NORTH ORANGE COUNTY COMMUNITY COLLEGE DISTRICT
SECTION 27 15 00 – HORIZONTAL CABLING
SAMPLE SPECIFICATION

RELATED SECTIONS:

Section 27 00 00 General Requirements
Section 27 02 00 General Communication Requirements
Section 27 05 00 Common Work Results for Communications
Section 27 05 26 Grounding and Bonding for Communications
Section 27 05 28 Pathways for Communication Systems
Section 27 05 37 Fire-stopping For Communication Systems
Section 27 10 00 Structure Cabling Testing
Section 27 11 00 Communication Equipment Room Fittings
Section 27 12 00 Communication Requirements for (RF) CATV System
Section 27 12 23 ABF Fiber Optic Cabling
Section 27 16 00 Communications Connection Cords

Communication Copper Horizontal Cabling

PART 1 – GENERAL

WORK INCLUDES
Provide all labor, materials, and equipment for the complete installation of all Copper Horizontal Cabling applications called for in the Bid Documents.

1.1 SCOPE OF WORK

This section includes the minimum requirements for Copper Horizontal Cables.

1.1.1 Horizontal (to desktop) cable shall consist of Category (Enter Type Here) copper cable for all Data and Voice applications.

1.1.2 At corporate, engineering and campus facilities, horizontal cabling to typical work area outlets (including offices, cubicles and conference rooms) shall consist of four (Enter Type Here) cables serving each outlet.

1.1.3 Outlets for wall-mounted or other "telephone only" installations shall consist of one (Enter Type Here) cable as a minimum.

1.1.4 Outlets for wireless access points (APs) shall consist of two (Enter Type Here) cables as a minimum with a 1 meter maintenance loop.

1.2 QUALITY ASSURANCE

All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

1.2.1 Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association

(TIA) recommended installation practices when installing communications/data cabling.

1.2.2 Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:
ANSI/TIA – 568 Series Commercial Building Telecommunications Cabling Standard,
TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces,
ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual
TIA/EIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
TIA/EIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards
ISO/IEC 11801 - Generic Cabling for Customer Premises
CENELEC EN-50173 - Generic Cabling Systems

1.3 CABLE CONSTRUCTION (by type):

Listed CMR cable: Solid copper conductors with high-density polyolefin insulation and an overall low smoke polyvinyl chloride (PVC) jacket to achieve a riser (i.e., non-plenum) rating by applicable NEC requirements.

1.3.1 Listed CMP cable: Solid copper conductors with fluorinated ethylene propylene (FEP)/polyolefin insulation and an overall low smoke PVC jacket to achieve plenum rating by applicable NEC requirements.

1.3.2 LSZH cable: Solid copper conductors with polyolefin insulation and a low smoke-zero halogen (LSZH), compound jacket to achieve a LSZH rating by applicable IEC standards.

1.3.3 LC cable: Solid copper conductors with FEP fluoropolymer insulation and overall FEP fluoropolymer jacket to achieve CMP 50 rating by UL standards

1.3.4 OSP outdoor cable rated for wet locations: Solid copper conductors with polyolefin insulation, polyolefin fluted center member with flooding compound, and black polyethylene jacket.

1.3.5 Comply with following general physical specifications:

1.3.5.1 Maximum pulling tension: 110 Newton's (25 pound-force)

1.3.5.2 Operating temperature: –20 to 60 degrees C [–4 to 140 degrees F]

1.4 SUBMITTALS

Provide product data for the following:
Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.5 COORDINATION

Coordinate layout and installation of cable tray with other trades.

NORTH ORANGE COUNTY COMMUNITY COLLEGE DISTRICT
SECTION 27 15 00 – HORIZONTAL CABLING
SAMPLE SPECIFICATION

PART2 – PRODUCTS

2.1 COMMUNICATIONS HORIZONTAL CABLING (Station Outlets) (Category 5e/Class D)

2.1.1 Category 5e Unshielded Twisted-Pair (UTP) Cable
2.1.2 All Cables shall be of round construction
2.1.3 Each cable shall contain 4 color coded pairs
2.1.4 Cable shall be listed for the environment where it will be installed (Plenum, Riser, LSZH, etc.)
2.1.5 Basis for Design Specifications: CommScope Sysitmax Category 5e DataPipe 200MHz cable.
2.1.6 Approved Manufacturer: CommScope Systimax
2.1.7 Catalog/Manufacturer Part Number
(Provide Approved Materials List and Part Number Here)
2.1.8 Category 5e horizontal cabling **shall** meet or exceed the following specifications:

