SECTION 17000
GENERAL TELECOMMUNICATIONS INFRASTRUCTURE REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including Facilities Management Design and Construction Guide, apply to this Section.

1.2 SUMMARY
A. This Section describes the general telecommunications infrastructure requirements of these specifications and applies to all phases of the work specified, indicated on the drawings, or required to provide for the complete installation of telecommunications infrastructure for this project.

1.3 DEFINITIONS
A. Telecommunications Cables: Term includes horizontal and backbone copper, fiber optic, and coaxial cabling; copper and optical outside plant cables; copper audio/visual cables; CCTV cables; building environmental, automation, and security wiring systems.
B. Telecommunications Pathways: A cable distribution system consisting of raceways, cable trays, racks, and ladders; conduits; distribution rings and mechanical cable supporting devices.

1.4 WARRANTIES
A. The Contractor shall warrant all materials, workmanship, and equipment against defects for a period of one year after the date of substantial completion. Certain equipment shall be warranted beginning at the time of final acceptance or for longer periods of time as specified in those sections of the Project Manual. The Contractor shall repair or replace, at no additional cost to the Owner, any item which may become defective within the warranty period. Any manufacturers' warranties concerning any item installed will run to the benefit of the Owner. The Contractor agrees not to void or impair, or to allow Sub-Contractors to void or impair, any warranties regarding products or items installed as part of this project. The repair of faulty workmanship shall be considered to be included in the contract.

1.5 SYMBOLS
A. Items of equipment and materials are indicated on the drawings in accordance with the symbols on the plans.

1.6 ABBREVIATIONS
A. The following abbreviations apply throughout the contract documents:
   1. ASME: American Society of Mechanical Engineers.
3. CSA: Canadian Standards Association.
4. EMI: Electromagnetic interference.
5. ETL: Electrical Testing Laboratories.
7. FO: Fiber optic.
8. IDC: Insulation displacement connector.
9. LAN: Local area network.
10. MM: Multimode.
14. PVC: Polyvinyl chloride.
15. ScTP: Screened twisted pair.
16. SM: Single mode.
17. STP: Shielded twisted pair.
18. Underwriters or UL: Underwriters Laboratories, Inc.

1.7 CODES AND STANDARDS

A. The work shall be performed by competent craftsmen skilled in the trade involved and shall be done in a manner consistent with normal industry standards. All work shall conform to all applicable sections of currently adopted editions of the codes and standards listed below or the codes, standards, and specifications published by the organizations listed below:

1. Safety and Health Regulations for Construction.
2. Occupational Safety and Health Standards (OSHA), National Consensus Standards and Established Federal Standards.
5. National Electrical Manufacturer's Association (NEMA).
6. Institute of Electrical and Electronics Engineers (IEEE).
14. Factory Mutual Engineering Corporation or other recognized national laboratories.
18. Electronics Industry Association (EIA).
20. State and Local Codes.
B. Where there is a conflict between the code or referenced standards and the contract documents, the code or standard shall have precedence only when it is more stringent than the contract documents. Items that are allowed by the code but are less stringent than those specified shall not be substituted.

C. Follow Owner’s installation standards unless otherwise shown on the drawings or stated herein. Where requirements of Installation Standards conflict with Performance Standards or manufacturer’s recommendations, refer to Owner for a decision before proceeding.

1.8 QUALITY ASSURANCE

A. Provide the following warranty:

1. 15-year Next Gen/General Cable Blolite warranty for fiber optic cabling.
2. 25-year Ortronics/Berk-Tek Netclear warranty for copper cabling.

B. Installer Qualifications: An experienced installer supervising the project who is a Registered Communications Distribution Designer (RCDD) certified by the Building Industry Consulting Service International (BICSI) and who has a minimum of five years experience installing and certifying similar systems. Be experienced in all aspects of this work. Have the manufacturer’s recommended number of employees on the job site who have completed the required training courses for the above-mentioned warranties.

C. Comply with NFPA 70.


1.9 SUBMITTALS

A. Field quality-control test reports.

B. Construction record drawings including station outlet numbers.
C. When required by specification sections, submit manufacturer’s printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, in quantities specified for shop drawings and equipment brochures.

D. Telecommunications outlet spreadsheet as shown on the detail drawings.

1.10 COORDINATION

A. Coordinate and schedule all construction work with the Owner and occupant prior to beginning work. Do not interrupt building activities without strict coordination with the Owner and occupant. Unscheduled appearance to work in the spaces without prior scheduling with the Owner is not allowed.

B. Coordinate layout and installation of voice and data communication cabling with Owner’s telephone switch, telephone instrument, workstation, telecommunications and LAN equipment suppliers. Coordinate service entrance arrangement with local exchange carrier.

1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.

2. Record agreements reached in meetings and distribute to other participants.

3. Adjust arrangements and locations of distribution frames, cross-connect blocks, and patch panels in equipment rooms and telecommunications rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

C. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

D. Fully examine the drawings and specifications for other trades and coordinate the installation of telecommunications work with the work of the other trades. Consult and cooperate with the other trades for determining space requirements and for determining that adequate clearance is allowed with respect to his equipment, other equipment, and the building.

