GILMER ISD -- REQUEST FOR PROPOSAL

Gilmer ISD will be accepting proposal for **Horizontal Cabling** for network, communications and security.

Determination of the awarded vendor will be based on the following criteria:

- Price
- Previous experience
- Support and service options
- Additional services

Vendors should submit a detailed list of all items required which includes: Manufacturer / Model / Qty / Price per Unit / Line Item Cost Total (MMQPL); which constitutes a complete functioning system that matches or exceeds the descriptions in the specification documents.

Qualifying proposals will include:

- A single cover page that lists the company name, contact person, phone number, email address and company's billing address, the name of the project that is being proposed and the total cost for completed functioning project.
- Pages, listing detailed line items, showing any materials or expenses that are project / building-wide expenses (labor, drawings, certifications); must include line item dollar amounts.
- A list of all parts with MMQPL by building section (as designated on drawings), each section should be clearly denoted.
- List of any additional features or considerations included for this job.
- List of 3 references from other recent jobs including Company Name, Contact Person, Phone Number and email address.
- Provide a description of the support that will be provided including terms of in length of time and associated costs for the 5 years after the building is occupied and beyond 5 years where appropriate.
- Completed Felony Conviction Notification
- Completed Conflict of Interest Questionnaire (2 pages)
- Completed Non-Resident Vendor Form
- Completed House Bill 89 Verification Form
- Completed SB 252 Form

All bullet points above must be completed before the proposal will be considered.

Sealed proposals are due at the above address no later than
10:00 a.m. on Tuesday, May 21, 2019 to Gilmer ISD ATTN:
Technology RFP : 500 S. Trinity St Gilmer TX 75644

"Virtual Walkthrough" / in-person questions:
Single Mode Fiber and Horizontal Cabling: Wed. May 15 – 8:30 – 11:30 am
Security / Intercom: Wed. May 15 – 1:00 – 4:00 pm
Location: Gilmer ISD Technology building 406 N. Bledsoe St. Gilmer Tx 75644

PROJECT DESCRIPTION / OVERVIEW

Gilmer ISD is seeking horizontal cabling for a network and copper infrastructure that fulfills the needs for data communications as well as wiring for time, intercom, communications, and security systems. This proposal lists suggested part numbers from Panduit. We will consider any manufacturer and parts that meets the specifications provided.

This RFP will also cover wiring required for other proposals. It is our intention to get the best pricing for each of our proposals. By including all wiring in one proposal our goal is to reduce the labor required to accomplish the project needs. We are seeking a fully functioning network that is labeled and certified when complete. This proposal does not require the movement, configuration or changes to any of the networking equipment, switches or routers that are owned by the school. Plenum encased wire is NOT required for this project.

The best proposal will be awarded by the school board of Gilmer ISD based on the criteria listed above. The building contractor for the Gilmer High School Project is RLM; this proposal is not part of the RLM contract. Gilmer ISD will manage the work and the awarded vendor of this project. Gilmer ISD has a construction manager that will help coordinate all work done on behalf of Gilmer ISD with the building contractor, as well as the Gilmer ISD technology staff.

This project will have two distinct timelines. Because we will recycle our mostly brand-new networking equipment into the new building, the installation of equipment and wires will take place in conjunction with the building construction. A fully working network will not be available until a number of days after the last day of school of the 2019-2020 school year (May 22, 2020); when the technology staff will begin moving and installing the networking backbone for the school from the existing building. At that time, any final project testing and training can begin.

Gilmer ISD will make reasonable payments based on percentage of project completion/hardware purchase and installation, when an application for payment is made. Final payment and approval will not be made until the specifications are complete, testing is complete, and any training is finished. A retainage of not more than 20% will be held. Please make any inquiries and/or requirements about payments known when submitting your RFP.

GILMER INDEPENDENT SCHOOL DISTRICT

FELONY CONVICTION NOTIFICATION

The Texas Education Code, Section 44.034(a) states that a person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of the felony.

Furthermore, Section 44.034(b) states that a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract.

Lastly, Section 44.034 (c) states that this section does not apply to a publicly held corporation.

( ) My firm is a publicly held corporation, therefore this requirement is not applicable.

( ) My firm is not owned nor operated by anyone who has been convicted of a felony.

( ) My firm is owned or operated by the following individual(s) who has/have been convicted of a felony:

Name: _____
Description of conduct resulting in a felony: _____
_____
Name: _____
Description of conduct resulting in a felony: _____
_____
Name: _____
Description of conduct resulting in a felony: _____
_____

I, the undersigned agent for the firm named below, certify that the information concerning notification of felony conviction has been received by me and that the information furnished above is true to the best of my knowledge.

Vendor's Name: _____

Authorized Company Official's Name: _____

Authorized Company Official's Title: _____

_____ _____

Date Signature

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

Signature of vendor doing business with the governmental entity

Date

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

***

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

Non-Resident Vendor Form

Gilmer Independent School District

Please answer the following questions and return with this proposal:

Texas law prohibits cities and governmental units from awarding contracts to a non-resident unless the amount of such proposal is lower than the lowest proposal by a Texas resident by the amount the Texas resident would be required to underbid in the non-resident proposer's state.

For information regarding this series of questions, see Article 601g of the Texas Civil Statutes.

Is your principal place of business in Texas? Yes No (Circle One)

If no, in which state is your principal place of business? _____

If your principal place of business is not Texas, does your state favor resident proposers in your state by some dollar increment or percentage?

Yes No (Circle One).

If yes, what is that dollar increment or percentage? _____

_____ _____

AUTHORIZED SIGNATURE NAME OF COMPANY

_____ _____

TELEPHONE NUMBER ADDRESS

_____ _____

DATE CITY STATE

House Bill 89 VERIFICATION

I, _____, the undersigned representative of

_____Company or Business name

(hereafter referred to as company) **being an adult over the age of eighteen (18) years of age, verify that the company named-above, under the provisions of Subtitle F, Title 10, Government Code Chapter 2270:**

1. **Does not boycott Israel currently; and**
2. **Will not boycott Israel during the term of the contract the above-named Company, business or individual with the Gilmer Independent School District.**

Pursuant to Section 2270.001, Texas Government Code:

1. *"Boycott Israel" means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes; and*
2. *"Company" means a for-profit sole proprietorship, organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, or any limited liability company, including a wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of those entities or business associations that exist to make a profit.*

_____ _____

DATE SIGNATURE OF COMPANY REPRESENTATIVE

SB 252

CHAPTER 2252 CERTIFICATION

I, _____, the undersigned representative of _____ (Company or business name) being an adult over the age of eighteen (18) years of age, pursuant to Texas Government Code, Chapter 2252, Section 2252.152 and Section 2252.153, certify that the company named above is not listed on the website of the Comptroller of the State of Texas concerning the listing of companies that are identified under Section 806.051, Section 807.051 or Section 2253.153. I further certify that should the above-named company enter into a contract that is on said listing of companies on the website of the Comptroller of the State of Texas which do business with Iran, Sudan or any Foreign Terrorist Organization, I will immediately notify the Gilmer Independent School District's Purchasing Department.

_____

Name of Company Representative (Print)

_____

Signature of Company Representative

_____

Date

GILMER ISD

GILMER, TEXAS, USA

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section (27 15 00) includes specifications for:

1. The supply, delivery, supervision, coordination, and installation of equipment items specified herein and shown on the Drawings

2. The specifications for the incorporation of Owner Furnished Equipment (OFE)

3. The testing, documentation, and instructions for completing the Structured Cabling System

4. Products supplied but not installed under this section, including loose equipment specified herein, which is to be turned over to the Owner at the completion of this project

B. Owner Furnished Equipment (OFE)

Certain equipment may be identified as Owner Furnished Equipment (OFE). This OFE may presently be part of the Owner's system or may be provided by the Owner and will either be delivered to the Contractor's off-site construction facility, be delivered to the Contractor's on-site secured storage area, or be installed on site by others, as appropriate, for incorporation into the system.

1. Clean and inspect all OFE.

2. Notify the Owner in writing of damage, defects, and the extent of any repair or adjustment required for the OFE to meet the original specification.

3. Service OFE only as directed by the Owner under the arrangements of a separate contract and incorporate repaired or adjusted OFE into the system as if provided new, except for warranty coverage.

C. Related Drawings

1. T-Series drawings follow the specifications in this Section.

2. Electrical drawings specify the electrical requirements.

3. Interior Design drawings specify the interior finishes, spatial relationships between items, and mounting height details.

D. What the Contractor Shall Provide and Install

The Contractor shall furnish and install telecommunications passive equipment, including:

a. Horizontal cable

b. Termination hardware

c. Communications outlets

d. Intersystem connections

e. Device connections

f. Splicing and terminations

g. Testing

h. Administration

2. Although such work is not specifically mentioned herein or on the Drawings, the Contractor shall furnish and install all miscellaneous items, accessories, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation, without claim for additional payment.

3. The Contractor shall provide system testing and demonstration, system documentation, and instruction of Owner personnel, without claim for additional payment.

E. Errors or Omissions in Drawings or Documentation

1. If any errors or omissions appear in Drawings, Specifications, or other documents, the bidding Contractor shall notify the Engineer no later than ten (10) days prior to submitting the bid.

2. Should conflict occur in or between Drawings and Specifications, the bidding Contractor is deemed to have estimated the more expensive way of doing the work, unless the bidding Contractor has asked for and obtained written decision (addendum) before submission of the bid as to which method or materials will be required.

F. Dimensions

Dimensions indicated are limiting dimensions.

1. Do not use equipment exceeding the dimensions indicated

2. Do not use equipment or arrangements that reduce the required clearances or exceed the specified maximum dimensions.

1.2 REFERENCES

A. Requirements, Codes, and Standards

Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with latest revision of the NFPA-70 (National Electrical Code®), state codes, local codes, requirements of Authorities Having Jurisdiction (AHJs), and the following standards, including the most current revisions, addendums, and any Technical Service Bulletins (TSBs) released at the time of bid:

1. ANSI/NECA/BICSI 607 – Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

2. ANSI/BICSI 002 Data Center Design and Implementation Best Practices

3. ANSI/TIA 568 Series – Telecommunications Cabling Standards

4. TIA-569 – Commercial Building Standard for Telecommunications Pathways and Spaces

5. TIA-606 – Administration Standard for Commercial Telecommunications Infrastructure

6. TIA-607 – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

7. TIA-526 Series – Standard Test Procedures for Fiber Optic Systems

8. NECA/FOA 301– Installing and Testing Fiber Optic Cables

9. TIA-942 – Telecommunications Infrastructure Standard for Data Centers

10. ISO/IEC 11801 – Generic Cabling for Customer Premises

B. BICSI® Publications

Install cabling in accordance with the most recent editions of the following BICSI® publications:

1. BICSI – Telecommunications Distribution Methods Manual

2. BICSI – Information Technology Systems Installation Manual

3. BICSI – Outside Plant Design Reference Manual

C. Applicability of Codes, Rules, and Regulations

1. Federal, state, and local codes, rules, regulations, and ordinances governing the work are as fully part of the specifications as if herein repeated or hereto attached.

2. If the Contractor notes items in the Drawings or the Specifications, construction of which would be code violations, the Contractor should promptly call them to the attention of the Owner's representative in writing.

3. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

D. Manufacturers' Recommendations

To maintain the applications warranties, install all cabling and termination devices using the manufacturers' recommended installation practices.

