DOUGLAS COUNTY SCHOOL DISTRICT
REQUEST FOR PROPOSAL # IT-02162018
LAN Fiber-CAT6e Cabling Installation

Request for Proposal January 12, 2018

Proposal Due Date
Friday, February 16, 2018
4 p.m.

FOR
Douglas County School District
1638 Mono Avenue
Minden, NV 89423

PURPOSE AND SCOPE

The purpose of this Request for Proposal (RFP) is to solicit proposals from vendors for the purchase and installation of LAN fiber and CAT6e cabling infrastructure for two (2) sites in the Douglas County School District (the "District").

The District is seeking to replace existing CAT5 copper cabling between MDF's and IDF's with single mode fiber, replace faulty multimode fiber with single mode fiber, and install eighty (80) network drops in various classrooms within school district buildings per included network diagrams.

It is the sole responsibility of the proposer to monitor the District Purchasing website (http://www.dcsd.k12.nv.us) for any addenda to the RFP. For the purpose of this document, the terms proposer, responder, vendor, supplier and contractor are those entities submitting a response to this RFP.

SECTION 1: GENERAL REQUIREMENTS

1.1 **Proposal Validity Period.** Submission of the proposal will signify the vendor's agreement that their proposal and the content thereof are valid for 120 days following the submission deadline and will become part of the contract that is negotiated between the District and the successful vendor.

1.2 **Evaluation Process.** The evaluators will consider how well the vendor's proposed solution meets the needs of the District as described in the vendor's response. It is important that the responses be clear, concise and complete so that the evaluators can understand all aspects of the proposal. The evaluation process is not designed to simply award the contract solely based on the lowest bid. Rather, it is intended to help the District select the right vendor with the best combination of professional attributes, experience, relevant skill-sets, and cost, based on the evaluation factors.

The District reserves the right to require that a subset of finalists make a presentation to the evaluation team for consideration. This RFP provides general and technical information as well as the required format for responses. Your submitted responses will be the primary source of information used for the system evaluation and selection.

Please include all required and appropriate information with your proposal. No other source of information, written or verbal, will be considered part of your proposal. At the completion of the RFP process, the District will determine the viability of moving forward to complete negotiations with the chosen vendor to provide equipment services and solutions that best meet the needs of the District's criteria for design, cost, vendor requirements and references.

All Responders must meet the following criteria:

1. Responder must be currently licensed to do business in the State of Nevada, which will be validated by Responder providing copies of all licenses and/or certificates as part of Responder's proposal.
2. Responder must have been in existence at least three (3) years as an operating business.
3. Responder must provide a list of at least three (3) clients where Responder has completed a contract of comparable size and scope of services.
4. Responder shall have the ability to fulfill standard contract requirements, including indemnification and insurance of the District.
5. Responder shall meet other presentation and participation requirements listed in this RFP

1.3 **Schedule.** Hard copy responses and related material must be delivered by 4 p.m. February 16, 2018. As specified in Sections 1.13, late responses will not be considered and will be returned unopened.

An approximate schedule is as follows:

Activity	**Time**	**Date**
RFP released		January 12, 2018
Site Tour	8:00 a.m.	January 19, 2018
Deadline for Questions	4:00 p.m.	January 23, 2018
Proposal Due Date	4:00 p.m.	February 16, 2018
Interviews (as requested)		TBD
Contract Award		TBD
Project Start Date		July 1, 2018
Project Completion Date		August 13, 2018

1.4 **Site Tour.** The District will conduct a school site tour of the two schools. The two school sites will be - Douglas High School and Pinion Hills Elementary School. The school site tour will begin at 8:00AM Wednesday, January 19, 2018 at Douglas High School. All attendees will be required to provide their own transportation between school sites.

1.5 **Deadline for Questions.** Questions regarding the RFP should be asked in writing. Responses will be posted on the District website and e-mailed to all proposing vendors. In order to make information available to all proposing vendors, no questions will be answered if submitted after 4 p.m. on January 23, 2018.

1.6 **RFP Submission.** Please submit one (1) hard copy of the proposal and one electronic copy (on USB Drive or CD/DVD), in its entirety, to the contact and address stated in 1.6 by 4 p.m. on Friday, February 16, 2018.

1.7 **Vendor Communication**. Upon release of this RFP, all vendor communications concerning the overall RFP should be directed to the Purchasing Agent listed below. Unauthorized contact with any other District employees or member of the Board of Trustees regarding this RFP is not permitted. Any oral communications will be considered unofficial and non-binding to the District. Vendors should rely only on written, faxed, or e-mailed statements issued by:

John Endter
Director of Information Technology
Douglas County School District
1126 Airport Rd
Minden, NV 89423

775-782-8190 (W)
775-782-8170 (FAX)
jendter@dcsd.k12.nv.us

1.8 **Right of Selection/Rejection - Waiver of Informalities or Irregularities.**
The District reserves the right to reject any or all proposals, to waive any minor informalities or irregularities contained in any proposal, and to accept any proposal deemed to be in the best interest of the District. Selection of a vendor shall not be construed as an award of contract but as a commencement of contract negotiations, including but not limited to the proposed contract price.

1.9 **RFP Revisions.** The District reserves the right to change the schedule or issue addenda to the RFP at any time up until the submission deadline. The District also reserves the right to cancel or reissue the RFP at any time. Addenda or a notice of cancellation will be posted to the District's website. It is the sole responsibility of the proposer to monitor the District's website for the posting of such information.

