

# **Request for Proposal: Cabling**

January 28, 2021

Bennington Public Schools  
11620 N 156<sup>th</sup> Street  
Bennington, NE 68007

Erate Identifier: Cat2.2021Cabling

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## Overview

Bennington Public Schools is seeking proposals for CommScopeCat6a, or equivalent to, cabling at the district. Additionally, Bennington Public Schools is seeking proposals for fiber installation from the new network closets back to existing network closets as well as building out the new data closet. See Appendix A for list of physical address. See Appendix C for further information regarding quantities being requested by entity.

### **A successful vendor must bid all projects in order to be considered.**

All bidding vendors must be Erate eligible and have an updated Form 473 (SPAC) on file to provide the services requested and provide their Service Provider's Form 498 ID (formally known as SPIN) as part of this RFP. **Vendors are required to state if any proposed equipment and/or services are ineligible for Erate funding as part of their proposal documentation.**

Top two vendors may be asked to present their proposal to the district technology staff in person.

Vendors will have 24 hours after vendor selection is announced to raise any questions. Questions will be addressed via the web site posting answers to all questions. The District will have the final authority to the resolution of all questions.

Proposals are due in either hardcopy or in electronic form (PDF format) on or before **Tuesday, March 2, 2021 at 3:00 pm CST** at Bennington Public Schools, Attn: Rob Uchtman – RFP Response, 11620 N 156<sup>th</sup> St, Bennington, NE 68007 or emailed to [ruchtman@bennps.org](mailto:ruchtman@bennps.org). Emailed proposal documents will be time-stamped from the receiving computer.

Proposals will be available for inspection, at the District Office (11620 N 156<sup>th</sup> Street, Bennington, NE) by Noon on March 10, 2021.

Questions should be addressed, no later than February 23, 2021, to:

Rob Uchtman

Ph: 402.238.3044 | Email: [ruchtman@bennps.org](mailto:ruchtman@bennps.org)

Questions and Answers will be posted on district website (<http://projects.benningtonschools.org/>) by February 25, 2021.

**Vendors are required to attend the district walk through; scheduled for Monday, February 8<sup>th</sup>, 2021 – beginning at 9:00 am to 11:00 am CST at Pine Creek Elementary, 7801 N HWS Cleveland Blvd, Bennington, NE.**

## 1.1 General Description

The general description of the Scope of Work (SOW) is to provide CommScope Cat6a, or highly equivalent to, cabling at the district for a total of seven hundred and seventy-five (775) drops for voice, data, wireless, and security networks including a fiber connection to the existing building infrastructure and the outfitting of the new data closets.

See Appendix A for list of physical address. See Appendix B for the technical specifications of all wiring, outfitting and fiber. See Appendix C for further information regarding quantities being requested by entity and technical specifications. All bids must comply with all sections of this RFP and the products and services to be considered.

Additional details will be provided during mandatory walk through, held on **Monday, February 8<sup>th</sup>, 2021, beginning at 9:00 am CST.**

## 2.1 Product and Services Specifications.

Please see Appendix B for all technical specifications related to the required installations.

## 3.1 Installation Schedule

Cabling installation must be completed during non-school day hours or times agreed upon at signing of contract. All installation equipment must be removed from student access during school hours. A secured storage room will be provided for vendor. Job must be completed by March 1, 2022.

## 4.1 Changes to Scope of Work

The District, without invalidating the Contract, may order changes within the SOW consisting of additions, deletions, and/or modifications, the Contract Sum and the Contract Time being adjusted accordingly. All said changes in the SOW shall be authorized by written "Change Order(s)", signed by the District.

## 5.1 Vendor Responsibilities

It shall be the responsibility of the selected vendor/contractor to provide the configuration and system quantities to all locations stated herein. The intentional or accidental omission of necessary component(s) or system(s) shall require the selected vendor/contractor to supply said missing component(s) or system(s) at no cost to the District. The District and any Consultants associated with this RFP are not responsible for any omission, failure to detect any requirement, or any other condition required to complete the Scope of Work.