E. Definitions

1. AWG – American Wire Gauge – The standardized wire gauge system for the diameter of round, solid, nonferrous, electrically-conducting wire.

2. BBC – Bonding Backbone Conductor – A telecommunication bonding connection which interconnects telecommunications bonding backbones. Formerly known as the grounding equalizer.

3. BD – Building Distributor – A distributor in which the building backbone cables terminate and at which connections to the campus backbone cables may be made.

4. BN – Bonding Network – A set of interconnected conductive structures that provides a low impedance path for the associated telecommunications infrastructure.

5. CP – Consolidation Point – A connection facility within Cabling Subsystem 1 for interconnection of cables extending from building pathways to the equipment outlet.

6. EDA – Equipment Distribution Area – A space allocated for end equipment, including computer systems and telecommunications equipment.

7. EF – Entrance Facility – An entrance to a building for both public and private network service cables, including wireless, that includes the entrance point of the building and continues to the entrance room or space.

8. ER – Equipment Room – An environmentally-controlled, centralized space for telecommunications equipment that serves the occupants of the building, considered distinct from a Telecommunications Room (TR) because of the nature or complexity of the equipment.

9. ESD – Electro Static Discharge – The sudden flow of electricity between two electrically-charged objects caused by contact, an electrical short, or dielectric breakdown.

10. HC – Horizontal Cross-connect – A group of connectors, such as patch panels or punch-down blocks, that allow horizontal, backbone, and equipment cabling to be cross-connected with patch cords or jumpers.

11. HDA – Horizontal Distribution Area – A space in a computer room where a Horizontal Cross-connect (HC) is located, and which may include LAN switches, Storage Area Network (SAN) switches, and Keyboard/Video/Mouse (KVM) switches for the end equipment located in the Equipment Distribution Areas (EDAs).

12. IC – Intermediate Cross-connect – A facility enabling the termination of different levels of backbone cabling and interconnection between them or equipment.

13. MC – Main Cross-connect – A facility enabling the termination of backbone cables and their connection to incoming services, other backbone cabling, or equipment.

14. MDA – Main Distribution Area –The central point of distribution for the structured cabling system, which includes the Main Cross-connect (MC) and, when equipment areas are served directly from the MDA, may also include Horizontal Cross-connect (HC).

15. Mesh-BN – Mesh Bonding Network – A bonding network to which all associated equipment, such as cabinets, frames, racks, trays, and pathways, are connected using a bonding grid that is connected to multiple points on the common bonding network.

16. PBB – Primary Bonding Busbar – A busbar placed in a convenient and accessible location and bonded, by means of the Telecommunications Bonding Conductor (TBC), to the building's service equipment (power) ground. Formerly known as the Telecommunications Main Grounding Busbar (TMGB).

17. RBB – Rack Bonding Busbar – A busbar within a cabinet, frame, or rack.

18. RBC – Rack Bonding Conductor – A bonding conductor from the rack or Rack Bonding Busbar (RBB) to the Telecommunications Equipment Bonding Conductor (TEBC).

19. RU – Rack Unit A unit of measure, compliant with EIA 310, used to describe the height of equipment intended for mounting on equipment rails. One RU is 1.75 inches (44.45 mm) high.

20. SBB – Secondary Bonding Busbar – A common point of connection for telecommunications system and equipment bonding to ground, located in the distributor room. Formerly known as the Telecommunications Grounding Busbar (TGB).

21. TBB – Telecommunications Bonding Backbone – The conductor that interconnects the Primary Bonding Busbar (PBB) to the Secondary Bonding Busbar (SBB).

22. TBC – Telecommunications Bonding Conductor – A conductor that interconnects the telecommunications bonding infrastructure to the building's service equipment (power) ground. Formerly known as the bonding conductor for telecommunications.

23. TEBC – Telecommunications Equipment Bonding Conductor – A conductor that connects the Primary Bonding Busbar (PBB) or Secondary Bonding Busbar (SBB) to equipment racks or cabinets.

24. TO – Telecommunications Outlet – A connecting device, located in a work area, at which the horizontal cabling terminates.

25. TR – Telecommunications Room – An enclosed space for housing telecommunications equipment, cable terminations, and cross-connect cabling. It is the recognized location of the cross-connect between the backbone and horizontal facilities.

26. UBC – Unit Bonding Conductor – A bonding conductor from equipment or a patch panel to a Rack Bonding Conductor (RBB) or a Rack Bonding Busbar (RBB).

27. ZDA – Zone Distribution Area – A space where a zone outlet or consolidation point is located, between the horizontal and equipment distribution areas, that allows frequent reconfiguration and flexibility.

1.3 PERMITS, FEES, AND CERTIFICATES OF APPROVAL

A. If required, the Owner or Owner's authorized agent will make application for and pay for any building permits.

1.4 SYSTEM DESCRIPTION

The Contractor will provide, install, and test a complete structured cabling system for the project's voice and data communications systems from the Telecommunications Outlet (TO) to the Telecommunications Room (TR), and between telecommunications spaces. The Contractor will provide and install all required components as identified below.

A. Horizontal Cabling

Horizontal cabling includes horizontal cable, telecommunications outlet/connectors in the Work Area (WA), mechanical terminations and patch cords or jumpers located in a Telecommunications Room (TR) or Telecommunications Enclosure (TE), and may incorporate Multi-User Telecommunications Outlet Assemblies (MUTOAs) and Consolidation Points (CPs).

B. Typical Equipment Room (ER)

A typical ER will consist of the following equipment:

1. Open racks and/or enclosures with vertical and horizontal wire management

2. 24-port or 48-port patch panels for termination of the horizontal cables served from this room

3. Fiber Distribution Enclosures (FDEs)

4. Fire-resistant plywood installed on at least one (1) wall, at a height of 96 inches Above the Finished Floor (AFF) on which to install wall-mounted equipment

5. A room-level or building-level Uninterruptible Power Supply (UPS) system

6. Rack-mounted Power Outlet Units (POU)

7. One or more racks or enclosures to house network servers and switch equipment

8. A grounding and bonding system connected to the building's main grounding electrode system

9. A cable runway system, installed above the racks and enclosures, to support and manage the cabling that runs from the racks and enclosures to the equipment in the space, which shall be fitted with all accessories required to adequately support the installed cabling, such as waterfalls, support components, and bonding components.

C. Typical Telecommunications Room (TR)

A typical TR will consist of the following equipment:

1. One or more floor-mounted open racks, wall-mounted racks, or enclosures, which shall have horizontal and vertical cable management and, when floor mounted racks are used, horizontal stabilization, which may be provided by the cable runway from the rack to the wall, though if this is insufficient, shall have supports fabricated by the Contractor

2. Termination hardware supporting all horizontal and backbone cabling

3. Rack-mounted FDEs for termination and interconnection of the optical fiber backbone

4. A room-level or building-level Uninterruptible Power Supply (UPS) system

5. A rack-mounted POU

6. Fire-resistant plywood installed on at least one (1) wall at 96 inches AFF on which to install wall-mounted equipment

7. A grounding and bonding system connected to the building's main grounding electrode system

8. A cable runway system, installed above the racks and enclosures, to support and manage the cabling that runs from the racks and enclosures to equipment in the space, which shall be fitted with all accessories required to adequately support the installed cabling, such as waterfalls, support components, and bonding components

D. Pathways and Raceways

1. Pathways and Raceways are the support system for the infrastructure. All pathways and raceways shall conform to the standards referenced in this Section.

2. All horizontal and backbone cable shall be properly supported every 48 inches to 60 inches. Infrastructure support systems include, but may not be limited to the following:

a. Properly-supported cable trays and cable runway

b. Properly-supported conduits, inside or outside, above ground or underground

c. Non-continuous cable supports, which shall be spaced no more than 60 inches apart

d. Surface raceway systems that may consist of metallic or non-metallic raceways and boxes

E. Using a Combination of Cable Supports

The preferred method for providing pathways is to use a combination of cable tray and non-continuous cable supports, however, please consult with Gilmer ISD for final determination.

1. Cable trays shall be used for main horizontal cable pathways on all levels from the ER and TR locations.

2. Cable trays shall be installed in the main corridors.

3. In areas of low cable density, use independently-supported non-continuous cable supports in lieu of the cable tray system.

4. All backbone cable shall also follow these cable tray pathways.

5. Horizontal and auxiliary system cables shall be combed and independently bundled. Bundle ties shall be easily removed for the addition or removal of cables and shall be plenum rated.

6. To allow for future maintenance and access, the primary cable routes shall be located over corridors.

7. To protect cable from damage and to provide a suitable aesthetic appearance in areas where the cable may be exposed, such as in open-ceiling rooms, conduit or surface raceway must be used instead of non-continuous cable supports.

1.5 SUBMITTALS

A. Engineer’s Review

1. The Engineer's review of shop drawings or samples shall not relieve the Contractor of responsibility for any deviation from the contract documents.

2. With the shop drawings, the Contractor shall include an index sheet detailing all deviations from the contract documents, and will be held responsible for all deviations, unless the Contractor has received written approval from the Engineer for the specific deviation, separate from general shop drawing approval.

3. The Engineer's review shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings or samples.

B. General Component Data

For all products covered under this Section, the Contractor shall submit the following data for each component:

1. A Specification Section

2. The Manufacturer's name.

3. The Manufacturer's model and part number

C. Copper Cable and Patch Cords

In addition to the general requirements above, the Contractor shall submit the following additional data:

1. Cable identification numbers

2. Cable specifications including quantity of pairs, material, insulation, performance, attenuation, Near-End CrossTalk (NEXT), diameter, conductor size, jacket, weight, and color

3. The length and color of the patch cords

4. The connector type for the patch cords

D. Fiber Cable and Patch Cords

In addition to the general requirements above, the Contractor shall submit the following additional data:

1. Cable identification numbers

2. Cable specifications including quantity of fibers, material, insulation, jacket, wavelength, attenuation, diameter, bend radius, core, cladding, coating, buffering, weight, and color

3. The length of the patch cords

4. The connector type for the patch cords

E. Devices

In addition to the general requirements above, the Contractor shall submit the following additional data for outlets, cover plates, and fiber connectors:

1. The outlet specifications, including category rating, material, wiring, termination type, wire type, and color

2. The associated faceplate

3. A drawing of each device

F. Connecting Hardware

In addition to the general requirements above, the Contractor shall submit the equipment specifications for copper patch panels, fiber patch panels, and wiring blocks, including quantity of ports, material, dimensions, mounting, terminating devices and color.

G. Connectors

In addition to the general requirements above, the Contractor shall submit the following additional data:

1. Connector specifications, including material, dimensions, attenuation, NEXT connection losses, ratings, and construction

2. A drawing of the equipment

H. Splicing and Terminations

In addition to the general requirements above, the Contractor shall submit the splicing and terminating tools, materials, and methods.

I. Testing

In addition to the general requirements above, the Contractor shall submit the following additional data:

1. The equipment serial number

2. A graphic diagram documenting the test procedure, including all connectors, the light source (as applicable,) the origin, and the destination of each cable tested.

J. Test Results

The Contractor shall submit all test results.

1.6 QUALITY ASSURANCE

A. Standards for Materials and Equipment

1. The Contractor shall provide all materials, equipment, and installation in compliance with the latest applicable standards from ANSI, FCC, ASTM, EIA/TIA, IEEE, NEC, NFPA, NEMA, OSHA, REA, and UL.