1.10 **Compensation.** No payment of any kind will be provided to the submitting vendor, or parties they represent, for obtaining any of the information solicited. Procurement of all equipment and services will be in accordance with any subsequent written contract.

1.11 **Commitments.** All quotes should be submitted on the most complete basis and with the most favorable financial terms available. The selected proposal may, at the District's option, be made part of the final purchase contract, and all representations in the proposal may be considered commitments to supply the system as described.

1.12 **Contract Award and Execution.** The District reserves the right to make an award without further discussion of the proposal submitted. Therefore, the proposal should be initially submitted on the most favorable terms the vendors can offer. It is understood that the proposal will become a part of the official file on this matter without obligation to the District. The general conditions and specifications of the RFP and the successful vendor's response, as amended by agreements between the District and the vendor, will become part of the contract documents. Additionally, the District will verify vendor representations that appear in the proposal. Failure of the vendor's products to meet the mandatory specifications may result in elimination of the vendor from competition or in contract cancellation or termination. The successful vendor is expected to enter into a contract with the District on terms similar to those set out in this RFP. If the selected vendor fails to sign and return the final contract within ten (10) business days of delivery, the District may elect to cancel the contract and award it to the next highest-ranked vendor.

No cost to the District may be incurred before the vendor has returned a fully executed contract.

1.13 **Late Submissions.** Proposals received after the due date, and time, will not be accepted. The District is not responsible for late delivery or proposals lost in transport. Please refer to the RFP schedule for the due date.

1.14 **Proposal Preparation.** All proposals must be received by 4 p.m. on Friday, February 16, 2018. Proposals are limited to 8 -1/2 x 11 paper in appropriately sized three ring binders or portfolios, with index tabs to separate sections. One electronic copy on USB drive or CD/DVD must be included in the sealed envelope. Email or Faxed proposals will not be accepted. The District is not responsible for any costs incurred by the responder in the preparation of the proposal.

Proposals must be organized as follows:

1. Cover letter – must include firm name, address, telephone, fax, and email address.
2. Company information.
3. List of similar projects and references.
4. Proposed design solution including a list of the specific equipment, and any site maps meeting the requirements identified in Section 2.
5. Detailed cost proposal, broken down by school site.
6. Project management plan including a proposed system design and installation schedule. The District's intent is to have all networks installed, tested and functional before the first day of school, August 13, 2018.
7. Identify all warranties and guarantees.

1.15 **Number of Proposals.** Responders shall provide one (1) hard copy of their proposal and one electronic copy on USB drive or CD/DVD in a sealed envelope. If printed supplementary materials are included which are not 8.5 x 11, one (1) hard copy should be included.

1.16 **Screening of Proposals.** The District will screen all proposals and may reject any proposal that does not meet the minimum requirements. The District reserves the right to reject any and all proposals. The District shall evaluate the proposal using the following criteria, which are also given relative weighting:

1. Initial Price: 60%
2. Project Plan: 20%
3. Experience with vendor/contractor: 10%
4. Warranty: 10%

1.17 **RFP Addenda.** The District reserves the right to amend this RFP at any time prior to the closing date. It is the responder's responsibility to check the District website at http://www.dcsd.k12.nv.us for any addenda prior to submitting their response.

1.18 **Ownership of Materials.** All materials submitted in response to this RFP become the property of the District. Proposals and supporting materials will not be returned to Responders.

1.19 **Confidential or Proprietary Information.** The District is not obligated to maintain the confidentiality of any information that was known prior to receipt of a proposal, or becomes publicly known through no fault of the District, or is received without obligation of confidentiality from a third party. It is the responsibility of the Responder to document any trade secret or confidential business information as defined by NRS 332.025 and other applicable NRS. District documents are subject to the Federal and State of Nevada public records laws with limitations as defined in NRS 322.061 and other applicable NRS.

1.20 **Complete Solutions.** The District will accept only complete solutions from a prime supplier. Responders may not bid on only one item or selected items from the RFP.

1.21 **Supplier Presentations.** After an initial District screening and reduction of proposals, remaining Responders may be required to give an oral presentation of their proposal to the Selection Committee to further define the primary features and benefits of their proposal, to allow clarification of their proposal and to permit questions from the committee. These presentations will be scheduled as requested after the proposal due date.

1.22 **Award Notification.** The District will make selection after proposal review, possible interviews, and references checks. After a final selection is made, the selected supplier will be invited to negotiate a contract with the District. Remaining Responders will be notified in writing of their selection status on or after TBD.

1.23 **No Press Releases or Public Disclosure.** The selected vendor may not release any information about this RFP. The selected supplier may not issue a press release until after Board of Trustees approval and under contract with the District.

1.24 **Contract Award.** The contract will consist of this RFP, the proposal, District standard terms and conditions, and all addenda, along with all other written correspondence concerning this RFP.

1.25 **Primary Supplier.** The District expects to negotiate and contract with only one prime supplier. The District will not accept any proposals that reflect an equal teaming arrangement or from Responders who are co-bidding on this RFP. The District will not accept any invoices from subcontractors or become part of any negotiations between a prime supplier and a subcontractor.

1.26 **Offer Expiration Date.** Proposals in response to this RFP will be valid for 120 days from the proposal due date. The District reserves the right to ask for an extension of time if needed.

1.27 **Designation of Requirements.** The District fully expects Responders to provide a comprehensive solution on a level that meets or exceeds all requirements as stated in the RFP. To prevent any confusion about identifying requirements in this RFP, the following definition is

offered: The words shall or must are used to designate a "high priority requirement". Responders must respond to all high priority requirement presented in this RFP. Failure to respond to all high priority requirements may be cause to disqualify a proposal.