### **The awarded Bidder shall:**

- Meet jointly with representatives of the District to exchange information and agree on details of equipment arrangements and installation interfaces for the cabling project.
- Have sufficient resources in order to complete the SOW within the allotted timeframe.
- Furnish all labor, supervision, tooling, and miscellaneous mounting hardware and consumables for the cabling system installed at the District.
- Furnish, install, and terminate data jacks at each location according to the Product and Services Specifications.
- Attend the mandatory walk-thru.
- Install all cable in accordance with the Product and Services Specifications and/or manufacturer's recommendations and best industry practices.
- Develop and submit for approval a labeling system for the cable installation. At a minimum, the labeling system shall clearly identify all components of the system; racks, cables, panels, and outlets. Sample labels must be approved by the District.
- Test (100%) all cables and termination hardware for defects in installation and to verify cable performance under installed conditions. Testing procedures should be included in proposal documentation.
- Supply documentation of testing and footage of each cabling run in proposal documentation.
- Abide by and responsible for all electrical and fire code regulations.
- Provide a written guarantee/warranty covering the installed cabling system against defects in workmanship, components, and performance, and follow-on support after project completion for a period of three (3) years.

## 6.1 E-rate Terms

Any and all USF E-rate "ineligible" products and/or services must be listed separately in the Bid.

## 7.1 Pricing and Payment Structure

Vendors are required to breakdown the purchases by building as outlined in the table in Appendix B. Vendors are required to complete all projects listed in Appendix B as part of their proposal. **A successful vendor must bid all projects in order to be considered.**

Contracts will be awarded only after receiving a funding commitment and decision letter from SLD or agreed upon by the district. This RFP will automatically become part of any contract awarded to a vendor. The District requests vendors to file a Form 474 (Service Provider Invoice; SPI) to request reimbursement directly from USAC for the eligible Erate portion of the contract.

## 8.1 Evaluation Process

Please refer to Appendix C for further details regarding the evaluation process.

## 9.1 Discrepancies and Omissions

Vendors finding discrepancies or omissions in the RFP or having any doubts as to the meaning or intent of any part thereof shall submit such questions or concerns to Rob Uchtman, Bennington Public Schools, [ruchtman@bennps.org](mailto:ruchtman@bennps.org). Addenda issued in correspondence to this RFP shall be considered a part of this RFP and shall become part of any final Contract that may be derived from this RFP. This RFP and its addenda will be part of any possible future contract with successful vendor(s).

## 10.1 Contingencies

This RFP should not be considered as a Contract to purchase goods or services, but is a Request for Proposal in accordance with the Terms and Conditions herein and will not necessarily give rise to a contract. However, RFP responses should be as detailed and complete as possible to facilitate the formation of a contract based on the RFP response(s) that are pursued should Bennington Public Schools decide to do so. Proposals stating that pricing is valid dependent upon availability and/or subject to prior sale will be considered as non-responsive. Completion of this RFP form and its associated Appendices are a requirement. Failure to do so will disqualify your RFP response submittal. Vendors must submit sealed RFP responses by the due date and time as specified herein. Electronic submissions will be accepted if create in PDF format and e-mail [ruchtman@bennps.org](mailto:ruchtman@bennps.org) by the due date and time as specified herein. Date and time stamp of receiving computer will govern all e-mails. Vendors will be considered nonresponsive if the above requirements are not submitted as requested. The Bennington Public Schools has the right to reject all submitted proposals and resubmit for new proposals through a revised RFP.

## 11.1 Vendor Questions and Clarifications.

Questions should be addressed, no later than February 23, 2021, to:

Rob Uchtman

Ph: 402.238.3044 | Email: [ruchtman@bennps.org](mailto:ruchtman@bennps.org)

Questions and Answers will be posted on district website (<http://projects.benningtonschools.org/>) by February 25, 2021.