2. Electronic equipment provided by the Contractor shall have the UL label where applicable.

B. Installer Qualifications

1. Registered Communications Distribution Designer (RCDD)

   The Contractor must have at least one (1) Registered Communications Distribution Designer (RCDD) as recognized by Building Industry Consulting Service International (BICSI.) The RCDD must be a full-time employee of the Contractor and shall be responsible for compliance of work with the referenced standards and guidelines. At the time of bid, the RCDD shall provide a professional resume and proof of current registration to the Engineer for approval. The RCDD shall be present during construction and all cable testing and shall have:

   a. Knowledge of BICSI installation standards

   b. Knowledge of NEC standards

   c. Knowledge of ANSI/TIA standards

   d. Five (5) years of experience in the installation of optical fiber cables, including splicing, terminating, and testing including single and multimode.

   e. Three (3) years of experience in the installation of balanced twisted pair copper cables for voice and data distribution systems, including splicing, terminating, testing, and complete verification of compliance with ANSI/TIA cable standards

   f. Three (3) references for projects of equivalent scope, type, and complexity of work completed within the last five (5) years. The Contractor shall submit, as proof, supporting documents and the names, addresses, and telephone numbers of the operating personnel who can be contacted regarding the installation of the system.

   g. Certification by the termination equipment manufacturer as an installer

C. Other Installers

   Products shall only be installed by qualified technicians certified by the manufacturers.

D. Provide all electronic equipment with the UL label when applicable.

E. Compliance with Laws, Ordinances, and Codes

   1. As applicable, electronic equipment provided shall have the UL label.

   2. Comply in every way with the requirements of local laws and ordinances, the National Board of Fire Underwriters, and the National Electrical Code. Anything in the plans or specifications that does not strictly comply with the above laws, ordinances, and rules must be referred to the attention of the Engineer for a decision before proceeding. No change in the plans or specifications shall be made without full consent, in writing, of the Engineer.

F. Contractor selected needs to be a current a Certified Partner of the equipment manufacturer and/or be able to offer a warranty for the all equipment from the manufacturer at completion of the project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handling

To prevent damage, theft, soiling, and misalignment, protect equipment during transit, storage, and handling.

B. Storage

The contractor shall coordinate the secure storage of equipment and materials on site, or, if no on-site storage is available, shall provide their own secure storage at the Contractor’s expense.

1. Do not store equipment where conditions fall outside the manufacturer's recommendations for environmental conditions.

2. Do not install damaged equipment. Remove environmental conditions from the site, and replace damaged equipment with new equipment.

3. If off-site storage of materials is necessary, this shall be at the Contractor’s expense.

1.8 COORDINATION

A. Installation Schedule

The Contractor shall coordinate with all other trades. The Contractor will submit a schedule for the installation within 10 days of contract award.

1. The schedule shall include delivery, installation, and testing for conformance to specific job completion dates.

2. At minimum, the schedule shall provide dates for the start of demolition, the completion of demolition, the installation start date, the completion of copper cabling, the completion of backbone cabling, the completion of testing and labeling, cutover, the completion of the final punch list, final inspection, and acceptance.

B. Meeting Attendance and Schedule Adherence

The Contractor must attend all project-related meetings and adhere to schedule set by the Construction Project Manager and school management personnel.

C. Final Inspection

1. The Contractor is required to notify the engineer of a proposed appointment for Final Inspection at least 72 hours before the appointment.

2. Within five working days after the final inspection, the Contractor shall send final project documentation and warranty information to the Owner and Engineer. The final project documentation shall include, but may not be limited to:

a. As-Built Drawings, in an AutoCAD / electronic format, with legible outlet address and cable paths

b. Outlet location spreadsheets

c. Warranty paperwork

d. A copy of the Final Inspection and Acceptance Signoff Sheet

e. Photos of each ER and TR

1.9 PROJECT CONDITIONS

A. Project Environmental Requirements

1. Seismic Safety

a. Provide mechanical and electrical support for all installed equipment as required by all applicable local building codes for this installation's earthquake risk hazard zone and as recommended by Telcordia Specification GR-63.

b. Anchor all equipment racks with suitable anchors that meet safety standards.

c. Mount overhead devices with appropriate safety attachments as required.

d. Where cabinets and racks are secured directly to the building, this shall be done in accordance with guidance provided by the Authority Having Jurisdiction (AHJ) or a structural engineer.

e. Provide shock and vibration isolation of equipment and fixtures as required.

2. Fiber Optic Cable Safety

a. The following warnings shall be posted on the job site:

WARNING: PERMANENT EYE DAMAGE CAN RESULT FROM LOOKING DIRECTLY INTO A LIGHT BEAM GENERATED BY AN LED OR LASER SOURCE OR INTO THE END OF A CABLE FIBER CONNECTED TO ONE OR THESE SOURCES.

CAUTION: LIGHT GENERATED BY THESE SOURCES MAY NOT BE VISIBLE, YET REMAIN HAZARDOUS TO THE EYE. LOOK FOR WARNING LABELS ON SOURCE DEVICES.

b. Observe all warning signs on equipment and all written safety precautions in the instruction and technical manuals.

c. Always handle cable carefully to avoid personal injury. Care should be taken with individual fibers to prevent injury to the eyes or penetration of the fibers into the skin.

3. Hazardous Materials Prohibition

The Contractor shall ensure that all materials used in the project are asbestos-free, unless specifically authorized in writing by the Owner.

4. Existing Conditions

a. Verify that all conditions on the project site are acceptable for the Work specified in this Section. Prior to bid opening, notify the Consulting Engineer, in writing, of any discrepancies, conflicts, or omissions. Otherwise, correct these issues at no additional cost to the Owner.

b. Continue to monitor the project site. If conditions develop that require a variance from the Specifications or Drawings, then immediately notify the Owner in writing. Otherwise, make recommendations, submit drawings showing how the Work may be installed, and, upon approval, proceed with the necessary changes without additional cost to the Owner.

B. Record Drawings

1. Keep a complete set of all telecommunications drawings in the job site office for demonstration of the actual installation work specified in this Section.

2. Use this set of drawings for no other purpose.

3. Where any material, equipment, or system components are installed differently than what is shown on the drawings, indicate the differences clearly and neatly using ink or indelible pencil.

4. Upon completion of the project, submit the record set of drawings.

1.10 USE OF THE SITE

A. Where the Owner deems it necessary to place restrictions, use the site as directed by the Owner.

B. When proceeding with the work, do not interfere with the ordinary use of streets, aisles, passages, exits, or operations of the Owner. During the day, set up cones and barriers in hallways and walkways. Do not string cable down the hallways during normal hours.

C. Request a hazardous materials worksheet that identifies potentially-hazardous locations. Do not proceed with any work in locations where hazardous materials are known to be. Obtain instructions from the Contractor’s Project Manager on and when to work in these areas.

D. Multiple times each day, each contractor shall remove all trash and debris from the site. Before leaving the room each day:

1. The Contractor shall replace all ceiling tiles that they have removed.

2. The Contractor shall place all furniture and equipment that they have moved back into its original location.

3. The Contractor shall return any equipment that they have disconnected to working order.

4. The Contractor’s Job Foreman shall inspect all work locations to ensure that the rooms are clean and that all of the tasks described above have been done.

5. It is recommended that the Contractor inspect the site and take pictures to document the condition of the ceilings and walls.

1.11 CONTINUITY OF SERVICES

A. Take no action that will interfere with or interrupt existing building services, unless previous arrangements have been made with the Owner's representative. Arrange all work to minimize shutdown time.

B. The Owner's personnel shall perform shutdown of operating systems. When shutdown of systems is required, the Contractor shall give three (3) days advance notice.

C. Should building services be inadvertently interrupted:

1. The Job Foreman shall immediately notify the Project Manager of the accidental disruption of services, the remedy, and how long it will take to restore services.

2. The Contractor shall immediately furnish the labor, including overtime, the material, and the equipment necessary to promptly restore the interrupted service at no cost to the Owner.

1.12 WARRANTY

A. The Contractor shall provide the following warranties for the system and components.

1. Contractor Materials and Labor Warranty

The Contractor shall provide system warranties, for a period specified in the contract documents, against faulty materials and defects in workmanship. The Contractor shall honor any manufacturer warranties that exceed this period of time.

2. Manufacturer Component Warranty

All components of the structured cabling system shall be free from manufacturing defects in material or workmanship, under normal and proper usage, for a minimum of twenty (20) years.

3. Manufacturer System Performance Warranty

The permanent links of the structured cabling system will comply with the standards for balanced twisted pair and optical fiber for end-to-end performance, as defined in ANSI/TIA-568 Telecommunications Standard, for a minimum of twenty (20) years.

4. Manufacturer Application Assurance Warranty

5. The structured cabling system will be free from defects that prevent the operation of standards-based applications and protocols over balanced twisted pair and optical fiber. The applications and protocols shall be those recognized by standards bodies IEEE, ANSI, and ATM Forum and sanctioned specifically for transmission over the specified medium as defined in ANSI/TIA-568 and shall support current and future applications designed for data transmission over the permanent link/ channel, as defined in ANSI/TIA-568 telecommunications standard, for a period of twenty-five years.

B. The Manufacturer shall bear the burden to replace or repair any such defective products during the warranty period at their cost, including labor and materials.

C. The warranty period shall begin on the date of the Owner's Acceptance of the Work. Evaluation of quality and workmanship shall be solely by the Owner or the Owner’s representatives.

1.13 OWNER INSTRUCTION

A. At the time of substantial completion, the Contractor shall submit the System Operation Manual and the Maintenance Data Manual, each neatly bound, with tabbed dividers between sections, and a title page with space for submittal stamps.

B. Maintenance Data Manual

The Maintenance Data Manual shall include:

1. A Table of Contents

2. The company name, address, telephone number, and contact name for system service or maintenance

3. A list of all equipment and materials, with the names of the manufacturers and the model numbers or part numbers

4. Catalog data sheets that include the manufacturers' names, addresses, and telephone numbers

5. Product manufacturers' warranties and a typed one-year system warranty that explicitly covers all materials and labor

6. The manufacturers' service manuals for all major equipment items

7. Test documentation showing the results of source quality control tests, field quality control tests, acceptance testing, and certification

8. A recommended preventative maintenance schedule with:

    a. References to the applicable pages in the manufacturer's maintenance manuals

    b. Where inadequate information is provided by the manufacturer, the information necessary for proper maintenance

C. Electronic Submittal

In addition to hard copy submittals, the Contractor shall submit all files needed to produce the above submittals:

1. Transportation media shall be in Microsoft® structure on CD-ROM or USB flash drive

2. A Master File List, in text format, placed on each medium, with a short description of files in the submittal

3. Drawings, in AutoCAD R2010 or later drawing format (.DWG), that include all XREFs, fonts, and other drawing parts required for the drawings

    Note: Drawing Exchange File Format (.DXF) is not acceptable

4. Word processing files in MS Word 2007 format

5. Graphs and charts in MS Excel 2007 format

6. All graphic images required for the reproduction of the submittals included in the files in JPEG (.JPG) file format

7. Manufacturers' data sheets, equipment manuals, and other documentation provided by the Manufacturers to the Contractor or documents that are similarly not otherwise available to the Contractor in electronic format shall be excluded from this requirement.