Electrical Specifications	
ANSI/TIA Category	5e
dc Resistance Unbalance, maximum	5%
dc Resistance, maximum	1.6 hms/100 m
Delay Skew	15 ns
Mutual Capacitance	5.6 nF/100 m @ 1 kHz
Nominal Velocity of Propagation (NVP)	69%
Operating Frequency, maximum	200 MHz
Transmission Standards	ANSI/TIA-568-C.2 | CENELEC EN 50288-3-1 | ISO/IEC 11801 Class D
Safety Voltage Rating	300 V
Dielectric Strength, minimum	1500 Vac | 2500 Vdc

Environmental Specifications	
Environmental Space	Non-plenum, Plenum
Flame Test Method	CMR, CMP, LSZH
Installation Temperature	0 °C to +60 °C (+32 °F to +140 °F)
Operating Temperature	-20 °C to +60 °C (-4 °F to +140 °F)

General Specifications	
Brand	**CommScope Systimax**
Cable Component Type	Horizontal
Cable Type	U/UTP (unshielded)
Pairs, quantity	4
Jacket Color	**Provide Color Here**

Conductor Gauge, singles	24 AWG
Conductor Type, singles	Solid
Conductors, quantity	8
Packaging Type	Reel
Product Number	5E55, 5EN5, 5EN5ZH

Mechanical Specifications	
Pulling Tension, maximum	11 kg | 25 lb

All guarantees described in this document are subject to the terms and conditions of the Sysitmax Extended Product Warranty and Applications Assurance Program

2.1.9 All electrical transmission tests include swept frequency measurements.

2.1.10 Category 5e horizontal cabling shall meet or exceed the performance specifications listed in the following table when installed in a 4 connector Channel.

DataPipe Solution	100 MHz	Margin to Cat 5e
Insertion Loss	23.5 dB	2.00%
NEXT Loss	32.1 dB	2.0 dB
Power Sum NEXT	29.1 dB	2.0 dB
ACR	8.6 dB	2.5 dB
Power Sum ACR	5.6 dB	2.5 dB
ELFEXT	19.4 dB	2.0 dB
Power Sum ELFEXT	16.4 dB	2.0 dB
Return Loss	12.0 dB	10 dB

2.1.11 The table provides reference values only. All parameters comply with the governing equations over the entire frequency range.

2.1.12 All values and equations apply to worst-case channels utilizing four DataPipe series cables with full cross-connects consolidation points and work area outlets (4 connections in a channel) for the length up to 100 meters.

2.2 DATA COMMUNICATIONS HORIZONTAL CABLING (Category 6A/Class EA)

2.2.1 Category 6 Augmented (6A)/Class EA Unshielded Twisted-Pair (UTP) Cable

2.2.2 All Cables shall be of round construction

2.2.3 Each cable shall contain 4 color coded pairs

2.2.4 Basis for Design Specifications: CommScope Sysitmax Ultra 10® U/UTP Twisted Pair Cable

2.2.5 Cable shall be listed for the environment where it will be installed (Plenum, Riser, LSZH, etc.)

2.2.6 Approved Manufacturer: CommScope Systimax Catalog/Manufacturer Part Number
2.2.7 (**Provide Approved Materials List and Part Number Here)**
2.2.8 Category 6A horizontal cabling shall meet or exceed the performance specifications:

Electrical Specifications	
ANSI/TIA Category	6A
dc Resistance Unbalance, maximum	4%
dc Resistance, maximum	8.00 ohms/100 m
Mutual Capacitance	6.0 nF/100 m @ 1 kHz
Nominal Velocity of Propagation (NVP)	0.65
Operating Frequency, maximum	500 MHz
Transmission Standards	ANSI/TIA-568-C.2
Safety Voltage Rating	300 V
Dielectric Strength, minimum	1500 Vac | 2500 Vdc

Environmental Specifications	
Environmental Space	Non-plenum, Plenum
Flame Test Method	CMR, CMP, LSZH
Installation Temperature	0 °C to +60 °C (+32 °F to +140 °F)
Operating Temperature	-20 °C to +60 °C (-4 °F to +140 °F)

General Specifications	
Brand	**CommScope Systimax**
Cable Component Type	Horizontal
Cable Type	U/UTP (unshielded)
Pairs, quantity	4
Jacket Color	**Provide Color Here**
Conductor Gauge, singles	23 AWG
Conductor Type, singles	Solid
Conductors, quantity	8
Separator Type	Bisector
Packaging Type	Reel
Product Number	10G4, 10GN4, 10GNZH

Mechanical Specifications	
Pulling Tension, maximum	11 g | 25 lb

Category 6A horizontal cabling shall meet or exceed the performance specifications listed in the following table when installed in a 4 connector Channel.