Final

## Appendix A

### **BUILDING**

Pine Creek Elementary  
Elementary #5  
Middle School #2

### **ADDRESS**

8701 N HWS Cleveland Blvd, Bennington, NE 68007  
9303 N 171<sup>st</sup> Street, Bennington, NE 68007  
9809 N 171<sup>st</sup> Street, Bennington, NE 68007

Final



## Appendix B

### CABLING INFRASTRUCTURE REQUIREMENTS

#### 1. Part 1 - General

##### A. Work Included

- a. Provide all labor, materials, tools and equipment required for a complete Category 6A installation of work called for in this document.
- b. Fiber Optic and Copper Backbones.
- c. Buildout of wire closets.

##### B. Scope of Work

- a. Provide cabling infrastructure for voice, data, wireless, and security networks at the new 16 classroom addition for Bennington High School. The new infrastructure will consist of Category 6A cabling, Copper and fiber backbones.
- b. The Horizontal Cabling System shall consist of Category 6A 4pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the prints, and routed to the appropriate rack serving that area and terminated as specified in this document.
- c. This section includes minimum requirements for the following:
  - UTP Cat 6A from TR to Work Area
  - Fiber optic Backbone
  - Copper Backbone
  - Category 6A Connector Modules
  - Optical Fiber Connector Modules
  - Faceplates and Modules
- d. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Telecommunications contractor as detailed in this document.
- e. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets,

typical installation details, cable routing and outlet types will be provided as an attachment to this document. If the bid documents are in conflict, this specification shall take precedence. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

### C. Regulatory References

- a. The following industry standards are the basis for the structured cabling system described in this document.
  - TIA/EIA
    - TIA/EIA-568-B Commercial Building Telecommunications Cabling
      - Standard
    - TIA/EIA-568-B.1 General Requirements
    - TIA/EIA-568-B.2 Balanced Twisted Pair Cabling Components Standard
    - TIA/EIA-568-B.3 Optical Fiber Cabling Components Standard
    - TIA/EIA-569-A Commercial Building Standard for Telecom Pathways
      - And Spaces
    - TIA/EIA-606 Administration Standard for the Telecommunications
      - Infrastructure of Commercial Buildings
    - TIA/EIA-607 Commercial Building Grounding/Bonding Requirements
  - NFPA
    - NFPA 70 National Electric Code(NEC)
  - ISO/IEC
    - ISO 11801 Generic Cabling for Customer Premises
- b. If there is a conflict between applicable documents, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.
- c. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

D. Quality Assurance

a. Complete System Warranty

- A Complete System Warranty shall guarantee end-to-end high performance cabling systems that meet application requirements. The guarantee shall include cable and connectivity components and have one point of contact for all cabling system issues. The system shall be warranted for a period of at least 15 years.

b. Contractor Agreement

- A factory registered contractor shall complete network installation. The contractor shall have completed standards based product and installation training. A copy of the Contractor Registration shall be submitted in the proposal.

c. Product Guarantee

- All installed, non-consumable products should have a minimum 20-year guarantee.

Note: All Networks shall be installed per applicable standards and manufacturer's guidelines.

**2. Part 2 - Products**

A. Work Area Outlets

- a. The Work Area shall consist of the connectivity equipment used to connect the horizontal cabling subsystem and the equipment in the work area. The connectivity equipment shall include the following options:
- Patch cords and modular connectors
  - Outlets and surface mount boxes
  - Surface raceway
- b. Patch Cords: For purpose of bid use gray for patch cords and Black for station cords. Colors will be identified by BPS.

Description	Qty
3FT Cat 6A 23 AWG Patch Gray	25% of total runs
5FT Cat 6A 23 AWG Patch Gray	25% of total runs
7FT Cat 6A 23 AWG Patch Gray	50% of total runs
7FT Cat 6A 23 AWG Patch Black	100% of total runs

c. Data Jack:

