

**SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Conduit
- B. Enclosures
- C. Innerduct
- D. Baseboard Molding
- E. Cable Tray

1.2 RELATED SECTIONS

- A. Contract Terms and Conditions.
- B. Section 16710 - Telecommunications - General Requirements
- C. Section 16715 - Telecommunications - Acceptance Testing
- D. Section 16725 - Telecommunications - Cable
- E. Section 16730 - Telecommunications - Underground Structures
- F. Section 16740 - Telecommunications - Building (RF) CATV / MATV System
- H. Section 16760 - Telecommunications - Grounding and Bonding

1.3 APPLICABLE PUBLICATIONS

- A. As defined in section 16710 - Telecommunications General Requirements.
- B. California State District, Office of the Chancellor - Telecommunications Infrastructure Planning (TIP) Standards- Adopted July 2003, plus the latest TIP updates
- C. North Orange County Community College Telecommunications Standards, dated January 2007.

1.4 SUBMITTALS

The Contractor shall submit the following materials to the District prior to the start of work:

- A. Product data for:

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-1
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS**

- (1) Innerduct
- (2) Cable trays
- (3) Splice cases
- (4) Racks and wire managers
- (5) Fiber optic patch/termination panels, frames, enclosures, and hardware
- (6) Copper terminals and hardware
- (7) Cable and splice case identification tags
- (8) Station hardware (outlets and jacks)

PART 2 - MATERIALS

Where applicable, the Contractor shall install materials and equipment as part of a certified CommScope, Inc. SYSTIMAX® SCS Premises Distribution Structured Cabling System.

2.1 CONDUIT

A. Rigid Steel Conduit

- (1) Rigid steel conduit shall comply to Underwriter's Laboratories UL-6 Specification, ANSI C80.1 and Federal Specification WW-C-581E or latest revisions. Hot dip galvanized on the exterior, zinc or enamel on the interior.
- (2) Couplings, locknuts, and all other fittings shall be galvanized or sheardized, waterproof and threaded type only. Rigid conduit shall terminate with two locknuts; one outside and one inside enclosures and specified bushings. No running threads or chase nipples shall be issued without approval. Manufacturer: Appleton, Crouse-Hinds or approved equivalent.
- (3) Bushings shall be non-metallic for 1 inch and smaller and insulated metallic for conduits larger than 1 inch.

B. Intermediate Metallic Conduit (IMC)

- (1) IMC shall comply to proposed Underwriter's Laboratories UL 1242 and Federal Specification WW-C-581E or latest revision. Hot dipped galvanized on the exterior, corrosion inhibiting coating on the interior.
- (2) Couplings, locknuts, and all other fittings shall be galvanized or sheardized, waterproof and threaded type only. Same material as conduit. Manufacturer: Appleton, Crouse-Hinds or approved equivalent.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-2
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- C. Electrical Metallic Tubing (EMT)
 - (1) EMT conduit shall comply to Underwriter's Laboratories UL 797, ANSI C80.3 and Federal Specification WW-C-563 or latest revision. EMT shall be galvanized or sheardized.
 - (2) Couplings and connectors for EMT shall be galvanized or cadmium plated and shall be of the compression type requiring the tightening of a nut on a gland ring. Appleton, Crouse-Hinds or approved equivalent. No die cast type allowed. All connections to have permanent insulated throats.
- D. Polyvinylchloride (PVC): PVC shall be rigid heavy weight type, Schedule 40 or Type C complete with PVC fittings.
- E. All communication conduits shall be equipped with a terminating bushing or collar to protect cables during placement.
- F. All station conduit shall be no smaller than one inch in diameter.

2.2 CONDUIT SUPPORTS

- A. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. The pipe ring shall be malleable iron, split and hinged, or shall be interlocked with the suspension rod socket.
- B. Pipe racks for group of parallel conduits shall be constructed of galvanized structural steel performed channels of length as required, suspended on threaded rods and secured thereto with nuts above and below the cross bar. All offsets shall be in the same plane and be parallel.
- C. Factory made pipe straps shall be one-hole malleable iron or two-hole galvanized clamps.
- D. Manufacturer: Kindorf, Unistrut, T&B or approved equivalent.

2.3 HANGERS AND CABLE TIES

- A. Materials: All hangers and cable ties shall be designed to support communications cable (including the fiber) without kinking or damage.
 - (1) Hangers shall be metal construction and shall provide a wire loop or elbow design to support multiple communications cables.
 - (2) No more than twelve (12) station cables may be supported by a single hanger without using a saddle (3 inches wide at a minimum) to support the weight of the additional cables.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-3
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS**

(3) Cable ties used within a rated ceiling plenum space shall be rated low smoke and shall be certified for use in a plenum environment.

