

**SECTION 17000- GENERAL PROVISIONS FOR TELECOMMUNICATIONS
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PART: GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions of the Contract and Division 1 - General Requirements are hereby made a part of this Section. Refer to paragraph titled "Telecommunications Subcontractor Qualifications" in this section and to Division 1 for requirements for Telecommunications Subcontractors. Throughout this and related Sections, "Subcontractor" shall not be limited to the singular and masculine and shall refer to one, or more than one, Telecommunications Subcontractor.

1.02 REFERENCE SPECIFICATIONS, STANDARDS AND CODES

- A. Comply with the referenced codes and standards and with the Contract Documents. Where conflicts occur, the more stringent shall apply.
- B. Work shall meet or exceed the standards and procedures of the following:

- American National Standards Institute (ANSI)
- National Electrical Manufacturers Association (NEMA)
- Telecommunications Industries Association (TIA)
- Electronic Industries Association (EIA)
- National Electrical Safety Code (NEC)
- Institute of Electrical & Electronics Engineers (IEEE)
- Underwriters Laboratories (UL)
- National Fire Protection Association (NFPA)
- American Standards Association (ASA)
- Federal Communications Commission (FCC)
- Occupational Safety and Health Administration (OSHA)
- American Society of Testing Material (ASTM)
- National Electric Code (NEC)
- Americans with Disabilities Act (ADA)

In the event of conflicts, the more stringent provisions shall apply.

- C. Construction Project Manager (CPM): As defined for Sections referring to telecommunications work only, the CPM shall be the design consultant employed by the Owner for the purpose of observing the work of the Telecommunications Subcontractor.

1.03 COORDINATION

- A. When articles, materials, operations or methods related to execution of telecommunications work are noted, specified, or described in the specifications or are indicated or reasonably implied on drawings and schedules, execute work

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as required or appropriate to provide complete and proper function, operation and installation.

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- B. The drawings utilize symbols and schematic diagrams to indicate items of work. These symbols and diagrams will not typically identify dimensions nor will they identify inclusion of specific accessories, appurtenances and related items necessary and appropriate for a complete and proper installation and operation. The Telecommunications Subcontractor shall install work complete and ready for proper operation, including related items not specifically identified, shown, indicated or specified. The work shall be installed, in accordance with the intent diagrammatically expressed on the drawings, and in conformity with the dimensions indicated on architectural drawings and on shop drawings approved by the Telecommunications Engineer. When abbreviations appear on the drawings or specifications in upper or lower case letters, with or without periods, the resultant work shall be as stated above.
- C. The drawings include details for various items, which are specific with regard to the dimensions and positioning of the work. These details are intended only for the purpose of establishing general feasibility. They do not obviate field coordination for the indicated work. Work shall not proceed until actual field conditions and requirements are verified by the Telecommunications Subcontractor.
- D. The drawings are diagrammatic and indicate the general arrangement of systems and equipment unless indicated otherwise by dimensions.

1.04 DESCRIPTION OF SYSTEMS

Furnish and install materials for the Telecommunications Infrastructure systems as specified herein and as shown on the drawings. Upon completion, the systems shall be functioning systems in compliance with performance requirements specified.

The cabling specified and shown on the drawings is for complete, performance based, workable systems. Deviations from the cabling shown due to a particular manufacturer's requirements shall be made only with the written approval of the Architect and the Owner, and at no additional cost to the Owner.

1.05 SUBMITTALS

Provide submittals in accordance with Division 1.

Submittals shall be made as one complete package.

- A. Submittals for individual systems and equipment assemblies which 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

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submittals will not be returned except at the request and expense of the Contractor.

- B. Generate shop drawings on AutoCad, Revision 13 or later. Modify reviewed and accepted shop drawings to include revisions based upon completion of work. Submit shop drawings with record drawings on hard copy and on electronic files in the form of ZIP disks or CDs.
- C. 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.

1.06 RECORD DRAWINGS

Provide Record Drawings in accordance with Division 1 for requirements regarding Project Record Documents.

"As-Built" record documentation for telecommunications work shall include:

System function diagrams.
Manufacturers' description literature for equipment.
Connection and programming schedules as appropriate.
Equipment material list including quantities.
Spare parts list with quantities.
Details not on original Contract Documents.
Test Results
Warranties
Release of Liens

Operation and Maintenance Manual:

Refer to Section 01300 - Submittals for requirements pertaining to Operation and Maintenance Data.

