

SECTION 270000 - COMMUNICATIONS SYSTEMS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. Applicable requirements of General Requirements/Provisions shall be considered a part of this section and shall have the same force as if printed here in full. In addition, all information related to communications infrastructure that is documented in the architectural, structural, mechanical, and electrical drawings/documents shall be included as part of the Communications documents.

1.2 QUALITY ASSURANCE

- A. Specifications, Standards, and Codes: All work shall be in accordance with the following:

1. The 2020 edition of the National Electrical Code (NFPA 70)
2. American National Standards Institute (ANSI)
3. National Electrical Manufacturers Association (NEMA)
4. Telecommunications Industries Association (TIA)
5. BICSI – Telecommunications Distribution Method Manual (TDMM)
6. Electronic Industries Association (EIA)
7. Institute of Electrical & Electronics Engineers (IEEE)
8. Underwriters Laboratories (UL)
9. American Standards Association (ASA)
10. Federal Communications Commission (FCC)
11. Occupational Safety and Health Administration (OSHA)
12. American Society of Testing Material (ASTM)
13. Americans with Disabilities Act (ADA)
14. Local city and county ordinances governing electrical work
15. In the event of conflicts, the more stringent provisions shall apply.

1.3 SCOPE

- A. The work to be done under this section of the Specifications shall include furnishing labor, material, equipment, and tools required for the complete installation of the work indicated on the Drawings or as specified herein.
- B. All materials, obviously a part of the communications Infrastructure and necessary to its proper operation, but not specifically mentioned or shown on the Drawings, shall be furnished and installed without additional charge.
- C. The Drawings and Specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. If a discrepancy exists between the Drawing and Specifications, the higher cost shall be included, and the engineer shall be notified of the

discrepancy.

1.4 WORK INCLUDED

- A. The communications Infrastructure installed and work performed under this Division of the Specifications shall include but not necessarily be limited to the following:
- B. Structured Cabling Infrastructure
- C. Communications conduits, raceways, cable tray, racks, cabinets and equipment mounting boards
- D. Grounding and Bonding
- E. Underground raceway excavation, backfill, and compaction.
- F. Concrete work for duct banks, maintenance holes, handholes, vaults, and restoration (where applicable)

1.5 DEFINITIONS

- A. Terms: The following definitions of terms supplement those of the General Requirements and are applicable to Division 27 - Communications:
- B. Provide: As used herein shall mean "furnish, install and test (if applicable) complete."
- C. Infrastructure: As used herein shall mean cable, conduit, raceway, cable tray or j-hooks with all required boxes, fittings, connectors, and accessories; completely installed.
- D. Work: As used herein shall be understood to mean the materials completely installed, including the labor involved.

1.6 DRAWINGS

- A. Drawings are generally diagrammatic and show the arrangement and location of pathways, outlets, support structures, and equipment. The Contractor shall carefully investigate the structural and finish conditions affecting his work and arrange his work accordingly. Should conditions on the job make it necessary to make adjustments to pathways or materials, the Contractor shall so advise the Engineer and secure approval before proceeding with such work.
- B. Where exact locations are required by equipment for stubbing up and terminating conduit concealed in floor slabs, the Contractor shall request shop drawings, equipment location drawings, foundation drawings, and any other data required by him to locate the concealed conduit before the floor slab is poured.
- C. Materials, equipment, or labor not indicated but which can be reasonably inferred to be necessary for a complete installation shall be provided. Drawings and Specifications do not

undertake to indicate every item of material, equipment, or labor required to produce a complete and properly operating installation.

- D. The right is reserved to make reasonable changes in locations of equipment indicated on Drawings before rough-in without an increase in contract cost.
- E. The Contractor shall not reduce the size or number of conduits runs indicated on the Drawings without the written approval of the Engineer.
- F. Any work installed contrary to Contract Drawings shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.
- G. The location of equipment, support structures, outlets, and similar devices shown on the Drawings are approximate only. Do not scale Drawings. Obtain layout dimensions for equipment from Architectural plans unless indicated on Communications plans.
- H. Schematic diagrams shown on the Drawings indicate the required functions only. The technology of a particular manufacturer may be used to accomplish the functions indicated without exact adherence to the schematic Drawings shown. Additional labor and materials required for such deviations shall be furnished at the Contractor's expense.
- I. Verify the ceiling type, ceiling suspension systems, and clearance above hung ceilings prior to ordering cabling and associated hardware. Notify the Engineer of any discrepancies.
- J. Review all architectural drawings for modular furniture.
- K. Portions of these Drawings and Specifications are abbreviated and may include incomplete sentences. Omissions of words or phrases such as "the Contractor shall," "shall be," "as indicated on the Drawings," "In accordance with," "a," "the" and "all are intended" shall be supplied by inference.