E. Coordinate installation of telecommunications cabling with the raceway installer. Verify raceways are installed according to current EIA/TIA standards before installing cable.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Unless otherwise specified, all materials and equipment shall be new, unused, and undamaged. Materials and equipment shall be the current and standard designs of manufacturers regularly engaged in their production.
B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Copper Horizontal and Backbone Cable:
   a. Berk-Tek.

2. Fiber Optic Cable:
   a. Berk-Tek
   b. Corning Cable Systems.
   c. Systimax.
   d. CommScope.
   e. Belden.

3. Broadband Coaxial Cable:
   a. Berk-Tek.
   b. Commscope.

4. Copper Termination Equipment:
   a. Ortronics.

5. Fiber Termination Equipment:
   a. Ortronics.

6. Copper Splice Equipment:
   a. Raychem.
   b. 3M.

7. Racks and Cabinets:
   a. Ortronics.

8. Cable Trays for Telecommunications Rooms and Entrance Facilities:
   a. Cabofil.
   b. GS Metals.

9. Firestopping Materials:
   a. Metacaulk.
   b. Nelson Fire Stop.
   c. Specified Technologies, Inc.
   d. 3M Fire Protection Products.
   e. Tremco Sealants and Coatings.

10. Mounting Elements:
    a. B-Line.
    b. Chatsworth.
    c. Erico.
    d. Homaco.

11. Surface Raceway:
    a. Wiremold.
12. Cable Management and Support:
   a. Cabofil.
   b. Chatsworth Products.
   c. Erico/Caddy.
   d. GS Metals.
   e. Homaco.
   f. Senior Industries.
   g. Tyton.
   h. Velcro Brand.

2.2 MATERIALS AND EQUIPMENT FURNISHED BY OTHERS

A. Where materials and equipment are indicated as furnished by others and installed or connected under this contract, it shall be the Contractor's responsibility to verify installation details.

2.3 QUANTITY OF SPECIFIED ITEMS REQUIRED

A. Wherever in these specifications an article, device, or piece of equipment is referred to in the singular number, such reference shall apply to as many such articles as are shown on the drawings or required to complete the installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Wiring Method: Provide wiring and optical fiber in conduit, raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

B. Provide cutover connections necessary to transfer voice and data communication signals to the new cable system. Verify the appearance of the signal at the designated station location. Owner will assist the Contractor in moving device plugs from the existing jacks to the new jacks.

C. Protect the existing electronics, cables, and enclosures from possible damage as there are active circuits and equipment in the building.

D. Install cables using techniques, practices, and methods that are consistent with Category rating of components and that ensure Category performance of completed and linked signal paths, end to end.

E. Install cables without damaging conductors, shield, or jacket.
F. Furnish tools and test equipment. Provide all specified materials, installation hardware, and labor required to complete work shown on drawings and specified in this Section. This shall include work and miscellaneous items not specified but necessary to build a complete telecommunications installation including test equipment accessories and appurtenances required for testing the system. All systems shall be complete and ready for operation.

G. Use cable bundling hardware rated for the environment and application in which used. Applications include, but are not limited to, general purpose, outdoor, chemical resistant, flame retardant, high temperature, and vibration. Provide reusable cable management straps for bundling and securing cables. Do not use nylon cable ties.

H. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

I. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.

J. Secure and support cables at intervals not exceeding 48 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

K. Wiring Within Wiring Closets and Enclosures: Provide conductors of adequate length. Train conductors to terminal points with no excess.

L. Separation of Wires: Comply with TIA/EIA-569-A rules for separating unshielded copper voice and data communication cabling from potential EMI sources, including electrical power lines and equipment.

M. Make splices and terminations only at indicated outlets, terminals, cross-connects, patch panels, and splices.

N. Use splice connectors compatible with media types.

3.3 RECORD DRAWINGS

A. Maintain current documents at the construction site.

B. Record drawings shall include all information required for shop drawings and, in addition, shall indicate the following:

1. Routing of cables between communications rooms and from communications rooms to entrance facilities.
2. Revisions to construction documents (addenda and field changes).

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations including, but not limited to, rerouting signals in failed cables.
3.5 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

B. Perform final clean-up of all telecommunications spaces. Remove all dust, debris, and excess equipment. Wax and polish floors after all demolition is complete.
## TELECOMMUNICATIONS SUBMITTAL SCHEDULE

<table>
<thead>
<tr>
<th>SECTION NUMBER</th>
<th>SECTION NAME</th>
<th>PRODUCT DATA</th>
<th>SHOP DRAWINGS</th>
<th>MAINTENANCE DATA</th>
<th>SAMPLES</th>
<th>WARRANTY</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>16850</td>
<td>CATV Distribution System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16900</td>
<td>General Telecommunications Infrastructure Requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>16905</td>
<td>Equipment Rooms, Telecommunications Rooms, and Service Entrances</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16915</td>
<td>Backbone Cabling</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16920</td>
<td>Horizontal Cabling</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>16935</td>
<td>Basic Firestopping Materials and Methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16940</td>
<td>Telecommunications Labeling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>16945</td>
<td>Telecommunications Testing and Documentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>

END OF SECTION 17000