D. Keys

Submit three copies of all keys required for access to and operation of the systems.

1.14 COMMISSIONING

Furnish one initial set of product brochures and owner's manuals to the Owner for use during acceptance testing and equalization.

PART 2 - PRODUCTS

2.1 GENERAL NOTES

A. In this section, certain products are specified by manufacturer and part number to establish a level of quality, performance, and consistency. To substitute other products would defeat this effort to the Owner's detriment. If no manufacturer or part number is specified for a part, then that part is generic, and the Contractor shall submit for approval a part that provides the performance specified herein.

B. All materials and products, including Owner Furnished Equipment (OFE), shall be:

1. Appropriate for the intended use

2. Recognized as such by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratories (UL), ETL SEMCO (ETL), the Canadian Standards Association (CSA) or the American National Standards Institute (ANSI)

3. Permitted by the Authority Having Jurisdiction (AHJ)

C. Electrical components shall bear the UL or ETL label, and this listing shall apply to the entire assembly. Only systems and equipment that meet or exceed the level of quality and the capabilities stated in this document will be considered for acceptance.

D. All products shall be new, of the latest version at time of bid, and brought to the job site in original manufacturer's packaging. Used equipment and damaged material will be rejected.

E. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.

F. Cable lubricants specifically designed for installing communications cable may be used as needed to reduce pulling tension when pulling cable into conduit.

G. Take care during installation to prevent scratches, dents, chips, etc. Equipment with significant or disfiguring cosmetic flaws will be rejected.

H. All components will be approved by the Engineer and shall have the most aesthetic value possible while maintaining specified functionality. Hardware shall:

1. Be in compliance with the Construction Documents

2. Have fit and finish compatible with the existing surrounding structure

3. Be unobtrusive

4. Provide the required functionality

I. All work area termination hardware, including mounting boxes, faceplates, and outlets, shall match the existing wall surface color as closely as possible.

J. All copper and fiber products shall be from a single manufacturer so that a single performance warranty covers all applications on vertical and horizontal links.

K. Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional aspects of the equipment and its installation.

L. Provide products that are suitable for the intended use, including, but not limited to environmental, regulatory, and electrical factors.

2.2 FIELD-TERMINATED PATCH PANELS

A. Patch panels for field termination of Category 6 (network) and Category 6A (WAP) Unshielded Twisted Pair (UTP) cable shall:

1. Be standard 19-inch rack-mountable panels

2. Be 1RU or 2RU, 24 port or 48 port units, discuss with Gilmer for final determination.

3. Have 8-pin modular Insulation Displacement Connectors (IDCs) that:

a. Meet Category 6 (network) and Category 6A (WAP) performance standards

b. Support T568A and T568B wiring schedules

4. Have space on the front and rear of all jacks for labeling and identification

5. Have a steel frame, with a black power-coat finish, in 24-port, and 48-port configurations

6. Accommodate at least 24 ports for each Rack Unit (RU)

7. Have circuit boards tested in both directions, as required by ANSI/TIA-568

8. Support applications up to 500 MHz

9. Meet the requirements of IEEE 802.af and IEEE 802.3at for PoE applications

10. Have 110-style IDCs on which termination is accomplished with a single conductor impact tool or a 4-pair impact tool

11. Be backwards compatible to allow lower-performing categories of cables or connecting hardware to operate at their full capacity

12. Allow for a minimum of 20 re-terminations without signal degradation below the limit specified by industry standards

13. Have modular ports that are in compliance with FCC CFR 47 part 68, subpart F and IEC 60603-7 with 50 micro--inches of gold plating over nickel contacts or equivalent

14. Have a fully-enclosed front and provide rear plastic strips for the physical protection of printed circuit boards

15. Be made by an ISO 9001 Certified Manufacturer

16. Have the following electrical specifications:

    a. Compliance with ANSI/TIA--568 and ISO/IEC 11801 Category 6 or Category 6A compliant

    b. CSA C22.2 approval or equivalent

    c. Provide color-coded icons or color-coded designation label strips for all patch panels that are incompliance with TIA/EIA-606 and that identify voice or data functionality as required

17. Have horizontal cable support bars from the same manufacturer as the patch panels, listed elsewhere in this Section, that:

    a. Are constructed of 3 mm roll-formed aluminum or steel

    b. Are 19-inch rack mountable

    c. Are less than 5/8 inch (16 mm) high

    d. Are factory manufactured with stamped or drilled points designed for use with hook and loop tape to provide secure support of incoming cables at the rear of the patch panel

    e. Have a black powder-coat paint finish

B. Field-Terminated Patch Panel Part Numbers

The table below lists (preferred) Panduit part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*description*	*unit of measure*	*std. pkg. qty.*	*std. ctn. qty.*	*more info*
Patch Panel					
NK6XPPG24Y	Punchdown Patch Panel, Cat 6A, Flat, 24 Port, 1RU	piece	1	10	
NK6XPPG48Y	Punchdown Patch Panel, Cat 6A, Flat, 48 Port, 2RU	piece	1	10	
NK6PPG24Y	Punchdown Patch Panel, Cat 6, Flat, 24 Port, 1RU	piece	1	10	
NK6PPG48Y	Punchdown Patch Panel, Cat 6, Flat, 48 Port, 2RU	piece	1	10	

part number	description	unit of measure	std. pkg. qty.	std. ctn. qty.	more info
Strain Relief					
SRB19BLY	Strain Relief Bar, Extended 2"	piece	1	10	Click Here
SRBBRKT	Strain Relief Bar Bracket	piece	1	10	Click Here
SRB19D5BL	Strain Relief Bar, Extended 5"	piece	1	10	Click Here
SRB19D7BL	Strain Relief Bar, Extended 7"	piece	1	10	Click Here

2.3 MODULAR / CASSETTE PATCH PANELS

A. Patch panels shall:

1. Be modular components with a maximum capacity of 48 connections per RU
    a. Made of a high-strength plastic frame with a black finish
    b. Made of a steel frame with black power coat finish
2. Have space on the front and rear of all jacks for labeling and identification
3. Accept a variety of media and connectivity components, including UTP, optical fiber, and audio/visual components
4. Inserts and panels must be made by the same manufacturer (Panduit preferred).
5. Have horizontal cable support bars from the same manufacturer as the patch panels, listed elsewhere in this Section, that:
    a. Are constructed of 3 mm roll-formed aluminum or steel
    b. Are 19” inch rack mountable
    c. Are less than 0.625 inch (16 mm) high
    d. Are factory manufactured with stamped or drilled points designed for use with hook and loop tape to provide secure support of incoming cables at the rear of the patch panel
    e. Have a black powder-coat paint finish

B. Modular / Cassette Patch Panel Part Numbers

The table below lists (preferred) Panduit part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	Description	unit of measure	std. pkg. qty.	std. ctn. qty.	more info
Modular					
NKPP24FMY	Patch Panel, 24 Port, Modular Flush Mount, Black	piece	1	10	
NKPP48FMY	Patch Panel, 48 Port, Modular Flush Mount, Black	piece	1	10	

2.4 HORIZONTAL UTP CABLE

A. Horizontal Category 6 cabling for networks shall be:

1. CMR listed 100 ohm, 24 AWG, 4-pair, Unshielded Twisted Pair (UTP)

2. In compliance with ANSI/TIA-568 for Category 6 / ISO Class E 6 / ISO Class EA performance, with swept frequency testing to at least 250 MHz

B. Horizontal Category 6A cabling for Wireless Access Points shall be:

1. CMR listed 100 ohm, 23 AWG, 4-pair Unshielded Twisted Pair (UTP))

2. In compliance with ANSI/TIA-568 for Category 6A / ISO Class E 6A performance, with swept frequency testing to at least 500 MHz.

C. The outermost jacket must be indelibly printed by the manufacturer with the name of the manufacturer, the UL rating, and incremental footage markings.

D. For Cat6A cables, all four pairs shall be surrounded by a metallic tape, cut into segments of varying length to combat the effects of alien crosstalk.

E. For Cat6A cables, the minimum nominal cable diameter shall be 0.250 inch for CMP and 0.260 inch for CMR.

F. Horizontal UTP Part Numbers

The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	Description	unit of measure	min. order qty.	min. order incrmt.	more info
Unshielded					

part number	Description	unit of measure	min. order qty.	min. order incrmt.	more info
PUR6AV04BU-G	Category 6A, 4-pair, 23 AWG, U/UTP, riser, (CMR), Blue or General Cable Equal	foot	5000	1000	
PUR6004BU-W	Category 6, 4-pair, 23 AWG, U/UTP, riser, (CMR), Blue or General Cable Equal	foot	12000	1000	

2.5 FACEPLATES AND JACKS

A. UTP Jacks

UTP Jacks shall:

1. Be flush-mount eight-pin, eight conductor (8P8C) modular jacks
2. Have an Insulation Displacement Connector (IDC) on the rear
3. Provide color-coding for both T568A and T568B wiring schedules
4. Preferred design is Panduit NetKey
5. Be in compliance with the intermateability standard IEC 60603-7 for backward compatibility
6. Meet ANSI/TIA-568 requirements for Category 6 (networks) or Category 6A (WAP) connecting hardware
7. Must accept 2-pair, 3-pair, or 4-pair modular plugs without damage to the outer jack contacts

B. SC SFF Fiber Optic Adapters

1. SC Small Form Factor (SFF) fiber optic adapters with integrated panel retention clips must be TIA/EIA-604 FOCIS-10 compatible.
2. Each SC simplex adapter shall connect one SC connector pair in one module space.
3. Each SC duplex adapter shall connect two SC connector pairs in one module space.
4. SC adapters and adapter modules shall include phosphor bronze split sleeves for multimode applications or zirconia ceramic split sleeves for single mode applications.

C. Jack Part Numbers

The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*description*	*unit of measure*	*std. pkg. qty.*	*std. ctn. qty.*	*more info*
UTP Jack Modules					
NK6X88Mxx	Panduit NetKey Module, Cat 6A, UTP, 8 pos 8 wire, Universal, 110 Style, Color to be determined by owner	piece	1	50	
	xx- denotes color code from Panduit				
NK688Mxx	Panduit NetKey Module, Cat 6, UTP, 8 pos 8 wire, Universal, 110 Style, Color to be determined by owner	piece	1	50	
	xx-denotes color code from Panduit				
Initial UTP Jack Module Color Scheme					
	BLUE jacks depict Data				
	YELLOW jacks depict Wireless Access Points (WAP)				
	GREEN jacks depict Power Over Ethernet (PoE)				
	RED jacks depict Life Safety concerns				
Pre-Polished Fiber Connectors					
FLCDMCXAQY	LC OM3/OM4 multimode duplex connector, aqua boot	piece	1	10	
FLCSMCXAQY	LC 50/125µm OM3/OM4 multimode simplex connector, aqua boot	piece	1	10	
FLCSSCBUY	LC 9/125µm singlemode simplex fiber optic connector for 900µm tight buffered fiber installation	piece	1	10	
FLCDSCBUY	LC OS2 singlemode duplex fiber optic connector for 900µm tight buffered fiber installation	piece	1	10	

D. Faceplates

Faceplates shall:

1. Be single-gang or double-gang
2. Port population determined by owner, Gilmer ISD
3. Supplied in colors and finishes coordinated with the owner, Gilmer ISD.
4. Have the capability for integral labeling and identification
5. Provide capacity for a maximum of:
   a. Six individual jacks for single-gang applications
   b. Up to 12 individual jacks for double-gang applications

E. Faceplate Part Numbers

The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*Description*	*unit of measure*	*std. pkg. qty.*	*std. ctn. qty.*	*more info*
Faceplates					
NKF2S	NetKey Single Gang Stainless Steel 2 port	piece	1	10	
NKF4S	NetKey Single Gang Stainless Steel 4-port	piece	1	10	
NK2FWHY	NetKey Faceplate White Single Gang with Label, 2-port	piece	1	10	
NK4FWHY	NetKey Faceplate White Single Gang with Label, 4-port	piece	1	10	

**Colors available: EI (Electric Ivory), IW (Off White), and WH (White)

All workstation termination hardware shall match the existing wall surface color as closely as possible, including surface-mounted boxes, faceplates, surface-mount raceway, and outlets.