SAMPLE SPECIFICATION

Guaranteed Performance Specifications for 4-Connection Ultra 10 UTP Channels		
Electrical Parameter	Guaranteed Channel Margins to Amendment 1 to ISO/IEC 11801:2002 "Class E" (1-250MHz)	Guaranteed Channel Margins to Draft ISO/IEC 11801 Edition 2.1 "Class E_A" (1-250MHz)
Insertion loss	5%	2%
NEXT	6 dB	1 dB
PSNEXT	7.5 dB	2.5 dB
ACR-F	6 dB	6 dB
PSACR-F	8 dB	8 dB
Rerturn Loss	3 dB	> 0 dB
PSANEXT, PSAACR-F, PSANEXT avg, PSAACR-F avg	N/A	> 0 dB

[1]Insertion Loss margin is calculated based on 12m of 95 series cordage and 88m of 91A series cable plus 4 connections. If the total cord length in a 100m channel has to be greater than 12m, please refer to GigaSPEED X10D Design and Installation Guidelines for the instruction on how to scale cable and cord length properly.

Guaranteed Channel Performance Specifications for 4-Connection Ultra 10 UTP Systems														
Freq (MHz)	Insert-ion Loss (dB)	PS ANEXT (dB)	Avg. PS ANEXT (dB)	PS AACR-F (dB)	AVG. PS AACR-F (dB)	NEXT (dB)	ACR-N (dB)	PS NEXT (dB)	PS ACR-N (dB)	ACR-F (dB)	PS ACR-F (dB)	Return Loss (dB)	Delay (ns)	Delay Skew (ns)
1.0	3.8	67.0	69.3	67.0	71.0	71.0	68.9	69.5	67.4	69.3	68.3	22.0	580	40
4.0	4.0	67.0	69.3	65.0	69.0	69.0	65.0	68.0	64.0	57.2	56.2	22.0	562	40
8.0	5.6	67.0	69.3	58.9	62.9	64.2	58.5	63.1	57.5	51.2	50.2	22.0	557	40
10.0	6.3	67.0	69.3	57.0	61.0	62.6	56.3	61.5	55.2	49.3	48.3	22.0	555	40
16.0	7.9	67.0	69.3	52.9	56.9	59.2	51.3	58.1	50.2	45.2	44.2	18.9	553	40
20.0	8.9	67.0	69.3	51.0	55.0	57.6	48.7	56.5	47.6	43.2	42.2	19.0	552	40
25.0	10.0	66.0	68.3	49.0	53.0	56.0	46.1	54.8	44.9	41.3	40.3	19.1	551	40
31.25	11.2	65.1	67.4	47.1	51.1	54.4	43.3	53.2	42.1	39.3	38.3	19.2	550	40
62.5	15.9	62.0	64.3	41.1	45.1	49.4	33.4	48.1	32.2	33.3	32.3	17.0	549	40
100.0	20.4	60.0	62.3	37.0	41.0	45.9	25.6	44.6	24.2	29.3	28.3	15.0	548	40
200.0	29.4	55.5	57.8	31.0	35.0	40.8	11.4	39.4	10.0	23.2	22.2	12.0	547	40
250.0	33.1	54.0	56.3	29.0	33.0	39.1	6.0	37.7	4.5	21.3	20.3	11.0	546	40
300.0	36.5	52.8	55.1	27.5	31.5	32.7	-3.8	31.3	-5.3	19.7	18.7	7.2	546	40
400.0	42.7	51.0	53.3	25.0	29.0	30.6	-12.2	29.1	-13.7	17.2	16.2	6.0	546	40
500.0	48.3	49.5	51.8	23.0	27.0	28.9	-19.4	27.3	-21.0	15.3	14.3	6.0	546	40

The table provides reference values only. All parameters comply with the governing equations over the entire frequency range.

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SAMPLE SPECIFICATION

All values and equations apply to worst-case channels utilizing four-pair Sysitmax Ultra 10 series cables with full cross-connects, consolidation points and work area outlets (4 connections in a channel) for the length up to 100 meters.

PART 3 – EXECUTION

3.1 INSTALLATION

Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.

3.1.1 Cable shall be installed following industry standard practices.

3.1.2 Horizontal cabling shall be installed from the work area outlet location to the nearest Telecommunications Space.

3.1.3 Horizontal cabling shall be terminated on a patch panel in the telecommunication space which is the same category rating as the Cable. i.e. Cat 6A cable terminates on Cat 6A panels.