- Category 6A UTP Data jack

The eight position modules shall be used in all work areas and shall exceed the connector requirements of the TIA/EIA Category 6A standard. Termination shall be accomplished by use of a forward motion termination cap and shall not require the use of a punchdown tool. The termination cap shall provide strain relief on the cable jacket, ensure cable twists are maintained to within 1/8” (3.18 mm) and include a wiring scheme label. The wiring scheme label shall be available with both T568A and T568B wiring schemes. All terminations for this project shall use the T568B (A) wiring scheme. The modules shall terminate 4 pair 23 AWG 100 ohm solid unshielded twisted pair cable. The modules shall be universal in design, including complying with the intermateability standard IEC 60603-7 for backward compatibility. Category 6A modules shall have UL and CSA approval. The modules shall have ETL verified Category 6A performance and ISO Class E performance (as defined in ISO/IEC 11801) in both the basic and channel links. They shall be universal in design, accepting 2, 3, or 4 pair modular plugs without damage to the outer jack contacts. The modules shall be able to be re-terminated a minimum of 10 times and be available in 11 standard colors for color coding purposes. The jack shall snap into all outlets and patch panels. The module shall include a black base to signify Category 6A 500 MHz performance. Keystone style data jacks will not be used.

Description	Jack Identifier
6A Jack Blue	Data
6A Jack Yellow	Voice
6A Jack Green	WAP
6A Jack White	Camera

B. Horizontal Distribution Cabling

a. Category 6A UTP (alternate Cat 6 UTP)

These specifications are for cable that will meet or exceed the proposed requirements of ANSI/TIA/EIA. Insulated bare copper enclosed in a thermoplastic jacket.

All cable shall conform to the requirements for communications circuits defined by the National Electrical Code (Article 800) and the Canadian Building Code. Cable listed to NEC Article 800-51(a) will be used for “Plenum” installations. Cable listed to NEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.

Description: 100-ohm, 4-pair UTP, 500 MHz minimum, covered with a Thermoplastic for CMPJacket. Provide in Color **blue**.

- Comply with ICEA S-90-661 for mechanical properties.
- Comply with TIA/EIA-568-B.1 for performance specifications.
- Comply with TIA/EIA-568-C.2 Category 6A
- Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70.
- Plenum rated: Type CMP, complying with NFPA 262
- Must be rated for a 100 meter channel.

Pairs	Wiring Configuration	Color
4 Pair	T568A and B	Blue

C. Fiber Optic Distribution Cabling

a. Fiber Optic:

These specifications are for cable that will meet or exceed the proposed requirements of ANSI/TIA/EIA.

All cable shall conform to the requirements for communications circuits defined by the National Electrical Code (Article 800) and the Canadian Building Code. Cable listed to NEC Article 800-51(a) will be used for “Plenum” installations. Cable listed to NEC Article 800-51(b) shall be installed in vertical runs penetrating more than one

Description:

Multimode, 50/125-micrometer, 12 fiber, tight buffer, graded index, glass optical fiber cable, Armored. Cable shall support 10 GB Ethernet out to 300 meters.

- Comply with ICEA S-83-596 for mechanical properties.
- Comply with TIA/EIA-568-B.3 for performance specifications.
- Comply with TIA/EIA-492AAA-B for detailed specifications.
- Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL444, UL 1651 and NFPA 70.
- Plenum rated, nonconductive: Type OFNP, Complying with NFPA 262.
- Armored type fiber cable.

Fiber	Cable	Type
24-Fiber	Armored	Indoor/outdoor CMP

#### D. Telecommunication Room

The telecommunications room (TR) includes those products that connect the networking equipment to the horizontal and backbone cabling subsystems. These products include termination hardware (connectors and patch cords), racks, cable management products and cable routing products.

##### a. Cable Termination Hardware

Each horizontal or backbone cabling run will be terminated using appropriate connectors or connecting blocks depending upon the cable type.