B. Manufacturers: 3M, Panduit, or approved equivalent.

2.4 RACEWAYS

A. Wiremold Series 5400

B. Wiremold Series 5417 Internal Elbow

C. Wiremold 5418 External Elbow

D. Wiremold 5474 Transition Fitting

E. Wiremold 5410 Blank End Fitting

F. Wiremold 5411 Flat Elbow

G. Manufacturers: Wiremold, Panduit, or approved equivalent

2.5 LADDER RACKING

A. Materials

(1) Cable support ladder racks shall be installed as defined in the Contract Documents and in any location where additional pathways are required to support large numbers of station cables that are otherwise not supported.

(2) The racks shall be twelve inches wide unless otherwise noted. The racks are to be black painted finish. B-Line or approved equivalent.

(3) In some locations the ladder rack shall be equipped with a four to six inch fence on both sides to support bundles of cables. This fence shall mechanically attach to the side or bottom of the ladder, not the surface over which the cable shall be placed.

(4) The racks shall be classified by Underwriters Laboratories (UL) as suitable for equipment grounding.

(5) The racks shall be earthquake braced, zone to be campus specific.

B. Manufacturer: B-Line, Homaco, and Newton

2.6 INTERBUILDING AIR BLOWN TUBE CABLE

A. Materials:

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-4
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS**

1. The inter-building tube cable shall be FutureFlex, dielectric outside plant tube cables designed specifically for outdoor applications. The Tube cable shall be layered with a water blocking tape to prohibit water seepage into the inner cells of the cable.
 2. The inter-building tube cable shall be 19 cell back bone from the MDF to the building distribution manhole. The sizes of the inter-building tube cable shall be 7 cells to each building. 6 cells shall be home run back to the MDF. **(Use existing 19 cell tube cable where possible).**
 3. Clear individual cell patch tube cables must be used for all cells patched through the splice case.
 4. All tube cables must be dried out using nitrogen and plugged with appropriate end caps.
 5. The placement and termination of the tube cables must be in accordance with the manufacturer's specifications and contract documents. A proper installation is essential in accommodating future network additions.
- B. Manufacturer: Sumitomo Electric, Part Number TCxxTOX , xx = number of tubes (7 or 19).

2.7 TUBE CABLE DISTRIBUTION UNITS

- A. Materials:
1. The tube cable distribution units shall be approved for intra-building use. The units shall be equipped with all required hardware, which includes tie down bars with grounding and tube cable termination panels.
- B. Manufacturer: Sumitomo Electric or approved equal.

2.8 CABLE TRAY (MAY REPLACE WITH FLEX TRAY)

- A. Materials
- (1) The cable trays shall be twelve inches (12") wide by a minimum of 3" deep, unless otherwise noted on the contract documents, aluminum, and equipped with a ladder-type bottom.
 - (2) The tray shall be equipped with elbows, tees, and other attachments as required to complete the installation following manufacturer's guidelines. There shall be no exposed nuts on the inside on any tray section.
 - (3) Each end of the tray shall be equipped with a finished lip and drop off to reduce damage to cables. Said lips and drop off shall be made by the same manufacturer as the tray.
 - (4) The tray shall be supported no less than every ten feet. Support attachments shall be made only to the building structure.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-5
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- (5) Each section of tray shall be equipped, on one external side only, with a ground wire support bracket sized to hold ½" plenum rated hard line coaxial cable. This "ground" clamp shall be made by the same manufacturer as the tray. The equivalent PW Industries part number is 9999-1873-05.
 - (6) The cable trays shall be NEMA Class Designation 12B (75 lbs. per linear foot) unless otherwise noted on the contract documents. Trays shall qualify under NEC Section 318-7(b) as equipment grounding conductor
 - (7) No exposed nuts, bolts or screws are allowed on the inside the tray in the cable pathway.
- B. Manufacturer: PW Industries, B-Line, Homaco, Square D, or approved equivalent.

2.9 SPLICE CASES - INDOOR COPPER

- A. Materials
- (1) All indoor splices shall be contained within an approved splice case designed for multiple entries.
 - (2) All end plates shall be designed for the number and size of cables served by the splice case.
 - (3) All splices shall utilize Commscope Systimax Inc. 710 or 3M splice modules. All cases shall be equipped to provide a continuous bond of cable shield through all splices.
- B. Manufacturer - Commscope Systimax Inc., Preformed, and 3M.