3.1.4 Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.

3.1.5 Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

Communication Optical Fiber Horizontal Cabling

PART 1 – GENERAL

WORK INCLUDE
Provide all labor, materials, and equipment for the complete installation of all Optical Fiber Horizontal Cabling applications called for in the Bid Documents.

1.1 SCOPE OF WORK

This section includes the minimum requirements for Optical Fiber Horizontal Cables.

1.1.1 At corporate, engineering, field sales offices and campus facilities, horizontal cabling to typical work area outlets (including offices, cubicles and conference rooms) shall consist of two or more strands of fiber serving each outlet.

1.1.2 When deemed as a requirement, fiber to the desktop shall require a minimum of **(Enter number of Strands here)** of fiber. All other fiber optic applications shall be specified with a minimum 100% growth allocation.

1.1.3 Unless otherwise stated in the Bid and/or Engineering Documents, all horizontal (to desktop) cable shall consist of OM3 or OM4 laser optimized 50/125 micrometer micron optical fibers and shall extend distance of low-cost 850 nanometer vertical cavity surface-emitting laser (VCSEL) based electronics, supporting following list of application standards.

1.1.4 Cable shall support dual speed 1 gigabit per second/10 gigabits per second ports, allowing incremental upgrades of switches and serving with less disruption.

1.1.5 Optical fibers shall be differential mode delay (DMD) tested using a high-resolution test bench that exceeds fiber optic test procedure (FOTP) 220 standards and independently certified by UL.

1.1.6 The optical fiber shall couple sufficient power from light emitting diode (LED) sources to support legacy applications such as Ethernet, token ring, FDDI, Fast Ethernet, and ATM. In addition, 50 micrometer core size shall be directly compatible with laser-based applications, as follows:

2.1 QUALITY ASSURANCE

All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.

2.1.1 Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

2.1.2 Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/TIA – 568 Series Commercial Building Telecommunications Cabling Standard,
TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces,
ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual
Bellcore, fiber distributed data interface (FDDI), and EIA standards
ANSI/ICEA S-87-640, Standard for Optical Fiber Outside Plant Communications Cable
Telcordia's Generic Requirements for Optical Fiber and Optical Fiber Cable
Telcordia requirements for superior armored cable
TIA/EIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
TIA/EIA-568-C.3 – Optical Fiber Cabling Components Standard
ISO/IEC 11801 - Generic Cabling for Customer Premises
CENELEC EN-50173 - Generic Cabling Systems

1.3 CABLE CONSTRUCTION (by type):

Listed OFNP cable: fiber buffer and cable jacket materials that have low smoke, low flame propagation characteristics that achieve a plenum rating by applicable NEC requirements.

1.3.1 Listed OFNR cable: fiber buffer and cable jacket materials that have low smoke, low flame propagation characteristics that achieve a plenum rating by applicable NEC requirements.

1.3.2 LSZH cable: fiber buffer and cable jacket materials that have non-halogen , low smoke, low flame propagation characteristics that achieve a OFN-LS rating by applicable NEC and IEC requirements.

1.4 SUBMITTALS

Provide product data for the following:
Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.5 COORDINATION

Coordinate layout and installation of cable tray with other installations.

PART 2 – PRODUCTS

2.1 INDOOR UL RATED, TIGHT BUFFERED DISTRIBUTION CABLE

2.1.1 Basis for Design Specifications: CommScope Sysitmax optical fiber cable, in strand-count identified on the bid document, and with the appropriate jacket material (OFNR, OFNP or LSZH) for the global region in which the cable will be installed.

2.1.2 Cable construction:

1. Tight buffer optical fibers, aramid strength yarn, and UL rated outer jacket.
2. Available in either Plenum, Riser or LSZH listing
3. Sheath color-coded to optical fiber type and printed with relevant cable information on cable

2.1.3 Approved Manufacturer: CommScope Sysitmax
Example Catalog/Manufacturer Part Number
P-012-DS-5M-FSUAQ (plenum 12F for NAR)
N-024-DS-5K-FSUAQ (24F LSZH for EMEA)
R-006-DS-5L-FSUAQ (6F Riser for APAC and CALA)
(See Appendix A for Approved Materials List)

2.2 INDOOR ARMORED, UL RATED, TIGHT BUFFERED DISTRIBUTION CABLE

2.2.1 Basis for Design Specifications: CommScope Sysitmax optical fiber cable, in strand-count identified on the bid document, and with the metallic armor of the appropriate jacket material (OFNR, OFNP, LSZH) for the global region in which the cable will be installed.