1.28 **Product Use Requirements.** The District requires that hardware included in proposals be currently in use in a production environment by at least three (3) other public school districts in Nevada and/or other states in the US and have been in use for at least six months. Unreleased or beta test hardware, systems software, or application software will not be accepted. It is understood that applications and software required to be developed is excluded from this provision.

1.29 **Proposal Errors.** The District will not be liable for any errors or omissions in proposals.

1.30 **Alternate Proposal and Options.** Responders may propose enhancements or equipment that provides increased performance as an option to the baseline RFP. Any option proposed must be clearly itemized as an option with the appropriate cost increase (or decrease) and contain a brief description of the enhancement.

1.31 **Pricing.** Responders shall provide the District with firm, fixed prices for the equipment at all sites specified in this RFP.

1.32 **E-Rate.** All pricing as proposed in Bidder's/Responder's solution must conform to E-Rate rules and regulations, as well as FCC mandates, as it applies to Lowest Corresponding Price, and must be proposed as a separate contract price, independent of the District's ability to use any 'master contract' or 'piggy- back contract' pricing element.

The District reserves the right to reject any or all proposals in the event that the District is denied Priority 2 E-Rate funding.

SECTION 2: SCOPE AND TECHNICAL REQUIREMENTS

2.1 **Sites included in this RFP**

2.1.1 Pinion Hills Elementary School
1479 Stephanie Way, Minden, NV 89423

2.1.2 Douglas High School
1670 Highway 88, Minden, NV 89423

2.2 **Pinion Hills Elementary School LAN Fiber Installation**

2.2.1 Install single mode 10GB LAN fiber from MDF to all IDFs (See Diagram 1)
2.2.2 Terminate 6 fiber strands at each IDF and 30 fiber strands at the MDF
2.2.3 Approximately 1,800ft of fiber cable
2.2.4 Test and certify fiber cabling per Attachment "A" "Douglas County School District Telecommunications Specification"

2.3 **Douglas High School Building 601 and 608 LAN Fiber Installation**

2.3.1 Install single mode 10Gb LAN fiber from Building 500 IDF to Building 601 IDF and 608 IDF (See Diagram 2)
2.3.2 Approximately 1,000ft of fiber cable
2.3.3 Use existing underground data conduit (2" conduit with 75% free space) (See Diagram 2)
2.3.4 Terminate 12 fiber strands at building 500 IDF, 6 fiber strands at building 601 IDF, and 6 fiber strands at building 608 IDF
2.3.5 Test and certify fiber cabling per Attachment "A" "Douglas County School District Telecommunications Specification"

2.4 **Douglas High School Portable Classroom CAT6e 1GB LAN Network Install**

2.4.1 Install and terminate five (5) network drops in fourteen (14) portable classrooms and ten (10) network drops in one (1) portable classroom per network diagram for a total of eighty (80) drops (See Diagram 2)
2.4.2 Approximately 15,000ft of CAT6e copper cabling
2.4.3 Use existing underground data conduit between classroom portables (2" conduit with 95% free space) (See Diagram 2)
2.4.4 Terminate all drops on vendor provided CAT 6e patch panels in the existing Building 608 IDF Network Enclosure
2.4.5 Test and certify CAT6e cabling and terminations per Attachment "A" "Douglas County School District Telecommunications Specification"

2.5 **FIBER OPTIC CABLE SPECIFICATION**

- 2.5.1 Single Mode Optical Fiber rated for 10Gb
- 2.5.2 Optical Characteristics – Single-mode fiber optic cable 8.3µm/125µm single-mode.
- 2.5.3 Attenuation: 0.35dB/km @ 1310 nm; 0.25dB/km @ 1550 nm
- 2.5.4 Provide optical fiber color codes in compliance with Color TIA/EIA 527-7 and 14
- 2.5.5 Provide for all new fiber optic installations with fusion spliced LC pig tail connectors. The connectors shall be manufactured by the cabling system manufacturer and composed of the same optical fiber glass as used in the optical fiber cable specified by the project
- 2.5.6 Each IDF will require a minimum of six (6) terminated fiber strands
- 2.5.7 Rack Mount enclosure at the MDF and Wall Mount enclosures at each IDF required for each building termination location and be approved by DCSD IT prior to system design and installation. RFI submittal is required. The enclosure shall be equipped for pigtail connector splicing and installation.
- 2.5.8 Provide wire management approved by DCSD IT to equipment and interconnection enclosures
- 2.5.9 Inner duct shall be used for all fiber installation inside of buildings
- 2.5.10 Aluminum threaded innerduct couplers shall be used to join two segments of corrugated innerduct together. Non-metallic couplers are not acceptable.
- 2.5.11 All inner duct shall have a measured pull tape rated for 200 lb pulling tensile
- 2.5.12 Each inner duct run shall be of the same manufacturer, model and size
- 2.5.13 For additional fiber cabling specification not listed above, see Attachment “A” “Douglas County School District Telecommunications Specification”

2.6 **CAT6e CABLING SPECIFICATION**

- 2.6.1 See Attachment “A” “Douglas County School District Telecommunications Specification” for all CAT6e cabling requirements.

2.7 **WRITTEN GUARANTEE**

- 2.7.1 The winning bidder must supply a written guarantee that the hardware and cabling is warranted from defects for a minimum of 5 years from installation.