2.10 FIBER OPTIC TERMINAL PANELS

- A. Singlemode and multimode cables are to be terminated on separate panels, each with its appropriate warning signs and labels.
- B. Materials
- (1) The fiber optic terminals/patch panels shall utilize G2 Shelves as manufactured by Commscope SYSTIMAX Inc. All multimode fiber shall be field terminated in a 1000G2 shelf ComCode 760023200, or a 600G2 shelf ComCode 760028324, dependant on quantity of connections and future growth, approved by owner. A sufficient number of ST G2 Modules ComCode shall be provided to terminate the multimode fiber count on each floor.
 - (2) All singlemode fiber shall be fusion spliced to 2 meter LC pigtailed pre-loaded in Commscope SYSTIMAX Inc. G2 Modules ComCode 760032219 and mounted in a 1000G2 shelf ComCode 760023200, or a 600G2 shelf ComCode 760028324, dependant on quantity of connections and future growth, approved by owner. G2

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-6
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

splice organizers shall be utilized, the Splice Wallet for the 1000G2 shelf, and the RoloSplice for the 600G2 shelf.

- (3) The G2 shall provide cross-connect, inter-connect, splicing capabilities and contain the proper troughs for supporting and routing the fiber cables/jumpers.
- (4) The G2 shall consist of a modular enclosure with retainer rings in the slack storage section to limit the bending radius of fibers.
- (5) The G2 shall have a "window" section to insert G2 Modules for the mounting of connectorized fibers utilizing ST style couplers for multimode and "LC" style couplers for singlemode.
- (6) The G2 shall provide terminating capability of couplers, in the quantity noted on the contract drawings, in panels of 6, 12, 24, 48, 96, and 144 respectively.
- (7) Install ST or LC style G2 Modules, depending on fiber type, in all patch bays, by Commscope Systimax Inc.
- (8) Fiber optic connectors shall be manufactured by Commscope SYSTIMAX Solutions. Epoxy style multimode connectors shall be provided for multimode fiber unless the contractor elects to use fusion spliced pigtailed. Singlemode fiber optic cable must be fusion spliced to a Commscope SYSTIMA 2 meter LC pigtail preloaded in a G2 Module.

Multimode connector specifications shall be as follows:

- | | |
|--------------------------|----------------------------------|
| (a) attenuation | < 0.3 dB @ 1300 nm typical |
| (b) reflection | <-25 dB typical |
| (c) connector durability | <0.2 dB change after 500 matings |
| (d) ferrule | zirconia ceramic |
| (e) housing | nickel plated zinc |
| (f) boot | Estane |

Singlemode connector specifications shall be as follows:

- | | |
|--------------------------|----------------------------------|
| (a) attenuation | < 0.2 dB @ 1300 nm typical |
| (b) reflection | <-55 dB typical |
| (c) connector durability | <0.3 dB change after 500 matings |
| (d) ferrule | 2.5 mm zirconia ceramic |
| (e) housing | nickel plated zinc |
| (f) boot | Estane |

B. Manufacturer: Commscope SYSTIMAX Solutions Inc. G2 Series Distribution Shelf

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-7
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS**

2.11 CABLE TAGS AND LABELS

- A. Laser Warning Signs
 - (1) Laser warning signs shall be provided for areas with singlemode fiber optics. LED warning signs shall be provided for areas with multi mode fiber optics.
 - (2) Appropriate warning signs are to be in plain view for technicians to see.
 - (3) Manufacturer: Edmund Scientific # X68085 or approved equivalent.
- B. Identification Tags
 - (1) Materials: Metal or heavy plastic identification tags with cable type and number, copper pair or optic number assignments, and destination shall be provided on both ends of all cables (except station cables) and all splice cases.
 - (2) Manufacturer: 3-M, or approved equivalent.

2.12 COMMUNICATIONS BACKBOARDS

- A. The Contractor shall provide 3/4" A/C void-free plywood as noted on drawings.
- B. All walls must be covered with 3/4 inch A-C plywood, sanded and then painted with two coats of insulating fire-retardant white paint.
- C. Backboards shall be mounted vertically, starting 6" above the finished floor, and secured to the walls.
- D. All backboards are to be constructed of 4' x 8' plywood.
- E. All plywood panels must be mounted in contact with one another, leaving no gaps between sheets.
- F. All exposed edges must be chamfered. Screws, bolts, washers and/or nuts are to be counter sunk to be flush with the surface of the plywood.
- G. No equipment, electronics, conduit, trays, racking, etc. is to be installed on these backboards without the approval of Campus or District Representative.

2.13 STATION OUTLETS

- A. Metal Outlet Boxes
 - (1) Metal outlet boxes shall be installed as receptacles for the information outlets in the following locations: new interior wall construction, exterior locations, locations with special vapor proof or explosion proof applications, and floor mounted outlets. Outlet boxes shall be galvanized steel. Boxes installed in any exterior location where exposed to rain or moisture laden atmosphere shall be cast screw

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-8
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

hub type with gaskets and weatherproof covers. Boxes for vapor proof or explosion proof applications shall be designed specifically for such use.