1.7 SUBMITTALS

- A. Submit for approval, details of all materials, equipment, and systems to be furnished. Work shall not proceed without the Owner and/or the Project Manager's approval of the submitted items. Three (3) copies of the following shall be submitted:
 - 1. Submittals for individual systems and equipment assemblies that consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered, reviewed or stored, and such submittals will not be returned except at the request and expense of the Contractor.
 - 2. The contractor shall generate shop drawings. Modify reviewed and accepted shop drawings to include revisions based upon completion of work. Submit shop drawings with record drawings on hard copy.
 - 3. Shop drawings shall include equipment racks, patch panels, termination blocks, connection details, rack mounting details, and any other details not included in the construction drawings.
- B. Any materials and equipment listed that are not in accordance with Specification requirements

may be rejected.

- C. The approval of material, equipment, systems and shop drawings is a general approval subject to the Drawings, Specifications and verification of all measurements at the job. Approval does not relieve the Contractor from the responsibility of shop drawing errors. The Contractor shall carefully check and correct all shop drawings prior to submission for approval.
- D. Refer to spec section 27080 for close-out requirements.

1.8 QUALITY ASSURANCE

- A. Equipment and materials required for installation under these Specifications shall be the current model and new (less than one [1] year from the date of manufacture), unused and without blemish or defect.
- B. Equipment shall bear labels attesting to Underwriters Laboratories, where subject to label service. Manufacturers of equipment and materials pertinent to these items shall have been engaged in the manufacture of said equipment for a minimum of three (3) years and, if so directed by the Owner, be able to furnish proof of their ability by submitting affidavits and descriptive data about their product including size and magnitude comparable to requirements specified herein.

1.9 CONTRACTOR QUALIFICATIONS

- A. The Contractor shall have total responsibility for the coordination and installation of the work shown and described in the Drawings and Specifications. The Contractor shall be a company specializing in the design, fabrication, and installation of integrated communications systems.
- B. Communications Systems specified shall be installed under the direction of a qualified Contractor. Qualification requirements shall include submittal by the Contractor to the Owner of the following:
 - 1. List of previous projects of this scope, size, and nature; including names and sizes of projects, description of work, time of completion, and names of contact persons for reference.
 - 2. Shall certify that they are manufacturer-authorized for work to be performed. Submit Certifications with qualification certification package.
 - 3. Shall certify that the contractor has employed at least one (1) full-time Registered Communications Distribution Designer (RCDD). Submit certification with qualification certification package.

1.10 COORDINATION WITH OTHER TRADES

- A. The Contractor shall coordinate communications work with that of other sections as required to ensure that the entire communications work will be carried out in an orderly, complete, and

coordinated fashion.

1.11 SITE INVESTIGATION

- A. Before submitting bids for the project, visit the site of the work to become aware of existing conditions that may affect the cost of the project. Where work under this project requires extension, relocation, reconnections, or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original condition before the completion of this project.

1.12 PERMITS

- A. Obtain all permits and inspections for the installation of this work and pay all charges incident thereto. Deliver to the Owner all certificates of said inspection issued by authorities having jurisdiction.

PART 2 - PRODUCTS

1.13 SUBSTITUTIONS

- A. Product substitutions are not allowed unless noted as, "Or Approved Equal (by Owner)." The Engineer's decision as to whether the submitted equipment is acceptable shall be final and binding.
- B. All changes necessary to accommodate the substituted equipment shall be made at the Contractor's expense and shall be as approved by the Engineer. Detailed drawings indicating the required changes shall be submitted for approval at the time the substitution is requested. Follow division 0 and division 1 in submitting substitution request.
- C. If substitutions are made in lieu of the device specified; form, dimension, design, and profile shall be submitted to the Engineer for approval.
- D. Submit a request for approval of substitute materials in writing to the Owner and Engineer at least ten days prior to bid opening.