2.8 **DOCUMENTATION**

- 2.8.1 The winning bidder must provide complete documentation of all work performed including as-built drawings and fiber/network drop numbering schemes. All documentation provided shall be in written form. Documentation should also be provided in electronic form and network accessible.

SECTION 3: OTHER RFP REQUIREMENTS

3.1 **Errors and Omissions.** If a responder discovers an ambiguity, conflict, discrepancy, omission, or other error in the RFP, they shall immediately notify the District of such error writing and request clarification or modification of the document. Modifications will be made by addenda. Such clarification shall be given by written notice to all parties who have been furnished an RFP for bidding purposes, without divulging the source of the request for same. The District will give such notice to the public through publication on its website.

If a responder fails to notify the District, prior to the date fixed for submission of bids of an error in the RFP known to them, or an error that reasonably should have been known to them, they shall bid at their own risk; and if they are awarded the contract, they shall not be entitled to additional compensation or time by reason of the error of its later correction.

The bidder should carefully examine the entire RFP and early addenda thereto, and all related materials and data referenced in the RFP or otherwise available to them, and should become fully aware of the nature and location of the work, and the conditions to be encountered in performing the work.

3.2 **Bidder Agreement.** In compliance with this request for proposal, the responder will propose and agree to furnish all labor, materials, transportation, and services for the work described and specifications and for the items listed herein.

3.3 **Proposal Agreement.** If the responder is an individual or an individual doing business under a firm name, the proposal must, in addition to the firm name, be signed by the individual; if the responder is a partnership, the proposal should be signed with the partnership name by one of the partners; if a corporation, with the name of the corporation by an officer authorized to execute a proposal on behalf of the corporation.

PINON HILLS ELEMENTARY SCHOOL

LAN Fiber Replacement

= MDF/IDF

= New, 6 strand fiber (replaces Cat5 copper)

MDF

BOYS
GIRLS
A-5 CLASSROOM
A-4 CLASSROOM
A-7 CLASSROOM
A-3 CLASSROOM
A-8 CLASSROOM
A-2 CLASSROOM
A-9 CLASSROOM
A-1 CLASSROOM
READING
A-10 CLASSROOM
CUSTODIAL
COMPUTER LAB
B-3 CLASSROOM
B-2 CLASSROOM
B-4 CLASSROOM
B-1 CLASSROOM
GIRLS
WOMENS RR
MENS RR
LOUNGE
COUNSELOR
B-5 CLASSROOM
B-9 CLASSROOM
B-7 CLASSROOM
B-8 CLASSROOM
BOYS
STORAGE
C-2 SPED
C-1 SPED
LIBRARY
CUSTODIAL
C3
OUTDOOR LEARNING AREA
D-3 CLASSROOM
D-2 CLASSROOM
BOYS
GIRLS
STORAGE
MECH
D1
D10
D9
D-4 CLASSROOM
D-5 CLASSROOM
D-6 CLASSROOM
D-7 CLASSROOM
D-8 CLASSROOM
OFFICE
PRINCIPAL
OFFICE LOBBY
OFFICE
STORAGE
STORAGE
NURSE
RR
EQUIPMENT
STORAGE
WOMENS RR
MENS RR
STORAGE
STORAGE
STORAGE
ART/MUSIC ROOM
KITCHEN
RR
GIRLS RR
BOYS RR
STORAGE
MULTI-PURPOSE ROOM
STAGE RAMP
STAGE
PE OFFICE
BOILER ROOM
CHILLER ROOM
K-1 CLASSROOM
K-2 CLASSROOM
K-3 CLASSROOM

Diagram 1

Douglas High School Building 601 - 619 Portables
CAT6e Network Drop Locations, Fiber Cabling, and Underground Conduit