2.6 OPTICAL FIBER CABLES

A. Optical Fiber Strands

1. All optical fibers shall:

   a. Be usable and shall meet required specifications

   b. Be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification

   c. Consist of a doped silica core surrounded by a concentric glass cladding and have a matched clad design.

   d. Be proof tested by the fiber manufacturer at a minimum of 100 kpsi (0.7 GN/m^2)

   e. Be coated with a dual layer acrylate protective coating that is in physical contact with the cladding surface

   f. Have a maximum attenuation value for each cabled fiber at 23˚C ± 5˚C on the original shipping reel

2. Graded Index (50/125 µm OM3)

   The multimode fiber utilized in the OM3 optical fiber cable shall meet TIA-492AAAC-A, “Detail Specification for 850-nm Laser-Optimized, 50µm Core Diameter/ 125-µm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers.” The fibers shall have:

   a. A core diameter of 50.0 ± 2.5 µm

   b. Core non-circularity of no more than 5%

   c. A cladding diameter of 125.0 ± 1.0 µm

   d. Cladding non-circularity of no more than 1.0%

   e. A core-to-cladding concentricity of no more than 1.0 µm

   f. A coating diameter of 245 ± 10 µm

   g. A refractive index core (graded index)

   h. A numerical aperture of 0.200 ± 0.015

   i. Maximum attenuation of 2.3 dB/km at 850 nm, 0.6 dB/km at 1300 nm, and 1.0 dB/km at 1301-1380 nm

   j. IEEE 802.3ae performance that supports laser-based 10 Gigabit Ethernet (GbE) operation in the 10GBASE-SR/SW (850 nm) and 10GBASE-LX4 (1310 nm) at 300 m and 10GBASE-LRM (1310 nm) at 220 meters

k. A minimum LED bandwidth of 500/500 MHz•km at 850/1300 nm

l. Attenuation uniformity with no point discontinuities greater than 0.08 dB at either 850 nm or 1300 nm

m. Water peak attenuation with a coefficient at 1380 nm that does not exceed the coefficient at 1300 nm by more than 3.0 dB/km

n. Macrobend attenuation due to 100 turns of fiber around a 75 mm ± 2 mm diameter mandrel that does not exceed 0.05 dB at 850 nm or 1300 nm

3. Graded Index (50/125 µm OM4)

The multi-mode fiber utilized in the OM4 optical fiber cable shall meet TIA-492AAAD "Detail specification for OM4 850-nm laser-optimized, 50-µm core diameter/125 µm cladding diameter class 1a graded-index multimode optical fibers." The fibers shall have:

a. A core diameter of 50.0 µm ± 2.5 µm

b. Core non-circularity of no more than 5%

c. A cladding diameter of 125.0 µm ± 1.0 µm

d. Cladding non-circularity of no more than 1.0%

e. Core-to-cladding concentricity of no more than 1.0 µm

f. A coating diameter of 245 µm ± 10 µm

g. A refractive index core (graded index)

h. A numerical aperture of 0.200 ± 0.015

i. Maximum attenuation of 2.3 dB/km at 850 nm and 0.6 dB/km at 1300 nm

j. IEEE 802.3ae performance that supports laser-based 10 Gigabit Ethernet (10GbE) operation in the 10GBASE-SR/SW (850 nm) to a maximum distance of 550 meters and 10GBASE-LX/LX4 (1300 nm) to a maximum distance of 300 meters

k. A minimum LED bandwidth of 500/500 MHz•km at 850/1300 nm

l. Attenuation uniformity with no point discontinuities greater than 0.2 dB at either 850 nm or 1300 nm

m. Water peak attenuation with a coefficient at 1380 nm that does not exceed the attenuation coefficient at 1300 nm by more than 3.0 dB/km

n. Macrobend attenuation due to 100 turns of fiber around a 75 mm ± 2 mm diameter mandrel that does not exceed 0.5 dB at 850 nm or 1300 nm

4. Single-Mode (8.5/125 µm)

Single-mode fibers shall meet TIA-492CAAB, “Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak,” and ITU recommendation TG.652, “Characteristics of Single-Mode Optical Fiber Cable.” The fibers shall have:

a. A core/cladding diameter (characterized) of 8.2 µm/125.0 µm ± 0.7 µm

b. Core-to-cladding concentricity of no more than 0.5 µm

c. Cladding non-circularity of no more than 1.0%

d. A coating diameter of 245 µm ± 5 µm

e. Attenuation of 0.34 dB/km at 1310 nm and 0.22 dB/km at 1550 nm

f. Attenuation uniformity with no point discontinuity greater than 0.05 dB at either 1310 nm or 1550 nm

g. Water peak attenuation at 1383 nm ± 3 nm that is no more than 0.31 dB/km

h. A cabled cutoff wavelength: (∂ccf) that is no more than 1260 nm

i. IEEE 802.3ae performance that supports laser-based Gigabit Ethernet (GbE) operation in the 10GBASE-LR (1300 nm) operating window at 10,000 m

j. A mode field diameter of 9.20 µm ± 0.40 µm at 1310 nm and 10.4 µm ± 0.8 µm at 1550 nm

k. Macrobend attenuation due to 100 turns of fiber around a 50 mm ± 2 mm diameter mandrel that does not exceed 0.05 dB at 1310 nm and 1550 nm.

l. A zero dispersion wavelength (∂o) of 1301.5 nm that is not more than ∂o at 1321.5 nm or less

m. A zero dispersion slope (So) of no more than 0.086 ps/(nm•km)

n. Maximum dispersion of no more than 3.2 ps/(nm•km) from 1285 nm through 1330 nm and less than 18 ps/(nm•km) at 1550 nm

o. A fiber curl with a curvature radius of no less than 4.0 m

B. Fiber Optic Cable Fire Ratings

Only approved Fire Rated by Gilmer ISD listed optical fiber backbone cable is acceptable for use on this project.

C. Fiber Optic Cable Construction

It shall be of a tight buffer construction, containing graded-index, 50/125 micron multimode and 9/125 micron single-mode, fibers which meet or exceed the requirements of ANSI/TIA-568-C.3 for backbone cabling.

D. Fiber Optic Cable Termination

1. Where cables are installed, the 250 µm coated fibers contained in these cables may be terminated either by:

    a. Splicing of factory-terminated cable assemblies (“pigtails”)

    b. Individual fibers secured in a protective covering such as an aramid-reinforced tube with connectors mated to the resulting assembly

2. Splicing shall be by the “fusion” method. Individual splice loss shall not exceed 0.3 dB.

3. Direct termination of 250 µm coated fibers shall not be permitted.

E. Size and Configuration

F. The size and configuration shall be as shown on the Drawings.

G. Fiber Subunits

1. The buffered fibers shall be grouped in 12-fiber subunits.

2. The fibers shall be stranded around a dielectric central member in the subunit.

3. Layered aramid yarns shall serve as the tensile strength member of the subunit.

4. A ripcord may be applied between the aramid yarns and the subunit jacket to facilitate jacket removal.

5. The subunit jacket shall be extruded over the aramid yarns for physical and environmental protection.

    a. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections.

    b. The jacket shall have a consistent, uniform thickness.

    c. The jacket shall be smooth, as is consistent with the best commercial practice.

6. The subunits shall be stranded around a dielectric central member. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. An outer jacket shall be extruded around the subunits.

H. Metallic Armor

An overall, helically wound, interlocking metallic armor shall be provided to surround the outer cable jacket, to which a listed outer jacket shall be applied.

Color-Coding

1. The individual fibers shall be color-coded for identification in accordance with EIA/TIA-598, “Optical Fiber Cable Color-Coding.”

2. The coloring material shall:

    a. Be stable over the temperature range of the cable

b. Not be susceptible to migration

c. Not affect the transmission characteristics of the optical fibers

d. Shall not cause the buffered fibers to adhere to one another

3. The overall jacket for graded index cables as specified herein shall be aqua.

4. The overall jacket for single-mode cables as specified herein shall be yellow.

I. Fiber Optic Cable Part Numbers

The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*description*	*unit of measure*	*min. order qty.*	*min. order incrmt.*	*more info*
Distribution					
FODRX12Y	12-fiber OM3 10 GbE OFNP (riser) Distribution Cable	foot	--	--	
FODRX24Y	24-fiber OM3 10 GbE OFNP (riser) Distribution Cable	foot	--	--	
FODRZ12Y	12-fiber OM4 10 GbE OFNP (riser) Distribution Cable	foot	--	--	
FODRZ24Y	24-fiber OM4 10 GbE OFNP (riser) Distribution Cable	foot	--	--	
Armored					
FOPRX12Y	12-fiber OM3 10 GbE multimode OFNP (riser) rated aluminum interlocking armored cable	foot	--	--	
FOPRZ12Y	12-fiber OM4 10 GbE multimode OFCP (riser) rated aluminum interlocking armored cable	foot	--	--	
FSPR924Y	24-fiber OS2 singlemode OFNP (riser) rated indoor interlocking aluminum armored cable	foot	--	--	

2.7 OPTICAL FIBER CONNECTORS

A. Optical fiber connectors shall be compliant with TIA/EIA-604-10A (LC).

B. For graded-index optical fiber strands, connectors use a mechanical splice and index-matching gel for interfacing the field strand with a pre-polished fiber stub.

C. For 9/125 µm single-mode strands, fusion splicing of factory cable assemblies is required. Field polish connectors are permitted for use with OS1 and OS2.

