

## SECTION 27-13-24 COMMUNICATIONS OPTICAL FIBER OSP 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. OSP optical fiber backbone cabling system

#### 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 shall 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. Cal Poly ITS Telecomm group, Telecommunications Standards Document and the Labeling, Design & Syntax Standards in Appendix B.
- C. Customer Owned Outside Plant Design Manual (BICSI)

#### 1.04 SUBMITTALS

- A. Refer to Section 27-00-00 for general details.
- 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 by the Cal Poly ITS Telecomm group.

#### 1.05 IDENTIFICATION

- A. Outdoor cables shall be labeled with a 1" wide machine-generated, white nylon label with characters in black ink, within 18" of all conduit endpoints as well as on both cable endpoints. Within all underground structures larger than 3' in any dimension, label each cable as it enters and exits the structure.
- B. Refer to Section 27-05-53 for additional details.
- C. Refer to the Cal Poly ITS Telecomm group Labeling, Design & Syntax Standards in Appendix B.

## 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  $\mu\text{m}$  multi-mode fiber. (old Campus Standard)
- H. OM2: Defined by ISO 11801 & TIA-492-AAAB, 50/125  $\mu\text{m}$  multi-mode fiber.
- I. OM3: Defined by ISO 11801 & TIA-492-AAAC, laser-optimized 50/125  $\mu\text{m}$  multi-mode fiber
- J. OM4: Defined by TIA-492-AAAD, laser-optimized 50/125  $\mu\text{m}$  multi-mode fiber (new Campus Standard)

## 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 shall 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. Cable Type
  - 4. Pair Count
  - 5. UL listing
  - 6. Sequential distance markings, in one foot increments
- B. All multimode fiber (UON) cable shall be OM4, 50  $\mu\text{m}$  multimode fiber.
- C. All single-mode shall be zero water peak single-mode fiber

### 2.03 MULTIMODE OPTICAL FIBER OSP CABLE:

- A. Shall be Non-Armored, Jacket MDPE, with strength elements and zip-cord immediately underneath.
- B. Internal structure shall include water swellable tape layer and 2 mm gel filled buffer tubes.
- C. Fibers shall be contained in loose tube construction surrounding a central dielectric strength member
- D. Shall be 12 strands per subunit, with required number of multimode fibers in one overall jacket.
- E. ***Jacket color shall be black.***

- F. Acceptable Manufacturers: Commscope, Corning or Cal Poly ITS Telecomm group approved equal

#### 2.04 SINGLE MODE OPTICAL FIBER OSP CABLE

- A. Non-Armored Jacket shall be MDPE, with strength elements and zip cord immediately underneath.
- B. Internal structure shall include water swellable tape layer and 2 mm gel filled buffer tubes.
- C. Fibers shall be contained in loose tube construction surrounding a central dielectric strength member
- D. Shall be 12 strands per subunit, with the required number of single-mode fibers in one overall jacket.
- E. ***Jacket color shall be black.***
- F. Approved Manufacturers: Commscope, Corning or Cal Poly ITS group approved equal

#### 2.05 MULTIMODE OPTICAL FIBER INDOOR/OUTDOOR CABLE

- A. Non-Armored Jacket shall be plenum and OSP rated
- B. Cable shall have aramid yarn and zip-cord immediately underneath jacket.
- C. Internal structure shall include water barrier layer and a central dielectric strength member
- D. ***Jacket color shall be black.***
- E. Approved Manufacturer: Commscope or Cal Poly ITS Telecomm group approved equal

#### 2.06 SINGLE MODE OPTICAL FIBER INDOOR/OUTDOOR CABLE

- A. Non-Armored Jacket shall be plenum and OSP rated
- B. Cable shall have aramid yarn and zip-cord immediately underneath jacket.
- C. Internal structure shall include water barrier layer and a central dielectric strength member
- D. ***Jacket color shall be black.***
- E. Approved Manufacturer: Commscope or Cal Poly ITS Telecomm group approved equal