2.2.2 Cable construction:

2.2.2.1 Tight buffer optical fibers, aramid strength yarn, and UL rated jacket.

2.2.2.2 Interlocking armor spiraling around premises distribution style cable, with an overall sheath jacket to provide additional protection and security

2.2.2.3 Aluminum armor

2.2.2.4 Available in either Plenum, Riser or LSZH listing

2.2.2.5 Sheath color-coded to optical fiber type and printed with relevant cable information on cable

2.2.3 Approved Manufacturer: CommScope Systimax,
Example Catalog/Manufacturer Part Number
(Provide Part Number Here) (plenum 12F for NAR)
(Provide Part Number Here) (24F LSZH for EMEA)
(Provide Approved Materials List)

PART 3 – EXECUTION

3.1 INSTALLATION

Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.

3.1.1 Horizontal cabling shall be terminated on a Fiber Connectors, Adapters and Adapter Panels which is designed for the fiber type of the cable. i.e. Single-mode cable terminates on Single-mode Connectors and Adapters.

3.1.2 Contractor shall not exceed the maximum pulling tension or the minimum bending radius for fiber optic cables per manufacturer's specifications.

3.1.3 Fiber Connectors, Adapters and Adapter Panels shall be installed following industry standard practices.

3.1.4 Contractor shall test all horizontal links for the relevant standards and requirements per the ANSI/TIA-568 Requirements.

Communications Copper Jack/Information Outlets and Connectors

PART 1 – GENERAL

WORK INCLUDE
Provide all labor, materials, and equipment for the complete installation of all Jack/Information outlets and connections called for in the Bid Documents.

1.1 SCOPE OF WORK

This section includes the minimum requirements for Jack/Information outlets and Connectors.

1.1.1 The channel performance for the installation shall meet or exceed the requirements of ANSI/TIA-568 and ISO/IEC 11801 for the specified Category.

1.1.2 The Jack/Information outlets shall match the category of the cabling

1.1.3 All jacks/information outlets shall meet UL 94 V-O

1.2 QUALITY ASSURANCE

All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.

1.2.1 Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

1.2.2 Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

1.2.3 Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/TIA – 568 Series Commercial Building Telecommunications Cabling Standard,
TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces,
ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual
Bellcore, fiber distributed data interface (FDDI), and EIA standards
ANSI/ICEA S-87-640, Standard for Optical Fiber Outside Plant Communications Cable
Telcordia's Generic Requirements for Optical Fiber and Optical Fiber Cable
TIA/EIA-568-C .1
TIA/EIA-568-C.2
TIA/EIA-568-C.3
ISO/IEC 11801
CENELEC EN-50173

1.3 SUBMITTALS

Provide product data for the following:
Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.4 COORDINATION

Coordinate installation of Jack/Information outlets and connectors with other trades.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 All products will be compliant to RoHS 2002/95/EC

2.1.1.1 All products will be designed, manufactured and/or distributed under this quality management system: ISO 9001:2008

2.1.2 Telecommunications jacks shall be 8-position/8-conductor modular outlets accepting industry standard modular RJ45 type plugs and insulation displacement conductor (IDC) terminations.

2.1.3 The Universal design shall support T568A and T568B wiring and shall have universal wiring labels, including color-coded insert identification labels to ensure accurate identification.

2.1.4 (Provide Jack Colors Here) selected by Owner's Representative.
2.1.5 Provide crosstalk cancellation with compensation and alien crosstalk mitigation using printed wiring board materials and compensation technology.
2.1.6 Jack shall be backward compatible with lower category cords and cables.
2.1.7 Low-profile wire cap shall protect against contamination and secure connection. Jacks shall be suitable for:
2.1.8 Modular patching applications or as modular TO
2.1.9 Installation without special faceplates at either 45- or a 90-degree angle in manufacturer's modular faceplates and frames, including those on surface-mounted boxes
2.1.10 Dimensions
1. Depth: 30.48 mm (1.20 in)
2. Height: 20.32 mm (0.80 in)
3. Width : 20.32 mm (0.80 in)

2.1.11 Electrical Specifications
1. Contact Resistance Variation, maximum: 20 mOhm
2. Contact Resistance, maximum: 100 mOhm
3. Current Rating : 1.5 A @ 20 °C, 1.5 A @ 68 °F
4. Dielectric Withstand Voltage, RMS, conductive surface: 1500 Vac @ 60 Hz
5. Dielectric Withstand Voltage, RMS, contact-to-contact: 1000 Vac @ 60 Hz
6. Insulation Resistance, minimum : 500 MOhm