- (2) In new wall construction, each box shall be flush mounted and equipped with a 1 1/4" conduit stubbed into the ceiling area. If cable trays are used as horizontal raceways, the 1 1/4" conduit will be extended to the top of the cable tray.
- (3) In walls that are not fishable and exterior locations, the outlet box will be surface mounted. Locations of surface mounted outlets must be approved by the Inspector of Record prior to installation. All floor boxes shall be recessed.
- (4) All boxes shall be equipped with single (one) gang ring in locations with one voice or one data cable. All boxes shall be equipped with a dual (two) gang ring in locations with a total of two to eight copper and fiber station cables.
- (5) Manufacturers: Appleton, Raco, or Steel City.

B. Non-Metallic Outlet Boxes

- (1) Non-metallic outlet boxes shall be used for interior surface mounted locations. Boxes shall be from same manufacturer as the non-metallic raceways used for installation of station wire.
- (2) The type of box must be from the same manufacturer and compatible with the wire mold raceway. Single (one) gang box shall be used in locations with one voice or data cable. Dual (two) gang box shall be used in locations with a total of two to eight copper and fiber station cables.
- (3) Manufacturer: Wiremold, or approved equal.

C. Mounting Brackets

- (1) Mounting brackets shall be utilized to attach faceplates on existing fishable walls.
- (2) Part Numbers: MPLS (for single gang faceplates); MPLS2 for dual gang faceplates.
- (3) Manufacturer: Caddy or approved equal.

D. Voice/Data Outlets

- (1) The standard voice/data outlet shall consist of three (3) Category X, four pair cables each terminated on a separate Commscope Systemax MGS400 series **(Category 6 or Category 5e)** rated RJ45 8-position jack following EIA/TIA 568 wiring standards. One outlet shall be electrical **XXX**, one electrical **XXX** and one electrical **XXX**. Each color jack is to be connected to a different colored cable. The **XXX** jack is in the upper left with the **XXX** jack to the right. The **XXX** jack is on the left on the second row. The blank locations are to have dust covers.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-9
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- (2) Commscope Systimax Inc. MGS400 series jacks shall be mounted in M16A-246 Modular Mounting Frame. Unused spaces shall be filled with M20AP-246 Dust Cover/Blank. This specification applies to all voice, data, fiber, and video locations except for the following:

TV/monitor use M14A faceplates

Wall phone use a 630B stainless steel faceplate

Raceway outlets must provide the capability of 6 ports at each location.

- (3) Manufacturer: Commscope Systimax MGS400 series.

E. Voice/Data/Video Outlets:

- (1) The voice/data/video outlet shall consist of two (2) Category X, four pair cables each terminated on a separate RJ45 8-position jack following EIA/TIA 568 wiring standards (one outlet shall be electrical ivory and one electrical orange), plus one RG6 coaxial cable/face plate, "F" connector. Each color jack is to be connected to a different colored cable. The orange jack is in the upper. The ivory jack is on the left on the second row. The video shall occupy the bottom right location. The other two locations are to have dust covers.
- (2) The CATV drop "F" connector shall be equipped with a self-terminating 75 ohm resistor configured to terminate the drop when no cable is connected into the outlet.
- (3) Manufacturer: Commscope Systimax Inc. Multimedia series.

F. Wall Phone Outlets:

- (1) Wall phone outlets shall consist of one (1) Category X, four pair cable terminated on an RJ45 8-position jack following EIA/TIA 568 wiring standards.
- (2) All wall phone outlets shall be placed at 44 inches above the finished floor unless otherwise noted to make the maximum height to the top of the telephone 48 inches above the finished floor.
- (3) Wall phone outlets shall be equipped with a duplex mud-ring around the standard dual gang outlet box.
- (4) Wall phone outlets shall consist of a stainless steel duplex faceplate equipped with a single 630B jack.
- (5) A backboard is required at each wall phone location. The specifications for this backboard are 6" X 9" X ½" birch plywood. The back is to be routed to allow for cable access.
- (6) Manufacturer: Commscope Systimax Inc. 630B stainless steel jack.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-10
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

G. Floor-Mount Voice/Data Outlets:

- (1) The voice/data floor-mount outlet shall consist of three (3) Category X, four pair cables per work station each terminated on a separate RJ45 8-position jacks following EIA/TIA 568 wiring standards. One outlet shall be electrical ivory, one electrical gray, and one electrical orange. Each color jack is to be connected to a different colored cable. The orange jack is in the upper left with the gray jack to it's right. The ivory jack is on the left on the second row. The other locations are to have dust covers.
- (2) The floor mount outlet shall be a joint power/signal outlet as defined in the electrical section of the specifications. The type of flush mount or monument must be coordinated with the Contractor.
- (3) The communications portion of the outlet shall be equipped with a NEMA standard duplex faceplate cutout and three RJ45 jacks.
- (4) The outlets shall be: Commscope Systimax M16A-246 with Category X jacks and dust covers M20AP-246 unless space restrictions shall only allow a 4 port faceplate. In this specific case a M106FR4-246 Com Code 106622277 is to be used.