The Telecommunications Subcontractor shall submit manuals in accordance with Division 1 containing manufacturers' brochures of items installed by the Telecommunications Subcontractor.

The manual shall be subdivided into separate sections with tab dividers to identify subsystems of the integrated system. Reference appropriate specification sections.

Provide the following additional information for each electronic system. Information shall be edited for this project where applicable.

Operations manuals for components and for system as a whole.

Maintenance manuals for components and for system as a whole.

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Point-to-point diagrams, cabling diagrams, construction details and cable labeling details.

List of spare parts, materials and suppliers of components. Provide name, address and telephone number for each supplier.

Emergency instructions for operational and maintenance requirements.

Delivery time frame for replacement of component parts from suppliers.

Recommend inspection schedule and procedures for components and for system as a whole.

Complete "Reviewed" shop drawings and product data for components and system as a whole.

Troubleshooting procedures for each system and for each major system component.

1.07 QUALITY ASSURANCE

Equipment and materials required for installation under these specifications shall be the current model and new (less than one [1] year from date of manufacture), unused and without blemish or defect.

Equipment shall bear labels attesting to Underwriters Laboratories approval, or approved by other Nationally Recognized Testing Laboratory (NRTL), where subject to label service. Manufacturers of equipment and materials pertinent to these items shall have been engaged in the manufacture of said equipment 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.

Provide a written quality assurance plan for approval by the Owner including testing plan for pretesting and for final testing and certification of pretesting and commissioning prior to final testing. Ensure compliance with Contract Documents. Include backcheck as part of testing plans.

1.08 TELECOMMUNICATIONS SUBCONTRACTOR QUALIFICATIONS

General:

The Telecommunications Subcontractor shall have total responsibility for the coordination and installation of the work shown and described in the telecommunications drawings and specifications. The Telecommunications Subcontractor shall be a company specializing in the design, fabrication and installation of integrated telecommunications systems.

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Telecommunications Systems specified shall be engineered, assembled and installed under the direction of a pre-qualified Telecommunications Subcontractor. Pre-qualification requirements shall include submittal by the Telecommunications Subcontractor to the Architect of the following:

List of previous projects of this scope and nature, including names and sizes of projects, description of work, times of completion, and names of contact persons for reference.

Installers shall certify that they are manufacturer-authorized for work to be performed.

1.09 COORDINATION WITH OTHER TRADES

The Telecommunications Subcontractor shall coordinate telecommunications work with that of other Sections as required to ensure that the entire telecommunications work will be carried out in an orderly, complete and coordinated fashion.

1.10 WARRANTY

Warrant work to be free from defects. Repair or replace defective materials or workmanship, as well as damage to the work of other trades resulting from same, as directed by the Owner for the duration of the stipulated warranty periods.

The primary suppliers of telecommunications hardware and software shall warranty, through the Telecommunications Subcontractor, in writing, phases of systems (including but not limited to, software, hardware, peripheral equipment) against defective materials, design and workmanship. Upon receipt of notice from the Owner of failure of the system, or parts thereof, the Telecommunications Subcontractor, with the assistance of the supplier, shall promptly restore the defective component to provide an acceptable system at no cost to the Owner. The Telecommunications Subcontractor shall warranty the performance of the system for its intended use for a period of 1 year from the date of final acceptance, and shall "pass-through" and shall activate the manufacturers warranties to the Owner for the full extent and period of the manufacturer's warranty.

The warranty period shall commence upon final acceptance of the work by the Owner. Acceptance tests and procedures shall be developed by the Telecommunications Subcontractor in accordance with the provisions of this specification and accepted by the Owner. The Telecommunications Subcontractor shall test the installed systems in accordance with the accepted test procedures.

Acceptance by a manufacturer of an order for equipment for this contract signifies acceptance of specified warranty requirements.

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During the warranty period, there shall be no charges to the Owner for service calls (mileage, labor, travel, expenses etc.) for warranty related work.

1.11 TRAINING

The Telecommunications Subcontractor shall be responsible for training of facility personnel in accordance with requirements of this Section and Division.

Training shall take place after occupancy and before acceptance and shall include programs for on-site operations and maintenance of telecommunications systems. Training shall be for not more than ten people, shall be held at the Owner's site in Austin, Texas, and shall be of sufficient duration and depth to ensure that the trained personnel can operate the installed systems and can perform usual and customary maintenance actions.