2.1.12 Environmental Specifications
2.1.12.1 Flammability Rating: UL 94 V-0
2.1.12.2 Operating Temperature: -10 °C to +60 °C (+14 °F to +140 °F)
2.1.12.3 Relative Humidity : Up to 95%, non-condensing
2.1.12.4 Safety Standard: cUL , UL
2.1.12.5 Storage Temperature: -40 °C to +70 °C (-40 °F to +158 °F)
2.1.13 Mechanical Specifications
2.1.13.1 Conductor Type: Solid, Stranded (7 strands)
2.1.13.2 Material Type: Copper alloy, High-impact, flame retardant, thermoplastic
2.1.13.3 Outlet/Module Contact Plating: Precious metals
2.1.13.4 Plug Insertion Life, minimum: 750 times
2.1.13.5 Plug Insertion Life, test plug: IEC 60603-7 compliant plug
2.1.13.6 Plug Retention Force, minimum: 30 lbf, 133 N
2.1.13.7 Rear Termination Contact Plating: Precious metals
2.1.13.8 Rear Termination Type: IDC
2.1.13.9 Wiring: T568A or T568B
2.1.14 Can be mounted either at 90 degrees (straight) or 45 degrees (angled)
2.1.15 Angled feature eliminates the need for special faceplates

2.2 CATEGORY 5 ENHANCED (5E)/CLASS D OUTLETS

2.2.1 Pair splitters and wider channel for enhance conductor placement and termination
2.2.2 Optional Plastic Icons (M61A) and Dust Covers (M20A) available in several colors
2.2.3 Backward compatible with Category 5 and 3 cords

2.2.4 Basis for Design Specifications: CommScope Sysitmax UNJ500 Category 5e Outlets
2.2.5 Approved Manufacturer: CommScope Systimax Catalog/Manufacturer Part Number:
(Provide Approved Part Number and Materials List)

2.3 CATEGORY 6 AUGMENTED (6A)/CLASS E_A OUTLETS

2.3.1 Patented crossing of straddling pair contacts enables efficient alien crosstalk reduction in the channel.
2.3.2 Optional Plastic Icons (M61A) and Dust Covers (M20A) available in several colors.
2.3.3 Backward compatible with Category 6, 5e, 5 and 3 cords and cables, however optimal performance achieved when used with Category 6 Augmented (6A)/Class EA Patch Cords.
2.3.4 Can support network line speeds up to at least 10 gigabits per second.
2.3.5 Basis for Design Specifications: CommScope Sysitmax UNJ10G Category 6A Outlets
2.3.6 Approved Manufacturer: CommScope Systimax Catalog/Manufacturer Part Number:
(Provide Approved Part Number and Materials List)

PART 3 – EXECUTION

3.1 INSTALLATION

Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.

3.3.1 Jack/Information outlets and Connectors shall be installed following industry standard practices.
3.3.2 Horizontal cabling shall be terminated on a Jack/Information outlet which is the same category rating as the Cable. i.e. Cat 6A cable terminates on Cat 6A Jack/Information outlets.
3.3.3 Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.
3.3.4 Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

Communications Fiber Connectors, Adapters and Adapter Panels

PART 1 – GENERAL

WORK INCLUDES
Provide all labor, materials, and equipment for the complete installation of all Fiber Connectors, Adapters and Adapter Panels called for in the Bid and Engineering Documents.

1.1 SCOPE OF WORK

This section includes the minimum requirements for Fiber Connectors, Adapters and Adapter Panels.

1.1.1 The performance for the installation shall meet or exceed the requirements of ANSI/TIA-568 and ISO/IEC 11801 and other requirements as noted in this specification for the specified Fiber Type.

1.1.2 The connectors and adapters shall match the fiber type of the cabling

1.1.3 All connectors and adapters shall meet UL 94 V-O

1.2 QUALITY ASSURANCE

1.2.1 All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.

1.2.2 Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

1.2.3 Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

1.2.4 Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:
ANSI/TIA – 568 Series Commercial Building Telecommunications Cabling Standard,
TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces,
ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual
Bellcore, fiber distributed data interface (FDDI), and EIA standards
ANSI/ICEA S-87-640, Standard for Optical Fiber Outside Plant Communications Cable
Telcordia's Generic Requirements for Optical Fiber and Optical Fiber Cable
TIA/EIA-568-C.3 – Optical Fiber Cabling Components Standard
ISO/IEC 11801 - Generic Cabling for Customer Premises
CENELEC EN-50173 - Generic Cabling Systems