H. Floor-Mount Furniture Feeds:

- (1) The voice/data furniture outlet shall consist of three Category X, four pair cables per work station terminated on a separate RJ45 8-position jack following EIA/TIA 568 wiring standards. One outlet shall be electrical ivory, one electrical gray, and one electrical orange. Each color jack is to be connected to a different colored cable.
- (2) The furniture shall be served through a joint power/signal poke-through floor outlet as defined in the electrical section. The Contractor shall provide and install all fittings and flex conduit (Seal-tight) with bushing necessary to form an unbroken link from the floor monument into the communications raceway of the modular furniture.
- (3) Category X station cable shall be placed from the IDF, through the riser sleeves, and routed through the cable tray system into the conduit, poles, etc. into the furniture to be served. The IDF closet terminations for these stations shall be on the same floor. (unless otherwise noted.)
- (4) No more than four stations (12 cables) shall be served through a single poke-through fitting.
- (5) The outlets shall be: Commscope Systimax M16A-246 with Category X jacks and dust covers M20AP-246 unless space restrictions shall only allow a 4 port faceplate. In this specific case the faceplate is to be a M14A-246 ComCode 106313646.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BACIS MATERIALS
16720-11
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- I. Video-Only Outlets
 - (1) Video only outlets are to be installed as described on the contract documents. The coupler modules are to be Commscope Systimax M81C-246.
- J. A/V Outlets
 - (1) Multimedia information outlets are to be Commscope Systimax M14A-246 ComCode 106313646 with 4 M20AP-246 dust covers. Refer to contract documents for details.

2.13 FACEPLATES

- A. Faceplates shall be supplied for every information outlet (voice, data, fiber, and video). Unless otherwise noted, faceplates shall be plastic and electrical ivory in color. All faceplates shall be as specified in 16720 2.12.B.2.
- B. Faceplates for information outlets (voice, data, fiber, and video) shall be for single gang rings (flush for wall, recessed for floor).

2.14 COPPER CABLE TERMINATION BLOCKS-STATION CABLE

- A. Materials
 - (1) All copper cable terminations shall be made on SYSTIMAX 110 modular terminals (300 pair size unless otherwise specifically noted as 900 pair). The Commscope Systimax part numbers are 110PB2-300FT Comcode 107058810 or 110PB2-900FT ComCode 107058869.
 - (2) All blocks shall be equipped with color coded identification strips following the convention listed below:
 - (a) Green - to dedicated MDF pairs
 - (b) White - to voice stations (**XXX** outlet)
 - (c) Red - to data stations (**XXX** outlet)
 - (d) Orange – to data stations (**XXX** outlet)
 - (e) Blue - riser
 - (3) All block assemblies, unless otherwise stated in the contract documents, (each 300 pair or 900 pair terminal) shall include a vertical wire management panel per block assembly. The Commscope Systimax part numbers are 188D3 ComCode 107151193 for 300 pair terminals and 188C3 ComCode 107151185 for 900 pair terminals.
 - (4) The proper size retaining clips shall be used for all cable terminations (e.g., four-pair for stations and five-pair for riser, inter-building, and entrance).

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BACIS MATERIALS
16720-12
XX% CONSTRUCTION DOCUMENTS – DATE HERE

**SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS**

B. Manufacturer: Commscope Systimax Inc.

2.15 BDF AND IDF EQUIPMENT RACKS

A. Materials

- (1) The BDF and each IDF shall be equipped with a 7' high, 19" wide equipment rack for fiber optic terminations and data equipment. The exact number of racks are specified on the contract drawings. The quad electrical outlet designated for each rack is to be mounted on the rack not on the adjacent wall at +72".
- (2) The frame shall be a bolted aluminum construction and shall meet EIA standards for equipment support frames. Seismic cross bracing that meets Zone 5 requirements shall be provided.
- (3) Floor-mounted frames shall have a self-supporting base designed to be anchored to the floor.
- (4) Frames shall be brushed aluminum not painted
- (5) Each rack will be equipped with a surge suppressor, APC SurgeArrest Rack mount NET9RM.