1.01 MATERIALS

- A. All materials used in this work shall be new and shall bear the inspection label of Underwriters' Laboratories Inc. or certification by another recognized laboratory.
- B. The published standards and requirements of the Telecommunications Industries Association (TIA), National Electrical Manufacturers Association (NEMA), the American National Standard Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE), and the American Society of Testing Materials (ASTM), are made a part of these Specifications and shall apply wherever applicable.
- C. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts are available.
- D. When more than one unit of the same class of equipment or material is required, such units shall be the products of a single manufacturer or partner manufacturers that offer a certified solution.
- E. Components of an assembled unit need not be products of the same manufacturer but must offer a certified end-to-end solution.
- F. Manufacturers of equipment assemblies, which include components made by others, shall

assume complete responsibility for the final assembled unit.

- G. Components shall be compatible with each other and with the total assembly for the intended service.

PART 3 - EXECUTION

1.01 EXAMINATION OF CONDITIONS

- A. Before the start of work, the Contractor shall carefully inspect the installed work of other trades and verify that such work is complete to the point where installation may properly commence. The start of work indicates acceptance of conditions.
- B. Install equipment in accordance with applicable codes and regulations, the original design, and the referenced standards.
- C. In the event of a discrepancy, immediately notify the Project Manager.
- D. Do not proceed with installation until unsatisfactory conditions and discrepancies have been fully resolved.

1.01 PROTECTION OF SYSTEMS AND EQUIPMENT

- A. Protect materials and equipment from damage during storage at the site and throughout the construction period. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, theft, moisture, extreme temperature, and rain.
- B. Damage from rain, dirt, sun, and ground water shall be prevented by storing the equipment on elevated supports and covering the sides with securely fastened protective rigid or flexible waterproof coverings.
- C. During installation, equipment shall be protected against entry of foreign matter on the inside and be vacuum cleaned both inside and outside before testing, operating, or painting.
- D. As determined by the Project Manager, damaged equipment shall be fully repaired or shall be removed and replaced with new equipment to fully comply with the requirements of the Contract Documents. The decision of the Project Manager shall be final.
- E. Damaged paint on equipment and materials shall be repainted with painting equipment and finished with the same quality of paint and workmanship as used by the manufacturer.

1.02 ACCESS TO EQUIPMENT

- A. Equipment shall be installed in a location and manner that will allow convenient access for maintenance and inspection.
- B. Working spaces shall be not less than specified in the National Electrical Code (NEC) for voltages specified.
- C. Where the Project Manager determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled, one time only, as directed by the Project Manager, at no additional cost to the Owner. "Conveniently accessible" is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, and duct work.

1.03 CLEANING

- A. During construction, and before Owner acceptance of the building, remove from the premises

and dispose of packing material and debris caused by communications work.

- B. Remove dust and debris from the interiors and exteriors of electrical equipment. Clean accessible current-carrying elements before being energized.

1.04 COMPLETION

- A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools, and similar items. Leave the premises clean, neat, and orderly.
- B. Results Expected: Systems shall be complete and operational, and controls shall be set and calibrated. Testing, start-up and cleaning work shall be complete.
- C. Maintenance Materials: Special tools for proper operation and maintenance of the equipment provided under this Specification shall be delivered to the Owner.

1.05 TESTING AND VERIFICATION

- A. See specific Division 27 sections for testing parameters of sub-systems.
- B. The Contractor shall verify that the requirements of this Specification are met. Verification shall be through a combination of analyses, inspections, demonstrations, and tests, as described below.
- C. Verification by inspection includes examination of items and comparison of pertinent characteristics against the qualitative or quantitative standard outlined in the Specifications. Inspection may require moving or partially disassembling the item to accomplish the verification, included as part of the work at no additional cost to the Owner.
- D. The Contractor shall verify by formal demonstrations or tests that the requirements of this Specification have been met. The Contractor shall demonstrate that the communications systems, components, and subsystems meet Specification requirements in the "as-installed" operating environment during the "System Operation Test." Even though no formal environmental testing is required, the Contractor shall measure and record temperature, humidity, and other environmental parameters and the environmental conditions, which were encountered during the "System Operation Test."
- E. The Contractor shall carefully plan and coordinate the final acceptance tests so that tests can be satisfactorily completed. The Contractor shall provide the necessary instruments, labor, and materials required for tests, including the equipment manufacturer's technical representative and qualified technicians in sufficient numbers to perform the tests within a reasonable time period.
- F. The Contractor shall satisfy all items detailed in the final acceptance check-off list (punch list). The list shall be a complete representation of specified installation requirements. At the time of final acceptance punch list items shall be corrected until the system is found to be acceptable to the Owner and the Project Manager.
- G. After the Contractor systems have been installed and tested, the completed test plan shall be signed by the Communications Contractor Project Manager and submitted for approval.

END OF SECTION