1.3 SUBMITTALS

Provide product data for the following:
Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.4 COORDINATION

Coordinate installation of Jack/Information outlets and connectors with other trades.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 All products will be:
2.1.2 Compliant to RoHS 2002/95/EC
2.1.3 Designed, manufactured and/or distributed under this quality management system: ISO 9001:2008

2.2 SC FIBER ADAPTERS

2.2.1 Multimode adapter for use with 62.5/125 OM1 Fiber
2.2.2 Color – Beige
2.2.3 Alignment Sleeve Material
2.2.4 Simplex/Duplex - Phosphorous bronze
2.2.5 Multiport - Zirconia
2.2.6 Basis for Design Specifications: CommScope MFA-SC fiber adapter product series for multimode OM1 fiber.
2.2.7 Approved Manufacturer: CommScope
2.2.8 (Provide Approved Part Number and Materials List)

2.3 MULTIMODE ADAPTER FOR USE WITH 50/125 OM2+,OM3 AND OM4 FIBER

2.3.1 Color – Aqua
2.3.2 Alignment Sleeve Material
2.3.3 Simplex/Duplex - Phosphorous bronze
2.3.4 Multiport - Zirconia
2.3.5 Basis for Design Specifications: CommScope MFA-SC fiber adapter product series for standard OM2 and laser optimized OM3/OM4 fiber.
2.3.6 Approved Manufacturer: CommScope
2.3.7 (Provide Approved Part Number and Materials List)

2.4 SINGLE-MODE ADAPTER FOR USE WITH G.652.D OR G.652.D, OS2 FIBER

2.4.1 Color – Blue
2.4.2 Alignment Sleeve Material
  a. Simplex/Duplex - Phosphorous bronze
  b. Multiport - Zirconia
2.4.3 Basis for Design Specifications: CommScope SFA-SC fiber adapter product series for Single-mode OS1 and OS2 fiber.
2.4.4 Approved Manufacturer: CommScope
2.4.5 (Provide Approved Part Number and Materials List)

2.5 SC FIBER CONNECTORS

2.5.1 Multimode Connector for use with OM1, OM2+, OM3 and OM4 fiber
2.5.2 Color – Beige
2.5.3 Ferrule Geometry - Pre-radiused
2.5.4 Ferrule Material - Zirconia
2.5.5 Performance meets or exceeds ANSI/TIA/EIA-568-C.3 standard
2.5.6 Insertion Loss, typical - 0.30 dB
2.5.7 Return Loss, minimum - 20.0 dB

2.5.8 Insertion Loss Change, mating - 0.30 dB
2.5.9 Insertion Loss Change, temperature - 0.30 dB 9.
2.5.10 Basis for Design Specifications: CommScope MFC-SCR fiber connector product series for multimode 62.5um and 50um (OM1 through OM4) fiber types.
2.5.11 Approved Manufacturer: CommScope
2.5.12 (Provide Approved Part Number and Materials List)

2.6 SINGLE-MODE CONNECTOR FOR USE WITH G.652.D OR G.652.D, OS2 FIBER

2.6.1 Color – Blue
2.6.2 Ferrule Geometry - Pre-radiused
2.6.3 Ferrule Material - Zirconia
2.6.4 Performance meets or exceeds ANSI/TIA/EIA-568-C.2 standard
2.6.5 Insertion Loss, typical - 0.30 dB
2.6.6 Return Loss, minimum - 55.0 dB
2.6.7 Insertion Loss Change, mating - 0.30 dB
2.6.8 Insertion Loss Change, temperature - 0.30 dB
2.6.9 Basis for Design Specifications: CommScope SFC-SCR fiber connector product series for Single-mode OS1 and OS2 fiber types.
2.6.10 Approved Manufacturer: CommScope
2.6.11 (Provide Approved Part Number and Materials List)

PART 3 – EXECUTION

3.1 INSTALLATION

Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.

3.1.1 Fiber Connectors, Adapters and Adapter Panels shall be installed following industry standard practices.
3.1.2 Horizontal cabling shall be terminated on a Fiber Connectors, Adapters and Adapter Panels which is designed for the fiber type of the cable. i.e. Single-mode cable terminates on Single-mode Connectors and Adapters.
3.1.4 Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.
3.1.4 Contractor shall test all horizontal links per the Relevant Standards and Requirements.