- **Copper Termination:**

The eight position modules shall be used in all work areas and shall exceed the connector requirements of the TIA/EIA Category 6A standard. Termination shall be accomplished by use of a forward motion termination cap and shall not require the use of a punch down tool. The termination cap shall provide strain relief on the cable jacket, ensure cable twists are maintained to within 1/8" (3.18 mm) and include a wiring scheme label. The wiring scheme label shall be available with both T568A and T568B wiring schemes. All terminations for this project shall use the T568B (A) wiring scheme. The modules shall terminate 4 pair 23 AWG 100 ohm solid unshielded twisted pair cable. The modules shall be universal in design, including complying with the intermateability standard IEC 60603-7 for backward compatibility. Category 6A modules shall have UL and CSA approval. The modules shall have ETL verified Category 6A performance and ISO Class E performance (as defined in ISO/IEC 11801) in both the basic and channel links. They shall be universal in design, accepting 2, 3, or 4 pair modular plugs without damage to the outer jack contacts. The modules shall be able to be re-terminated a minimum of 10 times and be available in 11 standard colors for color coding purposes. The jack shall snap into all outlets and patch panels. The module shall include a black base to signify Category 6A 500 MHz performance.

Style	Category	Color
RJ-45	6A	Black

Patch Panels shall be of a metal design with snap in four position molded faceplate frames. The faceplate frames shall be releasable from the front to provide access to the modules and terminated cable. Modules shall be mounted to the patch panel for added strength. Patch panels shall be available with and without labels.

Number of Ports	Wiring Configuration	Rack spaces
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48	T568A and B	2
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b. Fiber Termination Hardware

Fiber Connectors and Patch Cords

Fiber Optic Connectors shall be field Spiced simplex fiber optic connectors for multimode glass fiber that fully complies with both the fiber optic connector performance requirements specified in TIA/EIA-568-B.3 and the intermateability requirements specified by the TIA 604-3 FOCIS-3 standard. The multimode LC connector shall be compatible with 62.5/125  $\mu$ m and 50/125  $\mu$ m, 3.0 mm jacketed or 900  $\mu$ m tight-buffered, multimode glass fiber. The connector shall have an insertion loss typically less than 0.3 dB per fiber. They shall be capable of field Splice termination with commonly available tools. The cover and boots of the multimode SC connector shall be the industry standard electric ivory color signifying multimode fiber. They shall incorporate pre-radius zirconia ceramic ferrules to ensure consistent end face geometry and high performance connector mating.

Style	Fiber type	Termination	Colors
LC	Multimode 900um Buffered Pigtail	Fusion Spliced	Multiple

X- Denotes color

**LC Optical** Fiber Patch Cords shall be constructed from high performance 50/125  $\mu$ m (OM4) multimode cable and **LC** simplex/duplex connectors with *polymer / zirconia ceramic* ferrules. Integral boots shall be provided to provide strain relief and help maintain consistent polarity. They shall come in standard lengths of 1, 2, 3 and 10 meters. The following patch cord configuration(s) shall be used:

Ferrule Type	Connector #1 to ...	Connection #2	Quantity
Ceramic	Duplex LC	Duplex LC	24

c. Fiber Optic/Multi-media Equipment

Rack mounted fiber optic enclosures shall be designed to manage and organize fiber optic cable to and from the equipment or cabling plant. Enclosures shall protect fiber optic connections for patching or splicing requirements. Enclosures shall accommodate up to 36 fibers (with Fiber

Jack) per rack space and shall be constructed of steel material. Enclosures shall have removable front and rear covers and top and bottom pass through holes.

Rack Spaces	Number of FAP
2	6

*Splice Tray Fiber* optic splice module holds and protects up to 24 fusion splices. Self-stacking modules with integral cable management and fiber stacking/pooling features.

d. Data racks and Cabinets

- 2 Post Rack:

Description	Rack Spaces	Dimensions H x W x D (in)
7FT 2 Post rack	45	86.06 x 28.25 x 17.0

- 4 Post Rack:

Description	Rack Spaces	Dimensions H x W x D (in)
7FT 4 Post Rack	45	7' x 19" x 29"

- Vertical Cable Management/ Covers

Description	Rack Space
84"H x 6"W x 16.4"D	45
83.9"W x 10.0"W x 16.4"D	45
6" Dual Hinged door	
10" Dual Hinged door	

- Horizontal Cable Management

Description	Rack Space
1.7"H x 19.0"W x 8.9"D	1
3.5"H x 19.0"W x 8.9"D	2



e. Grounding and Bonding

All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TR or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.