PART 2: PRODUCTS

2.01 MATERIALS

Manufactured Products:

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.

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.

Equipment Assemblies and Components:

Components of an assembled unit need not be products of the same manufacturer, but must meet TIA/EIA Category 5e criteria as a complete permanent link.

Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.

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

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Moving parts or elements of equipment of the unit normally requiring lubrication shall have means provided for such lubrication and shall be adequately lubricated at the factory prior to delivery.

Factory cabling shall be identified on the equipment being furnished and on cabling diagrams.

PART 3: EXECUTION

3.01 EXAMINATION OF SURFACE CONDITIONS

Prior to the start of work, the Telecommunications Subcontractor shall carefully inspect the installed work of other trades and verify that such work is complete to the point where installation may properly commence. Start of work indicates acceptance of conditions.

Install equipment in accordance with applicable codes and regulations, the original design and the referenced standards.

In the event of discrepancy, immediately notify the CPM.

Do not proceed with installation until unsatisfactory conditions and discrepancies have been fully resolved.

3.02 PROTECTION OF SYSTEMS AND EQUIPMENT

A. Asbestos Survey: Prior to the disturbance of any building materials, construction personnel must know the results of an asbestos survey.

B. Lead Survey: Prior to the disturbance of any building materials, construction personnel must know the results of a lead survey.

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.

Damage from rain, dirt, sun and ground water shall be prevented by storing the equipment on elevated supports and covering them on sides with securely fastened protective rigid or flexible waterproof coverings.

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.

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As determined by the CPM, damaged equipment shall be fully repaired or shall be removed and replaced with new equipment to fully comply with requirements of the Contract Documents. Decision of the CPM shall be final.

Painted surfaces shall be protected with removable heavy kraft paper, sheet vinyl or equal, installed at the factory and removed prior to final inspection.

Damaged paint on equipment and materials shall be repainted with painting equipment and finished with same quality of paint and workmanship as used by manufacturer.

3.03 WORK PERFORMANCE

Coordinate location of equipment and conduit with other trades to minimize interference.

Holes through concrete and masonry in new and existing structures shall be cut with a diamond core drill or concrete saw upon approval of the structural engineer of record for the base building. Pneumatic hammer, impact electric, hand or manual hammer type drills shall not be allowed, except where permitted by the CPM as required by limited working space.

Holes shall be located so as not to affect structural sections such as ribs or beams.

Holes shall be laid out in advance. The CPM shall be advised prior to drilling through structural sections, for determination of proper layout.

Structural Penetrations: Where conduits, wireways and other raceways pass through fire partitions, fire walls or walls and floors, provide an effective barrier against the spread of fire, smoke and gases.

3.04 ACCESS TO EQUIPMENT

Equipment shall be installed in a location and manner that will allow convenient access for maintenance and inspection.

Working spaces shall be not less than specified in the National Electrical Code for voltages specified.

Where the CPM determines that the Telecommunications Subcontractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled, one time only, as directed by the CPM, at no additional cost to the Owner. "Conveniently accessible" is defined as being capable

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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.

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3.05 CABLE TERMINATIONS AND DRESS

Installation of signal, video, communication and control conductors shall adhere to the following:

Cables shall be dressed, labeled and tie wrapped in cabinets, racks and/or at cross connect backboard to present a neat, logical and orderly installation. At the discretion of the Telecommunications Subcontractor, cable duct with removable covers may be installed in equipment cabinets and control consoles to facilitate satisfying this requirement.

Cables shall be secured to equipment cabinet backboards, console members or to other system components using cable clamps and wraps. The Telecommunications Subcontractor shall furnish and install cable support posts to facilitate system installation.

Cables and conductors shall be terminated with cable termination connectors compatible with the specific termination.

Metallic cables and conductors entering the facility from a point exterior to the building shall be equipped with lightning protection. Protector shall be located at the nearest point of cable entry in the building.

3.06 UPS POWER

Electrical circuits supplying power to system components furnished as part of telecommunications work shall be connected to existing UPS power, if provided as work of the section of Division 16.

3.07 CLEANING

During construction, and prior to Owner acceptance of the building, remove from the premises and dispose of packing material and debris caused by telecommunications work.

Remove dust and debris from interiors and exteriors of electrical equipment. Clean accessible current carrying elements prior to being energized.