Multimedia audio/video connectors and adapters

PART 1 – GENERAL

WORK INCLUDE
Provide all labor, materials, and equipment for the complete installation of all audio/video connectors and adapters called for in the Bid Documents.

NORTH ORANGE COUNTY COMMUNITY COLLEGE DISTRICT
SECTION 27 15 00 – HORIZONTAL CABLING
SAMPLE SPECIFICATION

1.1 SCOPE OF WORK

This section includes the minimum requirements for audio/video connectors and adapters.

1.1.1 The performance for the installation shall meet or exceed the requirements of ANSI/TIA-568 and ISO/IEC 11801 for the specified Category.

1.1.2 The audio/video connectors and adapters shall match the type of cabling installed.

1.1.3 All audio/video connectors and adapters shall meet UL 94 V-O

1.1.4 See **Section 27 12 00** for (RF) CATV requirements

1.2 QUALITY ASSURANCE

All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.

1.2.1 Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

1.2.2 Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

1.2.3 Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/TIA – 568 Series Commercial Building Telecommunications Cabling Standard,
TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces,
ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual
TIA/EIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
TIA/EIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards
TIA/EIA-568-C.3 – Optical Fiber Cabling Components Standard
ISO/IEC 11801 - Generic Cabling for Customer Premises
CENELEC EN-50173 - Generic Cabling Systems

1.3 SUBMITTALS

Provide product data for the following:
Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.4 COORDINATION

Coordinate installation of Jack/Information outlets and connectors with other trades.

NORTH ORANGE COUNTY COMMUNITY COLLEGE DISTRICT
SECTION 27 15 00 – HORIZONTAL CABLING
SAMPLE SPECIFICATION

Work Area Faceplate/Wall Plates and Surface Mount Boxes

PART 1 – GENERAL

WORK INCLUDE
Provide all labor, materials, and equipment for the complete installation of all Faceplate/wall plates and Surface mount Boxes called for in the Bid Documents.

1.1 SCOPE OF WORK

1.1.1 This section includes the minimum requirements for Faceplate/wall plates and Surface mount Boxes.

1.1.2 All Faceplates and Surface Mount boxes shall be constructed of high-impact, flame retardant; UL rated 94 V-0 Thermoplastic.

1.1.3 Angled Faceplates shall be designed to accept the CommScope information outlets.

1.1.4 Number of outlets per faceplate shall be as detailed on the Telecommunications Drawings.

1.2 QUALITY ASSURANCE

All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.

1.2.1 Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

1.2.2 Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

1.2.3 Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:
ANSI/TIA – 568 Series Commercial Building Telecommunications Cabling Standard,
TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces,
ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual
TIA/EIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
TIA/EIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards

TIA/EIA-568-C.3 – Optical Fiber Cabling Components Standard
ISO/IEC 11801 - Generic Cabling for Customer Premises
CENELEC EN-50173 - Generic Cabling Systems

1.3 SUBMITTALS

Provide product data for the following:
Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.4 COORDINATION

Coordinate installation of Faceplate/wall plates and Surface mount Boxes with other trades.

PART 2 – PRODUCTS

2.1 FACEPLATES AND SURFACE MOUNT BOXES (SMB)

2.1.1 Universal design that accommodates CommScope information outlets.
2.1.2 Modular design that supports voice, data, audio and video applications.
2.1.3 Supports cable/port labeling.
2.1.4 Available in four different colors – white, black, ivory and gray.
2.1.5 Basis for Design Specifications: CommScope Flexible Faceplates and Surface Mount Boxes
2.1.6 Approved Manufacturer CommScope Sysitmax
Following Catalog Number/Part numbers are provided as examples,
(Provide Approved Materials List and Part Number Here)

2.2 DUST COVERS FOR FACEPLATES AND SURFACE MOUNT BOXES (SMB)

Dust Covers shall be dual purpose blank covers designed for use with modular outlets and faceplates. They shall be used to cover the outlet opening of all empty faceplate openings and unpopulated jacks to protect the wires from collecting dust.
2.2.1 Available in four different colors – white, black, ivory and gray.
2.2.2 Basis for Design Specifications: CommScope Covers, Flexible Faceplates and Surface Mount Boxes
2.2.3 Approved Manufacturer CommScope Sysitmax
2.2.4 Following Catalog Number/Part numbers are provided as examples,
(Provide Approved Materials List and Part Number Here)

PART 3 – EXECUTION

3.1 INSTALLATION

Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.

SAMPLE SPECIFICATION

3.1.1 Faceplate/wall plates and Surface mount Boxes shall be installed following industry standard practices.

3.1.2 Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.

3.1.3 Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

END of SECTION