All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and busbars shall be identified and labeled in accordance with the System Documentation Section of this specification.

f. Fire stop/Sleeves

A firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.

Firestop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed firestop system, stamped/embossed by the PE shall be provided to the Owner's Technical Representative prior to installing the firestop system(s).

#### E. UTP Voice BackBone Cabling

- a. Description: 100-ohm, 23AWG, UTP Cat 5E 50 Pair fully water blocked and rated for underground applications.
- b. Termination Hardware:

Description	Rack Space
48 Port Cat 5 Patch Panel	2

#### F. Cable Runway

- a. Materials: Tubular steel metal suitable for indoors made of 3/8" x 1 1/2" x .065 inch wall rectangular welded sections. Includes standard sections, 90 degree vertical sweeps horizontal and vertical radius bends, cable drop-outs, mounting hardware, brackets and accessories. Color: Black
  - Runway: 12, 15 and 18" wide and rung spacing of 9 inches
  - Corner Radiuses
  - Drop outs

#### G. Mounting Elements/ Power management

- a. Materials:
  - Keyboard/Monitor Shelf
  - Equipment Shelf
  - Networked Power Management Strip
  - UPS System
  - Pathways: Caddy J-hooks or approved equal

### 3. Part 3 - Execution

#### A. Work Area Outlets

Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12" of UTP and 36" of fiber slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-A document, manufacturer's recommendations and best industry practices. Pair untwist at the termination shall not exceed 3.18mm (0.125 inch).

Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.

The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

Data jacks, unless otherwise noted in drawings, shall be located in the top position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the left-most position(s).

Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

## B. Horizontal Distribution Cable Installation

Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type or 40%.

Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

Cables shall be identified by a machine printed self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

#### C. Horizontal Cross connect Installation

Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-A standard, manufacturer's recommendations and best industry practices.

Pair untwist at the termination shall not exceed 3.18 mm (0.125 inch).

Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

The cable jacket shall be maintained as close as possible to the termination point.

Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

#### D. Optical Fiber Termination Hardware

Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

Each cable shall be individually attached to the respective fiber enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

A maximum of 24 strands of fiber shall be spliced in each tray

All spare strands shall be installed into spare splice trays.

#### E. Backbone Cable Installation

Backbone cables shall be installed separately from horizontal distribution cables

A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits

Where cables are installed in an air return plenum, riser rated cable shall be installed in metallic conduit.

Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

All backbone cables shall be securely fastened to the sidewall of the TR on each floor.

Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.

Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

#### F. Copper Termination Hardware

Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-A standard, manufacturer's recommendations and best industry practice.

Pair untwist at the termination shall not exceed 3.18mm (0.125 inch).

Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.

Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

#### G. Racks

Racks shall be securely attached to the concrete floor using minimum 3/8" hardware or as required by local codes.

Racks shall be placed with a 36-inch (minimum) clearance from the back wall.

All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 2.4 of this document.

Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

Wall mounted termination block fields shall be mounted on 4' x 8' x .75" void free plywood. The plywood shall be mounted vertically 12" above the finished floor. The plywood shall be painted with two coats of white fire retardant paint.

Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18" from the finished floor.

#### H. Firestop System

All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

#### I. Grounding System

The TBB shall be designed and/or approved by a qualified PE, licensed in the state that the work is to be performed. The TBB shall adhere to the recommendations of the TIA/EIA-607 standard, and shall be installed in accordance with best industry practice.

A licensed electrical contractor shall perform installation and termination of the main bonding conductor to the building service entrance ground.

## J. Identification and Labeling

- a. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
- b. All label printing will be machine generated by Panduit PanMark software and Panduit desktop and hand-held printers using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

## K. Testing and Acceptance

### a. General

- All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-A Addendum 5, TSB-67 and TSB-95. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
- All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, Warranty guidelines and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

### b. Copper Channel Testing

All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance. Horizontal cabling shall be tested using a level IIe or level III test unit for category 5e or category 6A performance compliance, respectively.

Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above

stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-A Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

#### Category 6A Performance

Follow the Standards requirements established in:

- ANSI/TIA/EIA-568-A -TSB-67
- ANSI/TIA/EIA-568-A -TSB-95
- ANSI/TIA/EIA-568-A, Amendment 5.

A level IIe or better test unit is required to verify category 5e performance and must be updated to include the requirements of TSB-95 and Amendment 5. A level III test unit is required to verify category 6A performances.

The four basic tests required in TSB-67 are:

- Wire Map
- Length
- Attenuation
- NEXT (Near end crosstalk)

Four additional tests are required per TSB-95:

- Return Loss
- ELFEXT Loss
- Propagation Delay
- Delay skew

In Amendment 5, two additional tests are required:

- PSNEXT (Power sum near-end crosstalk loss)
- PSELFEXT (Power sum equal level far-end crosstalk loss)

#### c. Fiber Testing

All fiber testing shall be performed on all fibers in the completed end-to-end system. There shall be no splices unless clearly defined in an RFP. Testing shall consist of an end-to-end power meter test performed per TIA/EIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and



1310 and/or 1550 nanometers for single mode fibers. These tests also include continuity checking of each fiber.

For horizontal cabling system using multimode optical fiber, attenuation shall be measured in one direction at either 850 nanometer (nm) or 1300 nm using an LED light source and power meter.

Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for singlemode) in one direction.

Test set-up and performance shall be conducted in accordance with ANSI/TIA/EIA-526-14 Standard, Method B.

Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. **ONLY BASIC LINK TEST IS REQUIRED.** The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.

Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

d. Testing Equipment

Contractor shall utilize and have prior training with test equipment specifically suited to and designed for link testing of the cabling and connecting hardware specified. Unless approved otherwise, contractor shall utilize the Fluke DTX series tester for Fiber, copper and coax.

L. System Documentation

Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to Customer for approval. Documentation shall include the items detailed in the sub-sections below.

Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the EPS, the telecommunications contractor shall provide copies of the original test results.

**Test Results** documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-A including applicable TSB's and amendments. The appropriate level IIe tester shall be used to verify Category 5e cabling systems. The appropriate level III tester shall be used to verify Category 6 cabling systems.

Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form (3.5" diskette). These diskettes shall contain the electronic equivalent of the test results as defined by the bid specification and be of a format readable from Microsoft Word (version 6.0).

When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

The **As-Built** drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD rel. 14) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD rel. 14) form.

Appendix C

<b>TABLE 1.1: Pine Creek Elementary Addition</b>			
<b>Erate Eligible Services</b>			
<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Total</b>
<b>CAT6a drops</b>	<b>36</b>		
<b>Network racks</b>	<b>2</b>		

<b>TABLE 1.2: Elementary #5</b>			
<b>Erate Eligible Services</b>			
<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Total</b>
<b>CAT6a drops</b>	<b>300</b>		
<b>Network racks</b>	<b>11</b>		

<b>TABLE 1.3: Middle School #2</b>			
<b>Erate Eligible Services</b>			
<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Total</b>
<b>CAT6a drops</b>	<b>439</b>		
<b>Network racks</b>	<b>14</b>		

## Appendix D

Evaluation Rubric  
Bennington Public Schools  
Erate: Cat2.2021Cabling

### **1. Cost of Eligible Equipment and Services .....40 points**

Cost of Equipment and Services will be released at time of proposal opening. Points will be awarded during the evaluation of the proposal(s).

### **2. Vendor Qualifications, Knowledge and Experience, Past Work, Skills and Abilities, and Past Performance in Similar Projects ..... 25 points**

Criteria will be determined based on demonstrated history of related projects, knowledge in installation and managed services provided.

### **3. Testing Method and Warranty.....20 points**

All documentation provided on testing procedures and warranty coverage will be evaluated.

### **4. Reliability and References ..... 10 points**

Reliability score will be determined using the following criteria:

- a. References given in the RFP
- b. Known other users of the device
- c. Personal experiences

### **5. Regional Vendor .....5 points**

Regional Vendor score will be determined based on the location of the Vendor.