D. Connectors must meet or exceed the performance criteria as stipulated in ANSI/TIA-568-C and must be manufactured with the following strain relief boots:

1. A beige strain relief boot to indicate 62.5/125 µm multimode optical fiber

2. An aqua strain relief boot to indicate 50/125 µm multimode optical fiber

3. A blue strain relief boot to indicate single-mode optical fiber

E. Connectors shall use a precision zirconium ceramic ferrule.

F. Connectors shall have a typical insertion loss of 0.2 dB and a maximum insertion loss of 0.4 dB.

G. Connectors shall be ANSI/TIA-568 compliant.

H. Connectors shall be made by Panduit Corporation.

I. Do not use crimp or screw-on fiber connectors.

J. The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*Description*	*unit of measure*	*std. pkg. qty.*	*std. ctn. qty.*	*more info*
Pre-Polished					
FLCDMCXAQY	LC OM3/OM4 multimode duplex connector, aqua boot	piece	1	10	
FLCSMCXAQY	LC 50/125µm OM3/OM4 multimode simplex connector, aqua boot	piece	1	10	
FLCSSCBUY	LC 9/125µm singlemode simplex fiber optic connector for 900µm tight buffered fiber installation	piece	1	10	
FLCDSCBUY	LC OS2 singlemode duplex fiber optic connector for 900µm tight buffered fiber installation	piece	1	10	
Pigtails					
F91BN1NNNSNM001	OS1/2 1 FIBER 900um Buffered Patchcord No Jacket LC to Pigtail Std IL - 1 Meter	piece	1	10	
F91BN3NNNSNM001	OS2 1 Fiber 900um Buffered Patchcord No Jacket SC to Pigtail Std IL - 1 Meter	piece	1	10	
FX1BN1NNNSNM001	OM3 1 Fiber 900um Buffered Patchcord No Jacket LC to Pigtail Std IL - 1 Meter	piece	1	10	
FX1BN3NNNSNM001	OM3 1 Fiber 900um Buffered Patchcord No Jacket SC to Pigtail Std IL - 1 Meter	piece	1	10	

part number	Description	unit of measure	std. pkg. qty.	std. ctn. qty.	more info
FZ1BN1NNNSNM001	OM4 1 Fiber 900um Buffered Patchcord No Jacket LC to Pigtail Std IL - 1 Meter	piece	1	10	
FZ1BN3NNNSNM001	OM4 1 Fiber 900um Buffered Patchcord No Jacket SC to Pigtail Std IL - 1 Meter	piece	1	10	

2.8 OPTICAL FIBER CASSETTES

A. Only factory-manufactured high-density modular fiber optic cassettes that comply with IEEE 802.3ae 10GbE and ANSI T11.2 Fibre Channel requirements shall be used.

B. Optical fiber strands within the cassettes shall be equal to those used in the cable between cassettes.

C. To meet the IEEE 802.3ae channel loss specification, cassettes shall have a maximum insertion loss of 0.5 dB.

D. Cassettes shall employ high performance FOCIS-5 connectors on the rear of the units routed to couplers on the front face of the assembly.

E. The adapter housing colors shall follow the color identification scheme suggested by ANSI/TIA-568.

F. Cassettes shall interconnect with high-density small-form-factor pre-terminated cable assemblies.

G. The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

2.9 OPTICAL FIBER DISTRIBUTION ENCLOSURE

All Fiber Distribution Enclosures (FDEs) shall:

A. Be rack-mounted, metal enclosures with removable doors and panels at front and rear

B. Be designed for cable entry from the rear of the enclosure

C. Be equipped with appropriate means for physically securing the cables in place, and shall provide sufficient rings, saddles, and guides to ensure that all cables and strands are dressed in a neat and workmanlike manner and to maintain the required minimum bend radii for all changes in direction

D. Be equipped with an integral bonding lug or stud for securing the fiber strength member

E. Provide space for six or twelve inserts

F. Use modular snap-in coupler panels or factory-made cassettes

G. Have front and rear access panels be fitted with manufacturer-supplied labels for each enclosure, cable, and all termination positions

H. Have blank connector panels for all available positions, unless the housing is ordered with optical fiber adapters pre-installed

I. The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*description*	*unit of measure*	*std. pkg. qty.*	*std. ctn. qty.*	*more info*
Enclosures					
FRME1	Rack Mount Enclosure 1 RU	piece	1	10	Click Here
FCE1U	Rack Mount Fiber Enclosure 1RU	piece	1	10	Click Here
FRME1U	Rack Mount Fiber Enclosure 1 RU	piece	1	10	Click Here
FRME2	Rack Mount Fiber Enclosure 2 RU	piece	1	10	Click Here
FRME4	Rack Mount Fiber Enclosure 4 RU	piece	1	10	Click Here
FWME2	Wall Mount Fiber Enclosure With 2 FAP Openings	piece	1	10	Click Here
FAPB	Blank FAP	piece	1	10	Click Here

2.10 OPTICAL FIBER CONNECTOR PANELS

A connector panel is a modular removable plate containing optical fiber connector adapters or copper jacks.

A. Optical Fiber Couplers

1. Optical fiber couplers shall be a modular unit of the same manufacture as the Fiber Distribution Enclosures and shall have keyed openings on the front and rear to provide proper alignment of the connectors.

2. Couplers will be factory-installed to maintain an appropriate A-B orientation throughout the optical link.

3. Couplers will be aqua with ceramic alignment sleeves for 50 µm graded-index optical fiber and blue for single-mode.

B. Connector Panels

Connector panels shall:

1. Be manufactured from 16-gauge cold-rolled steel or injection molded polycarbonate for structural integrity

2. Be finished with a black powder-coat texture to match other hardware

3. Have a single mounting footprint

4. Be available with three, four, six, eight, twelve, or twenty-four connector adapters in each panel

5. Be both rack-mountable and wall-mountable

6. Be attached with two push-pull latches to allow for quick installation and removal

7. Be available with industry standard single-fiber and small form factor multi-fiber adapters, including the TIA/EIA-604-3A (SC), TIA/EIA-2 (ST) compatible, and TIA/EIA-604-10A (LC)

8. Include removable icons that identify the circuits, including blank, telephone, computer, CATV, video camera, satellite dish, or CAT 6, and in colors including blue, yellow, red, white, electric ivory, ash, green, purple, gray, black, brown, and orange

C. Blank Connector Panels

Blank connector panels shall be available to fill unused space in the housings. The blank connector panels shall be:

1. Attached with at least two push-pull latches to allow for quick installation and removal

2. Manufactured from injection molded polycarbonate

3. Finished with a wrinkled black texture to match the housing

D. The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*description*	*unit of measure*	*std. pkg. qty.*	*std. ctn. qty.*	*more info*
Adapters					
FAP12WAQDLCZ	FAP w/12 LC 10 GbE Dupl mm Adapters (AQ) Zirconia	piece	1	10	Click Here
FAP12WBUDLCZ	FAP w/12 LC Dupl Adapters (BU) Zirconia	piece	1	10	Click Here
FAP6WBUDLCZ	FAP w/6 LC Dupl Adapters (BU) Zirconia	piece	1	10	Click Here
FAP6WAQDLCZ	FAP w/6 LC 10 GbE Dupl mm Adapters (AQ) Zirconia	piece	1	10	Click Here
FAP6WBUDSCZ	FAP w/6 SC Dupl Adapters (BU) Zirconia	piece	1	10	Click Here
FAP12WEIDLC	FAP w/12 LC Dupl mm Adapters (EI) Phos	piece	1	10	Click Here

part number	description	unit of measure	std. pkg. qty.	std. ctn. qty.	more info
FAP6WEIDLC	FAP w/6 LC Dupl mm Adapters (EI) Phos	piece	1	10	Click Here
CFAPPBL1	Fiber Adapter Patch Panel 1 RU	piece	1	10	Click Here

2.11 FACTORY-TERMINATED CABLE ASSEMBLIES

A. All cable assemblies will be constructed and tested at the manufacturer's facilities.

B. Unshielded Twisted Pair (UTP) cable assemblies shall be:

1. Constructed using listed, 100 ohm, 23 AWG, 4-Pair, Unshielded Twisted Pair cabling, of a 4+0 FEP construction, compliant with ANSI/TIA-568 for Category 6 (network) or Category 6A (WAP) performance and ETL verified for performance, with swept frequency testing to at least 250MHz (Cat 6) or 500MHz (Cat6A)

2. Of the lengths and configurations indicated on the Drawings

3. Bundled using appropriate means to create a single unit

4. Terminated to 8P8C RJ45 modular plugs at each end.

C. The assembly and each link therein will be individually identified and bear an appropriate, ANSI/TIA-606 compliant label.

D. Optical Fiber Assemblies

1. Constructed using listed, OS2, OM3/OM4 optical fiber.

2. Optical fiber strands shall be as specified elsewhere in this Section.

3. Cables will be terminated to LC/LC; TIA-604

4. Size, length and configuration will be as indicated on the Drawings.

E. The assembly and each link therein will be individually identified and bear an appropriate label in compliance with ANSI/TIA-606.

2.12 CORDAGE

A. Unshielded Twisted Pair (UTP) Cordage

1. Patching, equipment, and station cords shall be factory manufactured and shall be in compliance with Category 6 (network) or Category 6A (WAP) for channel performance. The use of field-manufactured cordage is not permitted.

2. All cords shall be constructed of four twisted pair of 24 AWG stranded conductors terminated to industry standard 8P8C modular plug at both ends.

3. Cordage shall be color-coded by service type (Voice, Data, Video, etc.). Colors shall be coordinated with and approved by the Owner.

4. Wiring schedule shall match that of patch panels and outlets.

5. Cordage shall be of the same manufacturer as modular jacks, patch panels, and connecting/termination blocks.

6. Station cords shall be 6 m long.

7. Equipment cords shall be 3 m long.

8. Patch cords shall be available in varying lengths from 1 m to 5 m.

9. The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	*Description*	*unit of measure*	*std. pkg. qty.*	*std. ctn. qty.*	*more info*
Patch					
UTP28SP*xxY	Category 6 UTP Patch Cord, Color and length to be determined by owner, Gilmer ISD	foot	1	10	
UTP28X*xxY	Category 6A UTP Patch Cord, Color and length to be determined by owner, Gilmer ISD	foot	1	10	
* Standard lengths include: 6”, 8”, 12”, 2 feet, 3 feet, 4 feet, 5 feet, 6 feet, 7 feet, 10 feet, 14 feet, 15 feet. Bulk packaging available: Add -Q for a pack of 25.					

B. Optical Fiber

1. All optical fiber patch cords shall be 1.8 mm duplex (zip-cord), containing optical fiber strands equal to that specified for interior cabling, and shall match the type (graded-index or single-mode) connected to each cord.

2. All cords shall be terminated to factory-polished duplex LC connectors and shall be fully in compliance with ANSI/TIA-568-C.3 standards for performance to 1000 Mb/s.