B. Manufacturers: Chatsworth, Commscope Systimax Inc. Model RK130A, Newton, SWDP, and Homoco or approved equal.

2.16 PULL BOXES AND CABINETS

A. Materials:

- (1) All pull boxes and cabinets shall be code gauge galvanized steel. Pull boxes shall have a length of at least eight (8) times trade-size diameter of the largest conduit.
- (2) All pull boxes must be approved by the campus before installation, including the size, number of conduits entering the pull box and the feasibility of its placement. The size, orientation and location of the pull box are to be called out on the contract documents.
- (4) No extension boxes shall be accepted.
- (5) Pull box lids must be such that one person can safely open, remove and replace the lid without the need of special tools, rigging, and / or any assistance. Large pull boxes must be equipped with multiple section lids that can be easily removed and set aside from a hatch or T-bar ceiling opening.

B. Manufacturer: Hoffman, Wireguard Systems Inc., or approved equivalent.

**NAME OF PROJECT
LOCATION OF PROJECT**

TELECOMMUNICATIONS BACIS MATERIALS
16720-13
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

2.17 WIRE MANAGEMENT

A. Materials

- (1) All equipment and fiber optic panel frame racks shall be equipped with vertical and horizontal wire management organizers as outlined in the design documents. All horizontal wire managers shall be heavy duty painted black metal units designed specifically to connect to equipment frames. All vertical wire managers shall be brushed aluminum – clear. All wire managers shall be secured to the frames and shall provide a clear and unobstructed pathway in which to route the cables.

B. Vertical wire managers

- (1) Vertical wire managers shall be six inches wide and shall have a minimum of seven evenly spaced wire rings designed to maintain jumper, patch, or cross-connect wire in place.
- (2) These organizers shall be designed to extend past the frame to allow placement of equipment in any position within the rack. When mounted between equipment frames, they shall be designed to direct cables into either frame and shall be securely mounted to both units.
- (3) Manufacturers: Commscope SYSTIMAX Solutions Inc. Model GV100A, Homoco VCB-93-6UH or VO-84-T6, or SWDP 2374.

C. Horizontal (top of frame) wire managers

- (1) The horizontal wire managers shall be a minimum of six inches wide and shall have a lip or fence no less than six inches deep. In any location designed to support over 150 stations, the minimum size shall be nine inches wide.
- (2) Manufacturers: Homoco TR runway with fence and pan, or SWDP 2183-19.

D. Horizontal (mounted in the frame between equipment) wire managers

- (1) The in-frame horizontal managers shall range from one to two rack units in size and shall extend from side rail to side rail. These units shall be equipped with a minimum of four horizontal supporting rings and a minimum of eight smaller retaining rings top and bottom to route cables directly into equipment ports. The horizontal retaining rings shall be a minimum of 3" by 3".
- (2) Each frame shall be equipped with three units mounted as directed by the District's representative.
- (3) Manufacturers: Commscope SYSTIMAX Solutions Inc, Models HCM1U or HCM2U, Homoco FCM-19-2SRC or FCM-19-2XL with 310-19E strip, or SWDP 713.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-14
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

2.18 FIRESTOPPING

A. Materials

- (1) Firestopping shall be a material, or combination of materials, to retain the integrity of time-rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases. It shall be used in specific locations as follows:
 - (a) Duct, cables, conduit, piping, and cable tray penetrations through floor slab and through time-rated partitions or fire walls.
 - (b) Openings between floor slab and curtain walls, including inside hollow curtain walls at the floor slab.
 - (c) Penetrations of vertical service shafts.
 - (d) Openings and penetrations in time-rated partitions of fire walls containing fire doors.
 - (e) Locations where specifically shown on the drawings or where specified in other sections of the project manual.
- (2) Firestopping materials shall be asbestos free and capable of maintaining an effective barrier against flame, smoke, and gasses in compliance with requirements of ASTM E 814, and UL 1479. Only listed firestopping material acceptable to State, County, City and campus codes shall be used.
- (3) The rating of the firestops shall in no case less than the rating of the time-rated floor or wall assembly.
- (4) Damming materials shall be compatible with the above materials, as certified by the manufacturer in their respective published data.

B. Manufacturers

- (1) 3M Brand Caulk CP-25
- (2) 3M Brand Putty 303
- (3) 3M Brand Wrap/Strip FS-195
- (4) 3M Brand Composite Strip CS-195
- (5) 3M Brand Penetrating Sealing Systems 7900 Series
- (6) Dow Corning Fire Stop Foam, liquid component Part A (black) and liquid component Part B (off-white)
- (7) Dow Corning Fire Stop Sealant

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-15
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

(8). Fibrex Safing Insulation.

2.19 PATCH PANELS

- A. Materials: The Category X patch panels for 19 inch rack mounting, EIA-TIA568, shall be Commscope Systimax Inc. PATCHMAX. Sizes are 24 or 48 jack capacity.
- B. Manufacturer: Commscope Systimax Inc.

