

SECTION 27-13-23 COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work covered by this section of the Specifications includes all labor necessary to perform and complete such construction, all materials and equipment incorporated or to be incorporated in such construction and all services, facilities, tools and equipment necessary or used to perform and complete such construction. The work of this section shall include, but is not limited to, the following:
 - 1. Optical fiber backbone cabling

1.02 QUALITY ASSURANCE

- A. Refer to Section 27-00-00 for general details.
- B. As noted in Section 27-00-00, all contractors and installers working on structured cabling system elements must hold a current manufacturer's certification for each individual component they install.

1.03 CODES, STANDARDS, AND GUIDELINES

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations in Section 27-00-00.
- B. TIA-492-AAAD
- C. ITU-T G.652D
- D. The Cal Poly ITS Telecomm group, Telecommunications Standards Document and the Labeling, Design and Syntax Standards in Appendix B.

1.04 SUBMITTALS

- A. Also refer to Section 27-00-00.
- B. Shop Drawings:
 - 1. Shop Drawings shall show the locations where cables are to be routed and where terminating hardware is to be installed.
- C. Submit Manufacturer's Cut Sheets for the following:
 - 1. Any products not specifically listed in the PRODUCTS section shall require a submittal of the manufacturer's cut sheets and approval of the Cal Poly ITS Telecomm group.

1.05 IDENTIFICATION

- A. All fiber optic backbone and riser cables must be labeled with 1" nylon label with black machine generated lettering at each endpoint and each time it enters or exits an underground facility or vault.
- B. **All labels shall be easily accessible, both physically and visually, upon completion of the job.**
- C. Refer to Section 27-05-53 for additional details.

1.06 DEFINITIONS

- A. CMP: Communications Plenum Cable
- B. CMR: Communications Riser Cable
- C. MPP: Multipurpose Plenum Cable
- D. OFNP: Optical Fiber Nonconductive Plenum Cable
- E. OFCP: Optical Fiber Conductive Plenum Cable
- F. LSZR: Low Smoke Zero Halogen Rated Cable
- G. OM1: Defined by ISO 11801 & TIA-492-AAAA, 62.5/125 μm multimode fiber.
- H. OM2: Defined by ISO 11801 & TIA-492-AAAB, 50/125 μm multi-mode fiber.
- I. OM3: Defined by ISO 11801 & TIA-492-AAAC, laser-optimized 50/125 μm multi-mode fiber
- J. OM4: Defined by TIA-492-AAAD, laser-optimized 50/125 μm multi-mode fiber

1.07 WARRANTY

- A. Refer to Section 27-00-00 for general details.

PART 2 – PRODUCTS

2.01 PRODUCT CONSISTENCY

- A. Product Consistency: Any given item of equipment or material shall be the product of one manufacturer throughout the facility. Multiple manufacturers of any one item will not be permitted.

2.02 FIBER OPTIC CABLES – GENERAL

- A. Cable jacket marking: Must be legible and shall contain the following information:
 - 1. Manufacturer's name and/or trade mark
 - 2. Strand count
 - 3. Core Type
 - 4. Core Count
 - 5. UL listing
 - 6. Sequential distance markings, in one foot increments
- B. All multimode fiber (UON) shall be OM4, 50 μm , laser optimized, multimode fiber.
- C. All single mode shall be zero water peak single mode fiber

2.03 OPTICAL FIBER PLENUM RISER CABLE

- A. Non-armored, gel free, plenum rated distribution cable
- B. Jacket color for 50 μm multimode fiber shall be aqua.
- C. Jacket color for single mode fiber shall be yellow.
- D. Approved Manufacturer: Commscope or Cal Poly ITS Telecom group approved equal

PART 3 – EXECUTION

3.01 GENERAL

- A. Backbone (Non OSP) fiber optic cables are for use between telecommunications facilities within the same building.
- B. Location, fiber count and placement detail for all fiber optic cables shall be as shown on the Drawings.
- C. Provide 20' slack loops at the TR end of all backbone fiber optic cables.
- D. Provide 72" of stripped strands fiber wrapped neatly at each fiber cabinet.
- E. Insure all fiber optic cables as installed are not subject to strain, and that correct bend radiuses are maintained at all times.
- F. Do not combine terminations of fiber optic cables leading to different endpoints into a single cabinet. Each distribution, riser, OSP or Fire Alarm serving cable shall require their own, dedicated fiber termination cabinet
- G. Each fiber optic riser cable shall be placed within one cell of innerduct per Section 27-05-33
- H. Fiber optic cables and copper cables shall not share conduit or innerduct.
- I. Do not terminate fiber until after the rack locations and elevations of fiber cabinets have been approved by the Cal Poly ITS Telecomm group representative.
- J. Patch cables shall not be installed until after the fiber optic test reports have been approved by the Cal Poly ITS Telecomm group representative. *The Cal Poly ITS Telecomm group typically installs all patch cables.*

3.02 QUANTITIES

- A. Quantities of system elements shown on the drawings are illustrative only and are meant to indicate the general configuration of the work. The Contractor shall be responsible for providing the correct quantities of materials to construct a system that meets the intent of these Specifications and the relevant codes.

3.03 INSTALLATION

- A. Optical Fiber Backbone Cables:
 - 1. Provide support for vertical runs of fiber optic riser cables.
 - 2. Route fiber optic cables over telecom ladder racking.
 - 3. Route fiber optic cables together as a single bundle, not to be combined with copper or coax cabling.
 - 4. Installation of all fiber optic cables shall require the use of a breakaway swivel rated to the cable manufacturer's written specifications for pull strength.
 - 5. Follow all manufacturers' specifications for installation.
- B. Connector Installation
 - 1. Fiber Optic cabling shall be terminated using fusion-spliced pigtails **only**.
 - 2. Maximum length differential between terminated strands per bundle shall be 2". If the length does not meet this requirement the entire bundle must be re-terminated.

- C. Slack Loop
 - 1. Slack loop shall be mounted on the wall, above ladder rack height.
 - 2. Slack loop location shall be designated by the Cal Poly ITS Telecomm group representative.

3.04 GROUNDING & BONDING

- A. Any use of armored cable shall require the bonding of that shield to the TGB/TMGB with a #6 AWG copper bonding conductor.
- B. Refer to Section 27-05-26 for additional details.

3.05 TESTING

- A. Refer to Specification Section 27-08-23.

3.06 ACCEPTANCE

- A. 100% of the fiber tested must meet requirements for the whole of the fiber installation to be accepted.
- B. Upon receipt of the Contractor's cable testing documentation, the Cal Poly ITS Telecomm group representative shall review/observe the installation and/or randomly request tests of the cables installed. Once the installation and testing has been completed and the Cal Poly ITS Telecomm group representative is satisfied that all work is in accordance with the Contract Documents, the Cal Poly ITS Telecomm group representative will notify the Contractor and/or Cal Poly Project Manager in writing or via email.

3.07 RECORD (AS-BUILT) DRAWINGS

- A. The Project Record Drawings shall show the types and locations of all fiber optic cabling and fiber optic termination points. Drawings should include identifying information from the cable labels.

END OF SECTION

DOCUMENT VERSION CONTROL

REVISION	DATE	AUTHOR	REASON
1	02/20/14	R. VOLK	INITIAL DOCUMENT DEVELOPMENT
	02/20/14	DW & MH	PRIMARY REVIEW COMPLETE