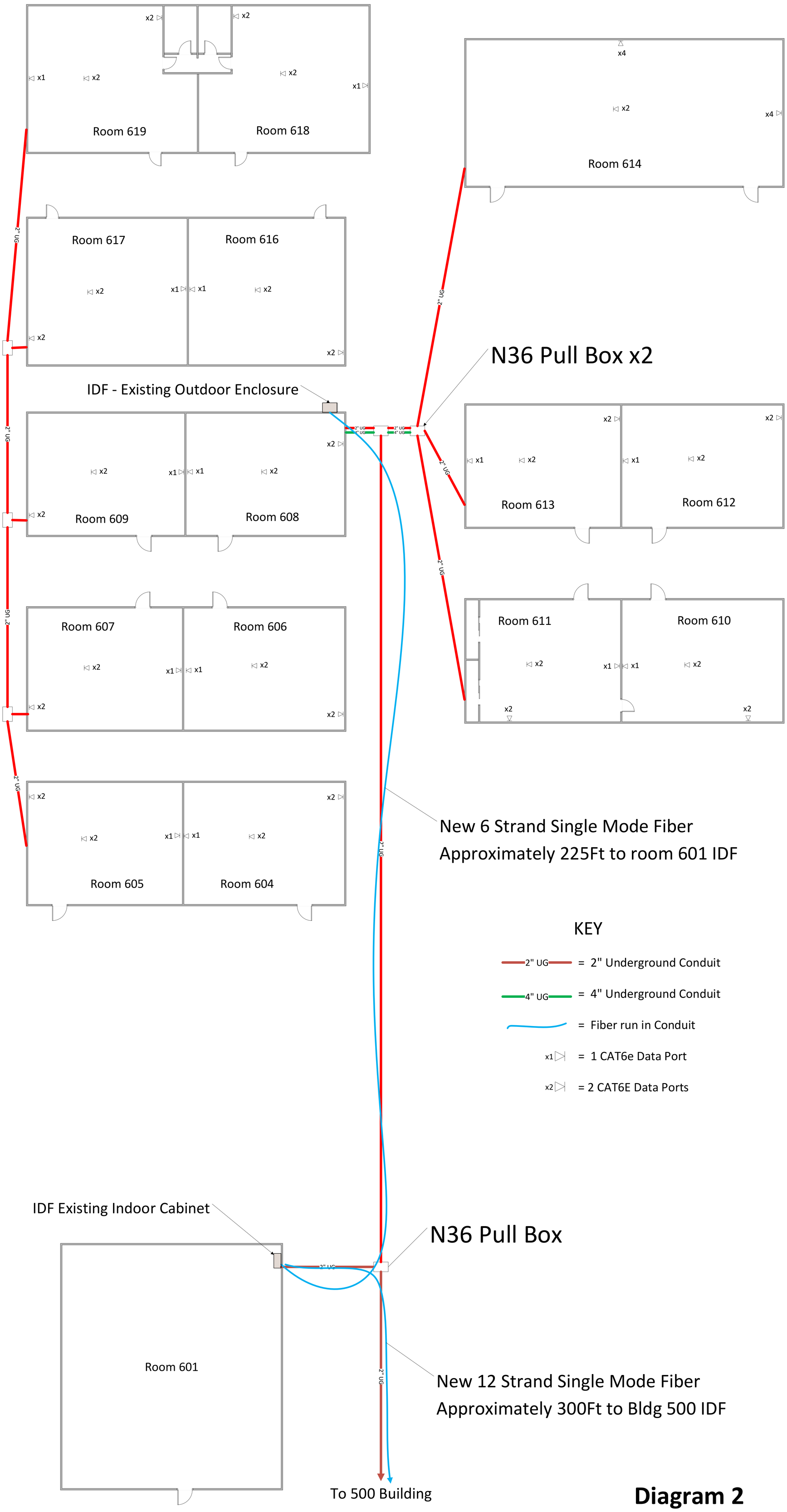

Diagram 2

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Attachment A

Telecommunications Specifications

Part I: Project Details

A. Scope of Document

1. The purpose of this document is to provide infrastructure design and installation guidelines for the Douglas County School District telecommunications and data communication systems centers. The owner of these facilities will be referred to herein as “DCSD”. These guidelines are both to encourage standardization of all data communication configurations and layouts as well as to provide basic information necessary to cabling contractors and installation firms wishing to bid for installation work within these facilities. These installers shall be referred within this document as “Contractor”.

2. The documentation includes: product specifications, minimum product performance, structured cabling design considerations and installation guidelines and makes reference to current, accepted low-voltage cabling Standards.

3. In all instances where Standards are cited, it is assumed Installer will have familiarity with and implicitly follow the recommendations of the most current version of the Standard referenced at the time of installation. Compliance with most current Standards is the sole responsibility of the Contractor.

4. Anywhere cabling Standards conflict with National or local electrical or safety codes, Contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either. Knowledge and execution of applicable codes is the sole responsibility of the Contractor. Any code violations shall be remedied at the Contractor’s expense.

B. Scope of Work

1. Contractor shall provide all labor, materials, tools and equipment required for the complete installation of work called for in the Construction Documents unless explicitly instructed otherwise by DCSD. All deviations from this must be by written instruction from DCSD.

2. Contractor shall be solely responsible for all parts, labor, testing, documentation and all other associated processes and physical apparatus necessary to turn-over the completed system fully warranted and operational for acceptance by DCSD.

3. Contractor shall provide performance verification testing of all installed links using up-to-date and industry accepted test equipment appropriate to the types of links being tested. All testers used shall be factory calibrated within one year of use with references set daily prior to testing.

4. Contractor shall provide valid test data in electronic format and hard copy indicating passing of all installed links according to applicable Standards cited under “Regulatory Requirements” section of this document. DCSD reserves the right to require more stringent test requirements than those cited in the Standards. Such requirements will be requested in writing prior to installation.

5. Final acceptance of the installation shall be in writing by DCSD.
6. Contractor shall provide all equipment brands and models that are specified within this document.

B. Clarification of Specifications and Bid Documents

1. Quantities of telecommunications equipment, typical installation details, cable routing conventions and support structure types will be provided as an attachment to this document if applicable.
2. If bid documents on specific projects appear to be in conflict, Contractor shall obtain formal clarification in writing from DCSD to resolve the conflict.

PART II: REGULATORY REQUIREMENTS

A. Industry Standard Requirements

1. The following industry standards are the basis for the structured cabling system described in this document:

    a. ANSI/TIA/EIA
        i. TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
        ii. TIA/EIA-568-B.1 General Requirements
        iii. TIA/EIA-568-B.2 Balanced Twisted Pair Cabling Components Standard
        iv. TIA/EIA-568-B.3 Optical Fiber Cabling Components Standard
        v. TIA/EIA - 942 Telecommunications Infrastructure for Data Centers
        vi. TIA/EIA-569-A Commercial Building Standard for Telecom Pathways and Spaces
        vii. TIA/EIA-606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
        viii. J-STD-607-A Commercial Building Grounding/Bonding Requirements

    b. NFPA
        i. NFPA 70 National Electric Code (NEC)

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. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

B. Warranty & Guarantees

1. **Cabling System Warranty**

    A Cable Products Warranty shall provide a complete warranty to guarantee a

high performance cabling systems that meet application requirements. The guarantee shall include all cable installed in the structured cabling system and cabling terminations. The Cable system shall be warranted for a period of at least 25 years.