2.20 PROTECTOR PANELS

- A. Materials: Inter-building and entrance cable protection shall be Commscope Systimax Inc. 190A1 Multipair Protector Panel equipped with 4C1S Protector Units.
- B. Manufacturer: Commscope Systimax Inc.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. All installation work shall be performed according to **published** industry guidelines, rules, and regulations. All SYSTIMAX[®] system equipment shall be installed according to Commscope Systimax Inc. procedures.
- B. No cables (copper, coaxial and / or fiber optic) shall be spliced without written authorization from the District's representative.
- C. The bend radius of any cable installed must not exceed the manufactures specifications. In those cases, such as in wire mold, where the minimum radius cannot be maintained, a 90 degree fitting is to be used provided the performance criteria is not jeopardized.

3.2 CONDUIT

- A. All conduits shall be routed parallel and perpendicular to walls.
- B. All conduit shall be installed in accordance with NEMA "Standard of Installation."
- C. No communications outlet boxes shall be "daisy-chained." Each communications outlet shall be served by a separate 1-inch (minimum) conduit.
- D. In rooms with a drop or false ceiling, communications outlets shall be served by a 1-inch conduit stubbed six inches above the false ceiling, angled toward the cable tray or open access area, and be equipped with a compression fitting and plastic bushing. All stubs shall be marked "Comm".
- E. All conduit shall be equipped with an approved water or barrier seal in building access points.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BACIS MATERIALS
16720-16
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- F. No communications conduit shall contain more than 180 degrees of bend without the use of a pull box. The District's representative must approve pull boxes to ensure proper sizing and conduit entry placement.
- G. In areas where hard lid ceilings are in place, all conduits are to be run to accessible ceiling space and in the direction of the communications room or cable tray.
- H. The minimum bend radius for conduits within the building that are greater than 1 inch in diameter is to equal 1 foot of radius per inch diameter of radius. A four inch conduit, for example, must have a 4 foot radius bend.

3.3 CABLE TRAY

- A. The Contractor shall be responsible for placement of the cable tray in concert with other trades in order to allow sufficient room for the cable installers to gain access to all portions of the tray system. Cable tray location shall be coordinated with open ceiling areas, access panel locations, and feeder conduit positions in order to provide an accessible cable pathway throughout the facility.
- B. Cable trays shall not be placed closer than six (6) inches to any overhead light fixture and no closer than twelve (12) inches to any electrical ballast. A minimum of eight (8) inches of clearance above the tray shall be maintained at all times. All bends and T-joints in the tray shall be fully accessible from above (within one (1) foot). Trays shall be mounted no higher than twelve (12) feet above the finished floor and shall not extend more than eight (8) feet over a fixed ceiling area.
- C. The Contractor shall fire stop around the tray and, after installation of the cables, within the tray using removable pillow-style products following manufacturers guidelines. Sound deadening material shall be provided and installed after installation of cable.
- D. In rooms without a drop ceiling (open to the structure), the cable tray shall be mounted as high as possible to provide the greatest clearance above the finished floor, but within the limits in 3.3.B above.

3.4 COMMUNICATIONS BACKBOARDS

- A. Communication backboards shall be configured and installed as defined on the drawings.
- B. All backboards shall be securely mounted to wall structures or studs using fasteners designed for the surface. All fasteners shall be mounted flush with the backboard and shall be located to not interfere with the placement of cable or equipment. Backboards shall be sanded smooth after being secured to the wall.
- C. All backboards shall be 3/4 inch A-C plywood, sanded and then painted with two coats of insulating fire-retardant white paint.
- D. Screws, bolts, washers and/or nuts are to be counter sunk to be flush with the surface of the plywood.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-17
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- E. No equipment, electronics, conduit, trays, racking, etc. is to be installed on these backboards without the approval of the campus representative.

3.5 SPLICE CASES – COPPER AND FIBER

- A. Any splice case enclosing a filled cable must be rated as a low-smoke (entrance) enclosure and must be designed to eliminate the movement of flow compound.
- B. All splices in underground vaults and as noted by engineer shall be encapsulated with a re-enterable type compound.
- C. Splice cases or enclosures shall have a hard outer shell (either metal or hard-molded plastic) for mechanical protection to the splice and sealed end plates.
- D. The splice case is to utilize a controlled force injection encapsulate system that will force encapsulate into the core of the splice and down the core of the cable. The splice core shall be wrapped with a porous wrap to allow encapsulate to flow out to the walls of the splice and to allow easy re-entry.
- E. Encapsulate compound to be used must be re-enterable and meet all requirements for use in confined spaces or OSHA standards for compounds used in confined spaces; which ever is more stringent.

3.6 FIBER OPTIC TERMINAL PANELS

- A. Final location of panels shall be coordinated with the District. Separate LIUs shall be used for singlemode and multimode terminations.
- B. Rack-mounted fiber panels shall be mounted at the top of the rack. See 2.9 for details.
- C. All cables mounted into fiber optic panels shall be installed and secured as defined by the manufacturer using the tools, materials, and techniques outlined by the manufacturer.