#### 2.07. MULTIMODE OSP FIBER INDOOR PLENUM-RATED CABLE

- A. Shall have a non-armored jacket and be plenum rated.
- B. Shall have aramid yarn and zip cord immediately under the cable jacket.
- C. Shall have an internal structure that includes water barrier and a central dielectric strength member.
- D. ***Jacket color shall be aqua.***

#### 2.08. SINGLE MODE OSP FIBER INDOOR PLENUM-RATED CABLE

- A. Shall have a non-armored jacket and be plenum rated.
- B. Shall have aramid yarn and zip cord immediately under the cable jacket.
- C. Shall have an internal structure that includes water barrier and a central dielectric strength member.
- D. ***Jacket color shall be yellow.***

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. OSP fiber optic cables shall be used between telecommunications facilities in different buildings, or for any connections that are subject to moisture.
- B. Location, fiber count and placement detail for all fiber optic cables shall be as shown on the Drawings.
- C. ***OSP cable shall be run through continuous conduit and/or manholes until it is exposed in a telecommunications space where it is to be terminated.***
- D. Provide 50' slack loops at the EF/TR/ER end of all OSP fiber optic cables over 12 strands. OSP fiber optic cables under 12 strands shall have 20' slack loops.
- E. Provide 72" of stripped fiber strands wrapped neatly at each fiber cabinet.
- F. Insure all fiber optic cables as installed are not subject to strain, and that correct bend radiuses are maintained at all times.
- G. Fiber optic cables and copper cables shall not share conduit or innerduct unless approved in advance by the Cal Poly ITS Telecomm group.
- H. ***Do not terminate fiber until after the rack locations and elevations of fiber cabinets have been accepted by the Cal Poly ITS Telecomm group representative.***
- I. ***Do not install patch cables. After the fiber optic cable test reports have been accepted by the Cal Poly ITS Telecomm group representative the ITS Telecomm group shall install all patch cables.***

### 3.02 QUANTITIES

- A. Quantities of system elements shown on the drawings shall be 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. A. Optical Fiber OSP 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. B. Connector Installation
  - 1. Terminate both ends of each fiber with an appropriate fusion spliced pigtail. Fibers shall be terminated in strict compliance with the manufacturer's printed instructions.
  - 2. ***Maximum length deferential between terminated strands per bundle shall be 6". If the length does not meet this requirement the entire bundle must be re-terminated.***
- C. Slack Loop

1. Slack loop shall be coiled and mounted on the wall. *(See Fig. #139 in Appendix B)*
  2. Slack loop location shall be designated by the Cal Poly ITS Telecomm group representative.
- D. Underground
1. OSP fiber optic cables shall be lashed to and supported by cable management arms within any underground facilities.
  2. Outdoor cables shall be labeled with a 1", machine generated, white nylon label, with characters in black ink at each location, within 12" of where it enters or exits in each underground facility.
  3. ***At each vault, each fiber optic OSP cable shall make one complete horizontal wrap of the vault before continuing along its pathway.***

### 3.04 GROUNDING & BONDING

- A. None Required

### 3.05 TESTING

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

### 3.06 ACCEPTANCE

- A. ***100% of the fiber plant shall be tested and shall meet all requirements and specifications as stated by the manufacturer and in the Contract Documents to receive final approval by the Cal Poly ITS Telecomm group.***
- B. Upon receipt of the Contractor's documentation of cable testing, the Cal Poly ITS Telecomm group representative will review/observe the installation and 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 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 shall include identifying information as indicated on the cable labels.
- B. Provided documentation shall include butterfly drawings for each vault, detailing specific conduit utilization for each cable.

END OF SECTION

DOCUMENT VERSION CONTROL

REVISION	DATE	AUTHOR	REASON
1	02/20/2014	R. VOLK	INITIAL DOCUMENT RECREATION
	02/20/2014	DW&MH	PRIMARY REVIEW COMPLETE