3. The end-faces of all patch cords shall be of a Universal Positive Contact (UPC) configuration.

4. Field-terminated cable assemblies are not permitted.

5. Quantities and lengths of cords shall be coordinated with and approved by the Engineer.

6. Cordage will be of the same manufacturer as that selected for the optical fiber and associated connectors.

7. The table below lists part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	description	unit of measure	std. pkg. qty.	std. ctn. qty.	more info
Patch					
F92ERLNLNSNM002	OS2 2 Fiber 1.6mm Jacket Patchcord Riser LC Duplex to LC Duplex Std IL - 2 Meters	meter	1	10	Click Here
F92ERLNLNSNM003	OS2 2 Fiber 1.6mm Jacket Patchcord Riser LC Duplex to LC Duplex Std IL - 3 Meters	meter	1	10	Click Here
FX2ERLNLNSNM001	OM3 2 Fiber 1.6mm Jacket Patchcord Riser LC Duplex to LC Duplex Std IL - 1 Meter	meter	1	10	Click Here
FX2ERLNLNSNM002	OM3 2 Fiber 1.6mm Jacket Patchcord Riser LC Duplex to LC Duplex Std IL - 2 Meters	meter	1	10	Click Here
FX2ERLNLNSNM003	OM3 2 Fiber 1.6mm Jacket Patchcord Riser LC Duplex to LC Duplex Std IL - 3 Meters	meter	1	10	Click Here
F923RSNSNSNM001	OS2 2 Fiber 3mm Jacket Patchcord Riser SC Duplex to SC Duplex Std. IL - 1 Meter	meter	1	10	Click Here
F92ERLNSNSNM001	OS2 2 Fiber 1.6mm Jacket Patchcord Riser LC Duplex to SC Duplex Std IL - 1 Meter	meter	1	10	Click Here
F92ERQ1Q1SNM001	OS2 2 Fiber 1.6mm Jacket Patch cord Riser LC Push-Pull to LC Push-Pull Standard IL - 1m	meter	1	10	Click Here
FX2ERQ1Q1ONM001	OM3 2 Fiber 1.6MM Jacket Patchcord Riser LC Push-Pull to LC Push-Pull Optimized IL - 1 Meter	meter	1	10	Click Here
FX2ERQ1Q1SNM001	OM3 2 Fiber 1.6mm Jacket Patch cord Riser LC Push-Pull to LC Push-Pull Standard IL - 1m	meter	1	10	Click Here
FZ2ERQ1Q1ONM001	OM4 2 Fiber 1.6MM Jacket Patchcord Riser LC Push-Pull to LC Push-Pull Optimized IL - 1 Meter	meter	1	10	Click Here
FZ2ERQ1Q1SNM001	OM4 2 Fiber 1.6mm Jacket Patch cord Riser LC Push-Pull to LC Push-Pull Standard IL - 1m	meter	1	10	Click Here
Length in meters: 1, 2, 3, 5, and 10 meter lengths.					

C. CABLE BUNDLING MATERIALS

1. Provide hook and loop tape, that is at least 0.5 inches wide, of a length equal to 150% of the circumference of the cable bundle.

2. Do not use Plastic Cable Tie Wraps on this project.

3. When used in areas considered environmental air spaces, all bundling materials must be appropriately listed.

4. The table below lists suggested part numbers. The part numbers and sizes listed are a small subset of the number available. For additional information, contact Panduit customer service or refer to the current parts catalog.

part number	Description	unit of measure	std. pkg. qty.	std. ctn. qty.	more info
Bundling					
HLS-75R0	Hook & Loop Roll, 75'L (22.9m), .75"W (19.1mm), Black	roll	1	10	Click Here
HLS-15R0	Hook & Loop Roll, 15'L (4.6m), .75"W (19.1mm), Black	roll	1	10	Click Here
HLB2S-C0	Hook & Loop Stacked Strip Ties, 7.0"L (178mm), .75"W (19.1mm), 100 pcs, Black	package	1	10	Click Here
HLC3S-X0	Hook & Loop Tie, Cinch, 12.0"L (305mm), .75"W (19.1mm), Black	piece	10	100	Click Here
HLM-15R0	Hook & Loop Roll, 15' L(4.6m), .33"W (8.4mm), Black	roll	1	10	Click Here
HLS1.5S-X0	Hook & Loop Tie, Strip, 6.0"L (152mm), .75"W (19.1mm), Black	piece	10	100	Click Here
HLS3S-X0	Hook & Loop Tie, Strip, 12.0"L (305mm), .75"W (19.1mm), Black	piece	10	100	Click Here
HLSP1.5S-X0	Hook & Loop Tie, Plenum Strip, 6.0"L (152mm), .75"W (19.1mm), Black	piece	10	100	Click Here
HLT2I-X0	Hook & Loop Tie, Loop Style, 8.0"L (203mm), .50"W (12.7mm), Black	piece	10	100	Click Here
HLTP2I-X0	Hook & Loop Tie, Plenum Loop Style, 8.0"L (203mm), .50"W (12.7mm), Black	piece	10	100	Click Here
TTS-35RX0	Hook and Loop Roll, 10 Roll-Pack, Low Profile, 35'L (10.7m), .75"W (19.1mm), Black	roll	1	10	Click Here
PLT3I-C	Cable Tie, 11.4"L (290mm), Intermediate, Nylon, Natural	piece	100	1000	Click Here
PLT3S-C2	Cable Tie, 11.5"L (292mm) Standard, Nylon, Red	piece	100	1000	Click Here
PLT8LH-C0	Cable Tie, 27.6"L (701mm), Light-Heavy, Weather Resistant, Black	piece	100	2000	Click Here
PLT4S-M30	Cable Tie, 14.5"L (368mm), Standard, Heat Stabilized, Black	piece	1000	10000	Click Here
PLT3S-M2	Cable Tie, 11.5"L (292mm) Standard, Nylon, Red	piece	1000	10000	Click Here
PLT4I-M	Cable Tie, 14.5"L (368mm), Intermediate, Nylon, Natural	piece	1000	10000	Click Here

PART 3 - EXECUTION

3.1 GENERAL

A. Upon completion of the work, a Registered Communications Distribution Designer (RCDD) shall submit as-built Drawings to the Owner and to the Engineer.

B. The Contractor shall input the cabling data into the cable management software.

C. Install voice and data cable, an outlet, and a jack at each location designated on the Drawings.

D. Provide any required screws, anchors, clamps, tie wraps, distribution rings, miscellaneous grounding and support hardware, etc. needed to facilitate the installation of the cable plant system.

E. Furnish any special installation equipment or tools necessary to properly complete the installation.

F. Do not roll or store cable reels without an appropriate underlay.

G. Failure to follow the appropriate guidelines may require the installer to provide additional material and labor required to properly rectify the situation. This shall also apply to any and all damages caused to the cables by the installer during the implementation.

H. Provide fire blocking at all fire rated penetrations.

I. Plug conduits where cabling has been installed in the main equipment room, backbone, and other cable entrance locations with re-enterable duct seal of flame retardant putty.

J. Provide bushings on all conduit ends.

K. All wiring, materials, and equipment must be listed and labeled by an NRTL. To certify that performance characteristics, meet ANSI/TIA-568 Standards, provide all Original Equipment Manufacturer (OEM) documentation to the Owner.

L. All techniques and fixtures used in the installation must minimize complexity and must allow for easy maintenance of, and ready access to, all components for test measurements.

M. No self-tapping screws shall be used.

N. All parts shall be made of corrosion-resistant material, such as plastic, anodized aluminum, or brass.

O. All materials used in installation shall be resistant to fungus growth and moisture deterioration.

P. To avoid corrosion caused by electrolysis between dissimilar metals under the environmental operating conditions specified, separate dissimilar metals with an inert dielectric material.

Q. All cable runs must be continuous from patch panel to the outlet location.

R. Place electrical components at outlets (such as impedance matching devices) outside the faceplate using a standard plug connection.

S. All empty innerduct or conduit shall include a non-corrosive pull-rope.

T. Turn all spare patch cables over to the Owner.

U. All of the pathways shown on the drawings are suggested routes for the Contractor to use as guidelines. Prior to construction, the Contractor shall coordinate in the field with other trades to determine the exact feeder, tie, and riser backbone cabling pathways. In any case where the communication pathway must be removed and re-routed, due to conflicts with other trades with which the Contractor did not previously coordinate, the Contractor is responsible for all costs associated with the removal and relocation.

3.2 WIRING PRACTICES

A. Group and bundle all wiring by power level or signal type.

B. Where specific instructions are not given, perform all wiring in strict adherence to standard industry practices as described in the referenced Telecommunications Distribution Methods Manual (TDMM), and ANSI/TIA-568 standards.

C. Exercise care in wiring to avoid damaging the cables and equipment. Where conduit or chase nipples are not installed around cutouts or knockouts, use grommets.

D. Where wiring of different classifications share a common enclosure or junction box, provide metallic isolation barriers to completely electrically separate wiring groups.

E. Coordinate with tradespeople in the field, and employ proper installation techniques, including earthing and bonding and adequate ElectroMagnetic Compatibility (EMC).The following table lists the distances that should be maintained between power sources and copper data cabling to avoid ElectroMagnetic Interference (EMI).

condition	***<2kVA***	***2-5kVA***	***>5kVA***
Unshielded power lines or electrical equipment in proximity to open or non-metal pathways	6 inches	12 inches	24 inches
Unshielded power lines or electrical equipment in proximity to grounded metal conduit pathway	3 inches	6 inches	12 inches
Power lines enclosed in a grounded metal conduit (or equivalent shielding (in proximity to grounded metal conduit pathway)	2 inches	6 inches	6 inches
Transformers and Electric Motors	36 inches	36 inches	47 inches
Fluorescent lighting	12 inches	12 inches	12 inches

1. These guidelines apply to properly earth-bonded tray containing communications circuits in parallel with power circuits for a distance of 45 feet or more.

2. Communications circuits, contained in properly-bonded, ventilated trough tray, shall not be placed in the same cable tray as power circuits.

F. All cables shall originate and terminate at active or passive devices. Cables shall not be spliced. Where several devices are in close proximity, use approved housing to housing connectors and adapters.

G. All cables terminated in a connection plate mounted in an enclosure shall be dressed to allow cables to be removed from the enclosure and shall be of sufficient cable length to allow for service or re-termination. The plate shall either set on the floor or freely swing clear.

H. All cables installed in vertical tray or chases shall be supported by means of appropriately-sized vertical cable supports on every third floor. Do not use nylon cable ties.

I. Cable Installation in Conduit and Duct Banks

1. Through the entire length of all underground conduits, pull mandrel that is one size smaller than the conduit.

2. When pulling cable, use pulling lubrication.

3. During long or difficult runs, use a dynamometer to measure pulling tension. Place the dynamometer between the cable puller and the pull line to monitor pulling tension. Do not exceed the manufacturer's maximum pulling tension.

4. Apply pulling grips suitable for use with copper cables to the ends of the cable. Consult the cable manufacturer to determine the appropriate pulling grip and method of attachment. Use breakaway or fuse links at the pulling grip, and ensure that the correct "fuse pin" is installed in the fuse link.

5. To protect the cable ends until they are terminated, use cable caps (heat-shrinking type) to seal the ends of the cable.

6. Use cable blocks to facilitate the bending of cable. For bends between 5° and 45°, use a 45° cable block. For bends between 45° and 90°, use a 90° cable block.

7. The bend radius for all cables shall conform to manufacturer's specifications.

3.3 PATCH PANELS

A. Install patch panels in the equipment racks identified on the Drawings. Place patch panels as close as is practical to the locations depicted on the Drawings.

B. Install patch panels square and plumb and fasten them to the mounting rails in four places using manufacturer-supplied screws, with at least one fastener at each corner.

C. Telco Racks to be used within TR shall be; Panduit R2P, 7foot rack, black in color

D. Panduit Vertical Cable managers to be used to organize patch cords within TR.

E. Install horizontal cable support bars at the rear of all patch panels as indicated on the manufacturer's instructions.

F. Attach all accessories supplied with the panels per the manufacturer's instructions.

G. Restore all covers, panels, label holders, and accessories removed during the installation of panels to their original places and states.

H. On the front and rear of each patch panel, place a machine-generated, self-adhesive white label bearing the panel's identifier, as listed in the submittals, in black ½-inch block letters.

3.4 HORIZONTAL UTP

A. Install horizontal cable in a continuous length from the point of origin to the point of termination. Group all cables and bundle them in the overhead pathways in a neat and workmanlike manner.

B. The Contractor shall terminate and test all cables.

C. The Contractor shall not exceed the manufacturer's maximum pulling tension.

D. Splices shall not be allowed.

E. The Contractor shall make sure that all of the materials being installed on this project are of the proper rating (Plenum or Riser) required for the pathways and spaces by local, state, and federal codes.