3.7 TERMINAL BLOCKS

- A. All 110 terminal blocks shall be clearly and neatly labeled with outlet (jack) or pair assignments.
- B. All outlets shall be numbered sequentially in the closet using a numbering assignment agreed upon with the District.
- C. All riser, tie, and data terminals shall be numbered using pre-printed identification strips.
- D. All terminal locations shall be approved prior to installation by the campus staff.
- E. All work on terminals shall be accomplished using tools and support hardware designed for the 110 system and following procedures identified by the manufacturer.

3.8 LABELING

NAME OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS

LOCATION OF PROJECT

16720-18

XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- A. The Contractor shall legibly label all voice and data outlets, cable, blocks, frames, and patch panels per campus-specific directions and as defined herein. Outlet faceplates shall be labeled on both sides.
- B. The Contractor shall employ a cable labeling and tagging scheme that meets ANSI-606 specifications.
- C. Construction labels shall be installed on all cables as they are pulled. These labels shall contain the same information as the finished labels. Typed labels on self-sealing tape shall be used. Each cable shall have a unique number that shall be related to the appropriate face plate number and jack letter.
- D. A label shall be installed on each conduit attached to a communications wall box and shall be affixed to the end of the conduit near the cable tray. The label shall have a unique number related to the appropriate face plate number and jack letter.
- E. Labels shall be installed on all station cables within two (2) inches of the end of the outer jacket material within the back box and at the blocks/patch panel. Typed labels on self-sealing tape, with a plastic overlay, shall be used. Each cable shall have a unique number that shall be related to the appropriate face plate number and jack letter.
- F. Labels shall be installed on all patch panels, blocks, and both the inside and outside of all face plates. A uniquely numbered label for each face plate and a unique letter for each jack shall be supplied and installed. The labels shall be machine printed (not embossed) on vinyl tape using a Brothers label maker or approved equivalent. The labels shall have protective overlays.
- G. Labels shall be numbered according to a scheme developed in consultation with the District.
- H. Ground bars:
 - (1) The master ground bar shall be labeled as such.
 - (2) Each subsidiary ground bar shall be labeled as such and have a unique identified.
 - (3) All ground bars shall have a warning label that states, *"If this connector or cable is loose or shall be removed, please call the Telecommunications Manager."* All ground bars shall be connected to the building ground with continuous "0" AWG wire.
 - (4) Each ground cable shall be labeled with a unique identifier.

3.9 STATION OUTLETS

- A. Surface mounted outlet box and surface mounted raceway requires approval from Inspector of Record prior to installation.

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-19
XX% CONSTRUCTION DOCUMENTS – DATE HERE

SECTION 16720
TELECOMMUNICATIONS - BASIC MATERIALS AND METHODS

- B. Station outlets shall be mounted securely at work area locations.
- C. Station outlets shall be located so that the cable required to reach the desktop equipment is no more than 16 feet long.
- D. Station outlets should not be "daisy-chained."
- E. Outlets shall be mounted as follows
 - (1) Wall phone: 48 inches above the finished floor.
 - (2) Standard voice/data outlet: 15 inches above the finished floor.
 - (3) Outlets Above Counter top: 6 inches above the counter top.

3.9 MODULAR FURNITURE TELECOMMUNICATIONS OUTLETS

- A. The Contractor shall provide and install all components and labor necessary to completely install, test, and document voice and data telecommunications outlets at each modular furniture workstation location.
- B. Category X station cable shall be placed from the IDF, through the riser sleeves, through the cable tray system into the conduit, poles, etc. into the furniture to be served. The IDF closet terminations for these stations shall be on the same floor as the modular furniture it serves. (unless otherwise noted.)
- C. The Contractor shall coordinate the telecommunications and electrical installation so that the modular furniture is served from the joint signal/power floor monuments or joint power pole in a consistent manner. The Contractor shall provide and install all fittings, flex conduit (Sealtight), adapter plates, and telecommunications cable and components necessary to install three (3) Category X four pair station cables from the consolidation point box (in the ceiling space of the floor below), through the floor monument or pole, , into the furniture raceway, and to the final user outlet location (including jacks, adapters, and faceplates).
- D. The telecommunications installers shall coordinate with the electrical drawings for the number and location of user voice and data outlets.
- E. Labels shall be numbered according to a scheme developed in consultation with the District.
- F. In all locations requiring the running of exposed cabling, the cabling shall be placed in Wiremold or approved equivalent.

END OF SECTION

NAME OF PROJECT
LOCATION OF PROJECT

TELECOMMUNICATIONS BASIC MATERIALS
16720-20
XX% CONSTRUCTION DOCUMENTS – DATE HERE