Installer Minimum Qualifications: For the purpose of this bit, the successful bidder shall be a company specializing in installing products specified in this section with minimum three years documented experience, and with service facilities within 150 miles of project. The Electrical/Telecommunications contractor must a qualified BICSI trained installer who also is certified to install structured data cabling and fiber. A copy of certification documents for each must be submitted with the quote in order for such quote to be valid.

The Electrical/Telecommunications contractor is responsible for workmanship and installation practices.

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

PART III: QUALITY ASSURANCE

A. Contractor Qualifications

Any contractor offering a proposal for a DCSD data center project must meet the minimum requirements listed below. Contractors shall also provide written, hard copy documentation of these qualifications with their proposals.

1. Have a minimum of 5 years in the communications structured cabling business.
2. Have design and installation of communications structured cabling systems as their primary line of business.

B. System Performance Warranty

Contractor shall provide a warranty on all installed copper and fiber permanent links. Such warranty shall provide a complete system warranty to guarantee high end-to-end performance for all applications designed to operate over the class of cabling installed. The guarantee shall include all connectivity components and cable within the permanent link and cover the system for duration of 25 years.

Part IV: Products

A. Equivalent Products

Belden or equivalent as specified by DCSD shall manufacture all products, including but not limited to cable management, faceplates, copper modules, patch panels, racks, 110 blocks, patch cords, labels, grounding lugs and fiber connectivity products for the purpose of this document.

B. Substitutions

Substitutions must follow the same rigid standards for quality and termination style as those described in this document. Any Contractor wishing to offer structured cabling products other than those specified herein shall submit a request for product substitution in writing in advance of bid. Written requests for substitution shall be accompanied by all drawings, specification sheets and engineering documents, as well as third party laboratory performance test results proving equivalency in performance and manufacturing style. This written documentation shall be accompanied by samples of the substitution product offered for evaluation. Equal product acceptance must be received in writing from DCSD. Contractor shall be responsible and assume all costs for removal and replacement of any substituted product installed without prior written approval. Such costs shall include, but not limited to labor, materials as well as any penalties, fees or costs incurred for late completion.

C. Documentation

Installation documentation must include "as built" drawings. These drawings shall be supplied to the Business Services Office no later than two weeks after completion of the installation. Each patch panel in an MDF or IDF will be labeled with letters A, B, C, D, … Each wall plate shall have a mechanically produced label for visible identification of patch panel and port number. Example: A-15. Hand written identification will not be acceptable. Each outlet will need to be documented on "as built". (Final payment will not be issued until all documentation and testing requirements are complete.)

Any deviation from the manufactures specifications and guidelines must be noted and submitted by the vendor in writing, receiving approval from DCSD in writing before continuing with the work.

D. *Standards & Codes Compliance:*

Equipment, devices, apparatus, systems and installation provided shall be entirely suitable and safe for each intended application and be in full compliance with applicable standards, requirements, rules, regulations, codes, statutes, ordinances, etc. of municipal, county, state and federal governments.

The installation must meet all industry standards and practices. Included but not limited to the following:

- Electronics industries Association / Telecommunications Industries Association (EIA/TIA) 568B.
- Building Industry Consulting Service International (BiCSi) Telecommunications Distribution Methods Manual.
- Electrical and Cabling materials and components shall be U.L. approved.

- All work must comply with current OSHA regulations and with the National Electrical Code.

- All materials, equipment, parts and pieces shall be new. No used, rebuilt, or refurbished material, equipment, parts and pieces shall be accepted.

E. Installation:

- All cabling must be installed to the latest EIA/TIA 568B standards. All cabling must be installed with proper stress relief and tie down EIA/TIA-TSB 40.

- All conduit installation must meet all state and local codes.

- Debris, boxes, leftover cables and trash must be removed from construction site upon completion of work.

- Unless otherwise noted, all exposed wiring in furnished rooms shall be installed in Wiremold or equivalent surface raceway. No exposed cabling in classrooms.

- Pull conductors together where more than one is being installed in a raceway or conduit.

- Use pulling lubricant or compound, where necessary, pulling compound must be water based pulling lubricant that will not deteriorate cable or conduit.

- No splicing of Data cable is allowed.

- All wire must meet or exceed national Electrical Code for PVC and Plenum wire. All wire and cable to be furnished and installed by Contractor.

- All cabling shall be pulled in the highest point possible in the interstitial space above the accessible ceiling space. No cabling is allowed to rest on any ceiling tile or suspension system.

- If more than one cable is run parallel with another, they must be hung every 5 ft. for support by drive rings or some sort of wire management. The cables must be secured with plenum rated Velcro wrap to the structure every 5 feet. Cable bundles must be uncombed.

- All cable / cabling shall be kept 30 inches away from any heat source; i.e. steam valves, etc. All cables / cabling shall be kept away from moveable mechanical equipment: i.e., dampers, valves, pneumatic tubes, etc. -- thirty (30) inches.

- Data wiring must be at least: Five (5) inches from power lines 2kVA or less, Twelve (12) inches from fluorescent lighting and power lines 2 and 5kVA, Thirty-six (36) inches from power lines greater than 5kVA, Forty (40) inches from transformers and motors.

- Where High Voltage is present in interstitial space, cables shall be kept away from the conduits as far as possible. Where possible, cables must cross AC power at 90-degree angles.

