invalid or conflicts with the written description, notify the Owner in writing prior to ordering the material and performing installation work.

2.2 PRODUCT SUBMITTAL AT TIME OF BID

A. At the time of bid, include a list of major products in the Contract documenting the intended cabling system solution, AV equipment, etc.

2.3 SUBSTITUTIONS

A. Conform to the substitutions requirements and procedures outlined in Division 01.

B. Only one substitution for each product specified will be considered.

C. Where products are noted as "or equal", a product of equivalent design, manufacture, and performance will be considered. Submit product data (product information, catalog cuts, pertinent test data, etc.) to substantiate that the product is in fact equivalent to that specified. The burden of proof that the substituted product is equivalent to the specified product rests with the Contractor. Whenever material, process or equipment is specified in accordance with an industry specification (ANSI, TIA, etc), UL rating, or other association standard, present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, submit supporting test data to substantiate compliance.

D. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the contract documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment that, in the opinion of the Engineer, are equivalent in quality, utility and appearance will be approved as substitutions to that specified when “or equal” follows the manufacturers' names or model number(s).

E. When the Engineer accepts a substitution in writing, it is with the understanding that the Contractor guarantees the substituted product, component, article, or material to be equivalent to the one specified and dimensioned to fit within the construction according to contract documents. Do not provide substituted material, processes, or equipment without written authorization from the Engineer. Assumptions on the acceptability of a proposed substitution, prior to acceptance by the Engineer, are at the sole risk of the Contractor.

F. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from provisions of the specifications.

G. Pay expenses, without additional charge to the Owner, in connection with substitution materials, processes and equipment, including the effect of substitution on self, subcontractor's or other Contractor's work.

PART 3 EXECUTION

3.1 PERMITS AND INSPECTIONS

A. Obtain and pay for permits and inspections required for the work.

B. Furnish materials and execute workmanship for this work in conformance with applicable legal and code requirements.

C. Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of legal authority having jurisdiction.

D. Arrange and pay for review/inspection from compliance officials responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with requirements of reference codes indicated herein.

3.2 EXAMINATION

A. Verify existing conditions, stated under other sections, are acceptable for installation in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

A. Staffing: Provide a qualified foreman to supervise the crew performing the work and who is present at the job site at times work is being performed.

B. Construction Meetings: Participate in construction coordination meetings throughout the course of construction to review the progress and to resolve issues and conflicts. Prepare and distribute meeting agenda for telecommunication issues prior to, and meeting notes after meetings, in a format acceptable to the Owner. Publish meeting notes within 3 business days following the meeting.

C. Scheduling: Perform the work within the approved construction schedule. Keep the construction schedule current, based on the results of the construction meetings. At minimum, schedule shall document critical due dates, tasks, and milestones. Submit revised schedules for approval within 3 business days whenever there are modifications.

D. Inspection: Inspect the work after installation. Keep areas of work accessible and notify code authorities, or designated inspectors, of work completion ready for inspection. Document completion and inspection as required.

3.4 INSTALLATION

A. Complete work in a neat, high-quality manner, relative to common industry practices, and in accordance to NECA “Standard of Installation”.

B. Complete work in conformance to applicable federal, state and local codes, and telephone standards.

C. Coordinate the entire installation throughout the construction team (general contractor and subcontractors).

D. Manufacturer's Instructions: Comply with manufacturer's published installation instructions, product data, product technical bulletins, product catalog, and other instructions for installation. Maintain a file on the jobsite of MSDSs for each product delivered to jobsite packaged with an MSDS.

E. Adjusting: Make changes and revisions to systems to optimize operation for final use. Make changes to systems such that defects in workmanship are corrected and completed systems pass the minimum test requirements.

F. Protection: Protect installed products and finish surfaces from damage during construction.

G. Repair/Restoration: Replace or repair work completed by others that you deface or destroy. Pay the full cost of this repair/replacement. Repair defects prior to system acceptance.

3.5 CLEANING

A. Remove temporary coverings and protection of adjacent work areas. Remove unused, excess, and left over products, debris, spills, or other excess materials. Remove installation equipment.

B. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.

C. Repair or replace damaged installed products.

D. Legally dispose of debris.

E. Clean installed products in accordance with manufacturer's instructions prior to Owner's, or Owner’s Representative’s, punch walk.

3.6 PUNCH WALKS AND PUNCH LISTS

A. Punching the Work of individual Sections of Division 27 may be combined when noted so.

B. Execute a punch walk with the Engineer and the Owner or Owner’s Representative to observe Work.

C. Develop a punch list for items needing correction. Issue this punch list to Engineer.

D. Correct the Work as noted on punch list.

E. Execute follow up punch walk with the Engineer and the Owner or Owner’s Representative to verify punch list items have been corrected.

3.7 SYSTEM ACCEPTANCE

A. Complete corrections (punch list items) prior to submitting acceptance certificate.

B. On completion of the acceptance test, submit system acceptance certificate to the Owner or Owner’s Representative requesting their signature and return of the certificate. Issue copies of the signed certificate back to the Owner or Owner’s Representative with copy to the Engineer.

3.8 TRAINING

A. After acceptance, schedule a time convenient with the Owner, or Owner's Representative, for instruction in the configuration, operation, and maintenance of the system.

B. Provide 2 hours, minimum, of on-site training by a factory-trained representative. Document dates and times of training, and submit a “sign in” sheet for individuals trained, as part of the close out documentation.

C. Refer to individual sections within Division 27 for additional training requirements.

END OF SECTION