F. No horizontal cables, including any required service loops, shall be more than 90 meters or 295 feet long. Prior to installation, the Contractor shall identify any area that cannot be reached within these constraints and shall report them to the Engineer. Do not install any data cable outside of these parameters without written approval from the Engineer.

G. Install cable paths perpendicular or parallel to the ceiling structure, unless otherwise shown on the Drawings.

H. Do not expose cable to water, paint overspray, paint removal products, or water-based pulling lubricants, as these substances can negatively impact the performance of the cable.

3.5 FACEPLATES AND JACKS

A. Faceplates

1. Provide faceplates in the configurations and quantities indicated on the Contract Drawings.

2. Fit faceplates to associated device boxes using appropriate adapters.

3. Install all faceplates square and plumb.

4. Within each faceplate, orient all UTP jacks with the locking tab at the bottom.

B. Terminations

1. Do not connect more than six cables in a 1-gang faceplate.

2. For 4-pair UTP cables, terminate all pairs to a single jack. Do not split pairs between jacks.

3. At the jack, remove the minimum amount of outer jacket.

4. Maintain the inherent Twists Per Inch (TPI) of UTP cable to within ½ inch of the termination.

5. Where provided, fit dust caps to all jacks.

C. Wall Mounted Telephone Outlets

On each telephone outlet:

1. Install a 4-inch square box with a single-gang mounting plate.

2. Affix a stainless-steel faceplate, with an un-keyed 8-pin modular jack and wall telephone mounting lugs.

3.6 OPTICAL FIBER CABLE

A. Install the optical fiber backbone in a continuous length from the FDE in the MC to an FDE within each TR.

B. Throughout its length, run the backbone cable in appropriate, listed raceway.

C. Leave a 3 m long maintenance loop at each end of the link, neatly contained in the integral management rings and saddles in a “figure 8” loop at the rear of the FDE.

D. Throughout the length of the cable, maintain the minimum bend radius and pulling force recommended by the manufacturer and required by industry standards, both during installation and after termination and testing.

E. On each end, remove all outer jacket and strength member materials to expose the individual 900-micron buffering of the individual strands for a length of 0.5 m (18 inches).

F. On each end, hold the cable ends securely in place with the cable clamping accessories in each FDE.

G. Route individual strands in the rear of the FDE in a neat and orderly fashion, and place them so as not to create undue stress or micro bending of the strands.

3.7 OPTICAL FIBER CONNECTORS

A. Place optical fiber connectors, appropriate for the optical fiber type, on all strands in strict accordance with manufacturer instructions and industry standards.

B. Install a strain relief boot on all strands, extending over the 900-micron buffer.

C. Remove all strength members from the individual strands, cleanly cutting them at the end of the associated buffer tube.

D. Polish all connector end-faces to a Universal Positive Contact (UPC) profile.

E. Perform the installation in strict compliance with all manufacturer instructions.

3.8 OPTICAL FIBER CASSETTES

A. Install fiber cassettes in strict compliance with the manufacturer’s instructions and requirements.

B. Ensure that, on completion of installation, all dust covers are in place.

3.9 FIBER DISTRIBUTION ENCLOSURES

A. Place optical FDEs as depicted on the Drawings.

B. Fasten all FDEs to the mounting rails, at the four corners of the enclosure at least, using manufacturer-supplied or manufacturer-approved fasteners.

C. Place each FDE in the equipment rack so that it is square and plumb and so that the front face of the FDE is as close as practical to the front face of the rack.

D. Install coupler modules in adequate numbers to support all terminated strands.

E. Fit all unused module spaces with blank plates.

F. To prevent the contamination of unused coupler module faces by airborne particulates, leave the dust caps on all unused faces in place.

G. Once you have finished installing the FDEs, replace all covers, doors, and panels that you removed during the installation.

H. On the front and rear of each enclosure, place a machine-generated, self-adhesive label with a white background and the FDE's identifier, as listed in submittals, in black 1/2-inch-high block letters.

3.10 FACTORY-TERMINATED BALANCED TWISTED PAIR CABLE ASSEMBLIES

A. All cable assemblies will be constructed and tested at the manufacturer's facilities.

B. Install cable assemblies in a continuous length from the point of origin to the point of termination. Group all cables and bundle them in the overhead pathways in a neat and workmanlike manner.

C. The Contractor shall terminate and test all cable assemblies.

D. The Contractor shall not exceed the manufacturer's maximum pulling tension.

E. Splices shall not be allowed.

F. The Contractor shall make sure that all of the materials being installed on this project are of the proper rating (Plenum or Riser) required for the pathways and spaces by local, state, and federal codes.

G. No UTP cable assembly, including any required service loops, shall be more than 90 meters or 295 feet long. Prior to installation, the Contractor shall identify any area that cannot be reached within these constraints and shall report them to the Engineer.

H. Do not install any data cable outside of these parameters without written approval from the Engineer.

I. Install cable paths perpendicular or parallel to the ceiling structure, unless otherwise shown on the Drawings.

J. Do not expose cable to water, paint overspray, paint removal products, or water-based pulling lubricants, as these substances can negatively impact the performance of the cable.

3.11 FACTORY-TERMINATED OPTICAL FIBER CABLE ASSEMBLIES

A. All cable assemblies will be constructed and tested at the manufacturer's facilities.

B. Install optical fiber cable assemblies in a continuous length from the point of origin to the point of termination as shown on the Drawings.

C. Throughout their length, run the optical fiber cable assemblies in appropriate, listed raceway.

D. Leave a 3 m long maintenance loop at each end of the link, neatly contained in the integral management rings and saddles in a "figure 8" loop at the rear of the FDE.

E. Throughout the length of the cable, maintain the minimum bend radius and pulling force recommended by the manufacturer and required by industry standards, both during installation and after termination and testing.

F. On each end, hold the cable ends securely in place with the cable clamping accessories in each FDE.

3.12 BALANCED TWISTED PAIR CORDAGE

1. Install equipment and station cords as directed by the Owner.

2. Route equipment cords in appropriate cable management accessories and maintain all required bend radius limits as specified by industry standards.

3. In racks and cabinets, separately route equipment cords along the longitudinal axis of the rack or cabinet so that no cord traverses the vertical centerline of the cabinet or rack except in an enclosed horizontal cable management panel.

4. Use equipment cords of sufficient length to allow each end of the cord to terminate at the appropriate interface without excessive strain or violation of the minimum bend radius for the selected medium.

3.13 OPTICAL FIBER CORDAGE

1. Install equipment and station cords as directed by the Owner.

2. Route equipment cords in appropriate cable management accessories and maintain all required bend radius limits as specified by industry standards.

3. In racks and cabinets, separately route equipment cords along the longitudinal axis of the rack or cabinet so that no cord traverses the vertical centerline of the cabinet or rack except in an enclosed horizontal cable management panel.

4. Use equipment cords of sufficient length to allow each end of the cord to terminate at the appropriate interface without excessive strain or violation of the minimum bend radius for the selected medium.

3.14 CABLE BUNDLING MATERIALS

A. Use cable bundling and securing materials as required to ensure that cable runs are securely held in place both vertically and horizontally.

B. Do not tighten bundling materials or securing devices so as to cause deformation of the inherent cable geometry or construction.

C. Do not use cable ties or hook and latch tape to secure cable runs to other building systems (such as electrical conduit, EMT, sprinkler pipes, ceiling suspension members, etc.).

D. In areas considered environment air-handling spaces, only use appropriately-listed materials.

3.15 SYSTEM ADMINISTRATION

A. Uniquely identify all components of the installed system by location, function, unit, and sub-unit.

B. Identify each location with a unique alphanumeric identifier.

C. Assign a unique alphanumeric identifier for each equipment enclosure in the building.

D. Identify each adapter module in each distribution or interconnect enclosure with an alphanumeric identifier.

E. Identify all conduits, trays, and pathways with a unique alphanumeric identifier.

F. Identify optical fiber cables by a textual label that indicates its type, strand count, point of origin, and termination.

G. Supply a Cable Identification Matrix

H. Supply all records in compliance with ANSI/TIA-606.

I. Provide a database that is Open DataBase Connectivity (ODBC) compliant, for administration of the Structured Cabling System described in this Section.

3.16 IDENTIFICATION

A. Before installing or terminating cable, confirm all specific labeling requirements with the Owner or the Owner's Engineer.

B. Cables

1. Mark each backbone cable at each endpoint and at all intermediate pull and access points, and junction boxes with labels that indicate the origination and destination identifiers, the sheath identifier, and the strand or pair range.

2. Mark each horizontal cable on the sheath at each end with the TR, patch panel, and panel port to which the cable is wired. Mark block-terminated cables with a V in place of the panel ID.

C. Faceplates, Patch Panels, and Wiring Blocks

1. Mark each FDE with an adhesive label that indicates the range of circuits installed in it. Label each port with the origination and destination grid identifier and the individual strand ID.

2. Label patch panels alphabetically, beginning at the top. Individual ports shall come from the factory labeled with a number designation.

3. For each cable that a faceplate houses, label the faceplate to indicate the TR, patch panel, and panel port to which the cable is wired. Label block-terminated cables with the Telecommunication Room and "V" for the cable number.

4. Label each wiring block numerically, beginning at the top left of the termination field. Within each block, identify the individual rows alphabetically, beginning at the top left and proceeding sequentially down and to the right. Label each row with the corresponding cable identifier, and label each pair or circuit of each cable.

5. Fit all cables with self-laminating labels, bearing the appropriate cable identifier, that surround the outermost jacket. Place the labels within 75 mm (3 inches) of each end of the sheath.

6. Fit all equipment enclosures with a self-adhesive label, bearing the enclosure's respective identifier, affixed to the top center of the front and rear doors.

7. Fit each Fiber Distribution Enclosure with a self-adhesive label, affixed, bearing the enclosure's respective identifier in block characters, at the top center of the front and rear face.

8. Fit each adapter in each enclosure with a label, bearing the identifier, affixed directly adjacent to the adapter's shortest side. Rotate characters to keep their orientation left to right, top to bottom.

D. Conduits and Pathways

1. Label conduits and pathways within 0.5 m (18 inches) of each end, where exposed and accessible.

2. It is recommended that the Contractor provide additional labeling every 3 m (10 feet) of exposed length.

E. Network Equipment

1. Fit each network equipment unit with a label, in accessible areas at the front and rear, bearing the appropriate identifier, MAC address, and date of installation.

2. These labels shall not interfere with the operation of or interface to the unit, nor shall they obscure manufacturer's labels.

3.17 FIELD QUALITY CONTROL

A. General Testing

1. Optical fiber shall be tested in accordance with Tier 1 testing requirements as prescribed in Annex E, TIA-568.3-D.

2. Copper shall be tested in accordance with the requirements of the permanent link performance level prescribed in TIA-588.2-C, using a field test instrument compliant with the requirements of TIA-1152-A.

B. Manufacturer's Field Service

1. At the start of the installation, periodically as the Work progresses, and after completion, furnish the services of the manufacturer's technical representative at the job site as needed to advise on every phase of the Work.

2. At minimum, furnish full-time attendance during the first three work days, and at least once every week thereafter.

3. Furnish technical assistance to the Installer as required.

END OF SECTION