- Fire and smoke partition and wall penetrations must be sleeved with conduit and

follow applicable fire codes.

- Cables shall be pulled free of sharp bends or kinks. Cables shall not be pulled across sharp edges. Cables shall not be forced or jammed between metal parts, assemblies, etc.

- Cables shall not be pulled across access doors and pull box covers. Access to all equipment and systems must be maintained.

- Termination of cables shall be of a high level of workmanship and satisfy Category 6e specifications for termination.

- All UTP cable runs shall be less than 328 ft. and rated by the manufacturer to be certified for the latest compliance standard.

F. Copper Cable:

Recommended design shall include:

- Minimum one Four-pair 100 ohm, 23 AWG, UTP cable—Category 6e for data

- Maximum cable length is 100 meter

- All cable shall meet or exceed the following specifications

Belden Copper cable or equivalent shall be used for the horizontal cabling subsystem. These requirements are for cables of unshielded 23 AWG bare copper conductors, insulated with thermoplastic, twisted into pairs and enclosed in a thermoplastic jacket. The finished cable shall meet or exceed the following requirements of the EIA-568-B.2 and ISO 11801 edition 2.0 for class cable requirements. All cable shall conform to the requirements for communications circuits defined by the National Electrical Code (Article 800). Cable listed to NEC Article 800-51(a) will be used for “Plenum” installations and carry labeling of CMP. Cable listed to NEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor and carry the labeling of CMR.

The cable manufacturer shall be ISO 9001 registered.

As a minimum, every Master Reel shall be tested for Attenuation, Pair to Pair and Power Sum Crosstalk, Impedance, and RL. Testing shall be performed using a sweep test method to category 6 650 (1000) MHZ. All testing shall be done in accordance with ASTM D 4566.

A test report is provided indicating the Master reel number, the date of the test, and test results for RL, Attenuation, Crosstalk. Power Sum may be listed as Pass/Fail. Characteristic impedance shall be shown for each pair.

G. Fiber Optic Cable

Single mode fiber is the standard optical fiber media for backbone WAN and LAN installations and optical fibers shall be laser optimized, suitable for CWDM use and complies with the ITU G.562.c/d. standard.

The cable types listed herein have been selected based on the typical environments

and applications. It is the Contractor's responsibility to verify and submit an RFI on cables specified within that do not meet code or the environmental requirements of the project, environmental or code requirements of the installation before purchasing or providing.

When splicing into existing optical fibers the Contractor is to ensure the matching of optical fiber glass to the new and existing fibers and install the same glass type and manufacturer to prevent optical fiber mismatch.

Single Mode Optical Fiber Specification

Single Mode Optical Fiber rated for 10Gb

Optical Characteristics – Single-mode fiber optic cable 8.3µm/125µm single-mode low water peak optical fibers.

Attenuation: 0.35dB/km @ 1310 nm; 0.25dB/km @ 1550 nm

Mechanical Construction – No direct-buried installation. All underground fiber installations will be in minimum 2" conduit. Cable Construction shall include: locatable central strength member or an IT approved equivalent, water swell-able yarn, buffer tubes/fibers, water swellable tape, ripcord, polyethylene inner jacket, high tensile strength, Polyethylene outer jacket, UV stabilized jacket or equivalent.

Provide optical fiber color codes in compliance with Color TIA/EIA 527-7 and 14.

FIBER OPTIC CONNECTORS

Provide for all new fiber optic installations with fusion spliced LC pig tail connectors. The connectors shall be manufactured by the cabling system manufacturer and composed of the same optical fiber glass as used in the optical fiber cable specified by the project.

Each site/MDF/IDF will require a minimum of six (6) terminated fiber strands, twelve (12) strands are preferred.

FIBER OPTIC ENCLOSURES

Rack Mount enclosures are required for each building termination location and be approved by DCSD IT prior to system design and installation. Wall Mount enclosures are acceptable in cases where rack mounting is not practical. RFI submittal is required. The enclosure shall be equipped for pigtail connector splicing and installation.

Provide wire management approved by DCSD IT to equipment and interconnection enclosures

INNER DUCT – Inside Buildings

Aluminum threaded innerduct couplers shall be used to join two segments of corrugated innerduct together. Non-metallic couplers are not acceptable.

All inner duct shall have a measured pull tape rated for 200 lb pulling tensile.

Each inner duct run shall be of the same manufacturer, model and size.

FIBER CABLE LABELS

Plastic cable labels shall be mechanically printed and shall be attached to all fiber optic cables using black UV rated cable ties or stainless steel cable ties within six inches of the splice closure and 6 " from all ducts and sleeves.

Provide electronically printed, waterproof, self-adhesive, laminated labels installable on the external surface of the outside panel of all FDU's and closures.

H. Termination Hardware (Data Jacks)

1. **Category 6 Unshielded Twisted Pair (UTP)**

   Four-pair Category 6 UTP cabling shall be terminated onto a four-pair Category 6 module. All modules shall be terminated using the T568B (B) wiring scheme. The eight-position module shall exceed the connector requirements of the TIA/EIA Category 6 standard.

2. **Faceplates:**

- The faceplate shall be ivory or white as per DCSD and labeled above each jack; labels shall coincide with patch panel letter and port number. Example: A-15 corresponds to port 15 of the top most patch panel in the rack.

- Provide dust covers for each blank outlet.