3.08 COMPLETION

General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools and similar items. Leave the premises clean, neat and orderly.

Results Expected:

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Systems shall be complete and operational and controls shall be set and calibrated.

Testing, start-up and cleaning work shall be complete.

Maintenance Materials: Special tools for proper operation and maintenance of the equipment provided under this Specification shall be delivered to the Owner.

3.09 TESTING AND VERIFICATION

General: The Telecommunications Subcontractor shall verify that requirements of this specification are met. Verification shall be through a combination of analyses, inspections, demonstrations and tests, as described below.

Verification by Inspection: Verification by inspection includes examination of items and comparison of pertinent characteristics against the qualitative or quantitative standard set forth 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.

Verification by Test and Demonstration: The Telecommunications Subcontractor shall verify by formal demonstrations or tests that the requirements of this Specification have been met. The Telecommunications Subcontractor shall demonstrate that the telecommunications 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 Telecommunications Subcontractor shall measure and record temperature, humidity and other environmental parameters and the environmental conditions, which were encountered during the "System Operation Test".

Perform commissioning and pretest prior to enclosure of walls.

Perform system operation tests after full enclosure of walls.

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System Operation Tests Conducted Upon Completion of Work: Upon completion of the Telecommunications Subcontractor's Work, subject the system to functional and operational tests. When required, corrections determined by initial test results, have been completed, fully retest the system. The Owner shall be notified in writing not less than seven days in advance of date of proposed final testing and inspection. The advance notice shall include certification that the installation is complete and operable and that the Telecommunications Subcontractor has satisfactorily performed the final tests specified herein. The acceptance testing and final inspection shall be accomplished in the presence of the Owner and the CPM. At least 10 days prior to scheduled system completion, the Telecommunications Subcontractor shall submit, for approval by Owner and CPM, a test plan to completely test telecommunications systems. The Telecommunications Subcontractor shall include in test plan, for acceptance by the Owner and CPM, a complete and detailed final acceptance test check-off list ("punch list"). The list shall be a complete representation of specified functions and conditions, including contingency, priority and abnormal modes of operation. The arrangement of the list shall be such as to provide an orderly method of tabulating checks of system features, response and operation. The punch list shall include a designated space adjacent to each test procedure where the CPM can mark his initials to indicate compliance with each test procedure. At the time of final acceptance testing, required tests shall be repeated and defects corrected until the system is found to be acceptable to the Owner and the CPM. The Telecommunications Subcontractor shall maintain a log of test activities and results. Both electronic and printed copies of this log including copies of the signed-off punch list shall be submitted to the Owner within seven days of the testing. Final tests shall include, but not be limited to, the following:

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Test all category cables in accordance with current TIA/EIA specifications for that category of cabling with a test device meeting or exceeding Level II accuracy.

Bi-directional attenuation (loss) test for each multimode fiber strand at 850nm and 1300nm wave lengths and each single mode fiber strand at 1310nm and 1550nm. Conduct tests in accordance with ANSI/TIA/EIA-526-14-A, Method B for multimode fibers, and ANSI/TIA/EIA-526-7, Method A.1 for singlemode fibers and with test instrument manufacturers printed instructions. Demonstrate that measured link loss does not exceed the "worst case" allowable loss which is the sum of: the connectors loss (based on the number of mated connector pairs at the ANSI/TIA/EIA-568-B.1 maximum allowable loss of 0.75 dB per mated pair) and the optical fiber loss (based on the maximum allowable loss of 3.5 dB/km @850nm and 1.5 dB/km @ 1300nm for multimode fiber and 1.0 dB/km @1310nm and 1.0 dB/km @ 1550nm for indoor singlemode fiber and 0.5 dB/km @ 1310nm and 0.5 dB/km @ 1550nm for outdoor singlemode fiber).

Visual inspection of cabling for proper routing, bends radii and security.

Verification that required submittals have been provided and have been accepted.

The Telecommunications Subcontractor shall carefully plan and coordinate the final acceptance tests so that tests can be satisfactorily completed. The Telecommunications Subcontractor shall provide necessary instruments, labor and materials required for tests, including qualified technicians in sufficient numbers to perform the tests within a reasonable time period.

After Telecommunications systems have been installed and tested, the completed test plan shall be signed by the Telecommunications Subcontractor Project Manager and submitted for approval.

END OF STANDARD 17000