3. **Equipment Racks:**

- Equipment racks shall be supported or braced at the top of each rack by a length of cable runway, unless otherwise noted. Runway shall be attached at one end to a full height wall by the appropriate fastening hardware. Equipment racks shall have the following physical characteristics:

- Self-supporting, manufactured of either aluminum or steel. One side of vertical channel drilled and tapped for equipment mounting. Finish to be either mill (aluminum), telephone gray or black in color.

- All racks shall be standard 19-inch rack mounting space.

I. Patch Panels and Wire Management:

1. **Patch Panels**

   Belden patch panels or equivalent shall be used. Patch panels will be labeled with a capital letter starting with "A" for the top most patch panel and alphabetically lettered from the top to bottom. Individual patch panel ports will be labeled 1 – 24 for 24 ports or 1 – 48 for 48 ports. Example: B-15 corresponds to port 15 of the second patch panel from the top of the rack.

2. Patch Cords:

The patch cords shall be factory terminated with modular plugs featuring a one-piece, tangle-free latch design and strain-relief boots to support easy moves, adds and changes. They shall be constructed with Category 6 stranded UTP cable. Each patch cord shall be 100% performance tested at the factory in a channel test to the Category 6 standard. The patch cords shall come in standard lengths of three, five, seven, ten, fourteen, and twenty feet and six colors of Black, Blue, Green, Red, Yellow and Off White.

PART V: CABLING RACKS, CABINETS AND MANAGERS

A. Racks

Belden or Hoffman or equivalent

B. Vertical & Vertical Cable Managers

Belden or Hoffman or equivalent

C. Overhead / Underfloor / Underground Cable Routing

Contractor shall be responsible for sizing all pathways such that newly installed cable represents not more than a 35% fill as per manufacturer's directions. Overfilled pathways are the sole responsibility of the Contractor who shall remove and reinstall at Contractors expense.

D. Fiber Optic Patch Cords:

The modular connectors and patch cords will be chosen to match the horizontal cabling medium and rating. The same manufacturer shall provide the modular connectors and patch cords. The total patch cord length at the work area is not to exceed 3 meters (10 ft). Fiber optic patch cord termination and connectors is TBD due to unknown new network hardware requirements. LC connectors will more than likely be used. Patch cord length at cabinet should be used as required for proper cable management routing and connectivity.

E. Testing and Acceptance

1. 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-B-1 Section 11. 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.

2. Copper Channel Testing

All twisted-pair copper cable links shall be tested for compliance to the requirements

in ANSI/TIA/EIA/568-B.2 Section 11 for the appropriate Category of cabling installed.

3. **Fiber Testing**

All installed fiber shall be tested in accordance with ANSI/TIA/EIA-568-B.2 section 11.

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 single mode) in Both directions.

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. 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.

4. **System Documentation**

Upon completion of the installation, the telecommunications contractor shall provide two (2) full documentation sets to the Engineer/End User 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 Engineer, the telecommunications contractor shall provide copies of the original test results.

The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

Test Results documentation shall be provided in native electronic format within three weeks after the completion of the project. The media 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-B. 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. The media shall contain the electronic equivalent of the test results as defined by the specification along with the software necessary to view and evaluate the test reports.

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/or electronic (DWG, AutoCAD, Visio) 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 form.

5. Grounding and Bonding

A Telecommunications Main Grounding Busbar (TMGB) shall be located at the service entrance. A Telecommunications Grounding Busbar (TGB) shall be located in each telecommunications space. The TGB will be grounded/earthed to the Telecommunications Main Grounding Busbar (TMGB).

The TMGB shall be bonded to building steel and grounded/earthed to the electrical service ground according to J-STD-607-A guidelines. Each TGB shall be bonded to building steel and the electrical panel serving equipment in the telecommunications space.

The gauge of the connecting ground/earth cable, known as the Telecommunications Bonding Backbone (TBB) will follow J-STD-607-A guidelines, as is shown in the table below:

Sizing of the TBB	
TBB Length in Linear meters (feet)	TBB Size (AWG)
Less than 4 (13)	6
4-6 (14-20)	4
6-8 (21-26)	3
8-10 (27-33)	2
10-13 (34-41)	1
13-16 (42-52)	1/0
16-20 (53-66)	2/0
Greater than 20 (66)	3/0

Route the TBB to each TGB in as straight a path as possible. The TBB should be installed as a continuous conductor, avoiding splices where possible. When more than one TBB is used, bond them together using the TGBs on the top floor and every third floor in between with a conductor known as a grounding equalizer (GE). Use the J-STD-607-A guidelines for sizing of the TBB when sizing the GE (shown in the table above).

6. Construction of the Grounding/Earthing System

Avoid routing grounding/earthing conductors in metal conduits. If the grounding/earthing conductor must be routed through a metal conduit, bond each end of the conduit to the grounding/earthing conductor.

In telecommunications spaces with a small number of racks or cabinets, it may be most convenient to bond the grounding/earthing jumper cable directly to the TGB. Larger spaces require a mesh Common Bonding Network, as described in the table below:

Cable Sizes for Other Grounding/Earthing Applications Not Specifically Described Elsewhere in This Document	
Purpose	Copper Code Cable Size
Aisle grounds (overhead or under floor) of the common bonding network	#2 AWG
Bonding conductor to each PDU or panel board serving the room.	Size per NEC 250.122 & manufacturer recommendations
Bonding conductor to HVAC equipment	#6 AWG
Building columns	#4 AWG
Cable ladders and trays	#6 AWG
Conduit, water pipe, duct	#6 AWG