

ADDENDUM No. 2
Request for Proposals (RFP)
20RFP003 Notification and Scheduling System

July 17, 2019

Received by bidder:

Date: _____

Name: _____

Signature: _____

Item 1: Question and Answer

Question:

Documents Including Section 271300

Answer: Section 271300 has been attached to this addendum.

**COMMUNICATIONS CABLE PLANT
SECTION 271300**

PART 1 GENERAL

1.1 PURPOSE

- A. This section identifies the Communications Cable Plant technical design and specifications requirements for AISD Network Support Services located in Austin, Texas ("Owner").
- B. Responsible Parties
 - 1. Owner (AISD Network Support Services) will have the final approval for Attachment A, any changes in the project scope, and approval of the final installation.
 - 2. Contractor is responsible for the complete Bill of Materials (BOM), installation of the solution, and warranty.
 - 3. Technology Consultant:
 - a. The Technology Consultant will be responsible for coordinating needs assessments, technology design requirements, equipment requirements, and network designs between AISD Construction Management, AISD Network Systems and Support, Technology Vendors, Architects, and General Contractors.
 - b. The Technology Consultant will coordinate with the AISD Network Support Services department and the Contractor to validate all aspects of the Data Communications design and installation.

1.2 AISD RELATED SPECIFICATIONS

- A. Section 272100 Data Communications Network System
- B. Section 273123 VoIP System
- C. Section 275100 PA and Bell Clock
- D. Section 274100 Audio-Visual Systems
- E. Section 275300 IP Clock
- F. Section 280000 Electronic Security
- G. NSS-4 WAN General Naming and Numbering Convention
- H. AISD Guidelines for Completing LAN Install
- I. AISD New Building Installation Checklist
- J. NSS-2 Campus Upgrade Process
- K. NSS-3 General Rack Layout and Design Guidelines
- L. NSS-8 Installation Guidelines for Vendors
- M. NSS-5 Network Labeling Standard v3

- N. Design Standards of the Project Development Manual for GAATN requirements
- O. AISD Network Infrastructure Upgrade
- P. AISD Approved Master Equipment List
- Q. Schematic of Campus Physical Links and Cabling

1.3 CODES, STANDARDS, AND REGULATIONS

- A. American National Standards Institute/Telecommunications Industry Association (ANSI/TIA)
 - 1. ANSI/TIA-568-C.0 "Generic Telecommunications Cabling for Customer Premises".
 - 2. ANSI/TIA-568-C.1 "Commercial Building Telecommunications Cabling Standard".
 - 3. ANSI/TIA-568-C.2 "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
 - 4. ANSI/TIA-568-C.3 "Optical Fiber Cabling Components Standard".
 - 5. ANSI/TIA-568-C.4 "Broadband Coaxial Cabling and Components Standard".
 - 6. ANSI/TIA-569-C "Telecommunications Pathways and Spaces".
 - 7. ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure".
 - 8. ANSI/TIA-607-B "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
 - 9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
 - 10. ANSI/TIA-862-A "Building Automation Systems Cabling Standard".
- B. Building Industry Consulting Service International (BICSI).
 - 1. BICSI Outside Plant Design Reference Manual.
 - 2. BICSI Telecommunications Distribution Methods Manual (TDMM).
- C. Local, county, state and federal regulations and codes in effect as of the date of the installation.
- D. Equipment of foreign manufacture must meet U.S. codes and standards.

1.4 ASBESTOS / SILICA DUST

- D. Contractor is advised that the locations of all hazardous materials may not be clearly known and that he shall proceed with caution in all phases of the work.

PART 2 PRODUCTS

2.1 SCOPE

- A. The following sections specifically list the acceptable equipment types and items for this project. Proposed equivalent items must meet or exceed these specifications and the specifications of the listed item.
- B. In the event a specified manufacturer's part number has changed or is no longer valid, from Attachment A, the Contractor shall obtain Owner's approval prior to substituting alternative equipment or materials.
- C. Owner will have the final determination of the acceptability of all proposed equipment and must approve submitted equipment prior to installation. Where quantities are not noted, they may be obtained from the Technology Consultant. In the event of a discrepancy between the specifications and the drawings, the greater quantity or higher quality shall prevail and be used as the basis of pricing. A subsequent Request for Information shall be submitted by the Contractor to the Technology Consultant for resolution.
- D. Any Owner-furnished materials or equipment not installed in the project shall be returned to the Owner. Contractor shall store all materials and equipment in accordance with manufacturers' instructions in a weather-tight, secure enclosure. Contractor shall be responsible for safety and security of all Owner-furnished materials until the project is complete and accepted by Owner.
- E. All equipment and materials, unless otherwise specified, shall be new, free from any defects, and of the best quality of their respective kinds. All like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.

2.2 FIBER OPTIC CABLE AND COMPONENTS

- A. General Fiber Requirements
 - 1. Fiber shall be certified to meet all parts of TIA-455 and comply with TIA-492, ANSI/ICEA S-83-596, ANSI/ICEA S-83-640 and the NEC.
 - 2. All fiber optic cable submitted for consideration must meet ANSI/TIA-568-C.3 standard for all new cabling.
 - 3. All cable must be suitable for the environment that it is installed in.
 - 4. All fiber must be armored rated.
 - 5. All fiber optic cable will be terminated per ANSI/TIA-598.
- B. 50 Micron OM4 Multi Mode Fiber
 - 1. All fiber optic cable submitted for consideration must be OM4 rated 50 microns with 12 strands and meet ANSI/TIA- 568-C.3 standard for all new cabling.
 - 2. All cable must be suitable for the environment that it is installed in and be armored rated.
 - 3. All fiber optic cable will be terminated per ANSI/TIA-598.
 - 4. Fibers shall have dual wavelength capability; transmitting at 850 and 1300 nm ranges.

5. 50/125 $\mu\text{m} \pm 2.5 \mu\text{m}$ core (OM4)
6. Maximum Attenuation: 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm
7. Minimum Bandwidth: 2000 MHz per km with laser launch at 850 nm ensured by differential

4. ASP-filled multi-pair copper cables shall be utilized for underground conduit or direct buried applications.
5. Per the National Electric Code (NEC), all OSP cabling shall transition to inside cable within 50'-0" of building entry or within 50'-0" of exiting a conduit body. The metallic portion of the cables, if present, must be bonded to the building ground upon entry.
6. The bending radius and pulling strength requirements of all backbone cables shall be observed during handling and installation.

B. Copper

1. Copper patch cords, verify exact quantities and lengths with Owner prior to purchase
2. Category 5e, Stranded UTP cable Meets FCC Part 68.
 - a. Only to be used in remodel construction projects.
 - b. Standard modular non-keyed, 8-position 8-conductor plug
 - c. 94V-0 rated
 - d. UL listed
 - e. Supports Gigabit Ethernet.
 - f. Plenum rated
 - g. No less than 19.0 dB signal loss@ 100 MHz
 - h. TIA-568-C category 5e rating printed on the jacket.
 - i. Meets the requirements of ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard.
 - j. Will consist #23 AWG copper wiring, stranded conductors, tightly twisted into individual pairs.
3. Category 6, stranded UTP cable meets FCC Part 68
 - a. Use for new construction projects.
 - b. Standard modular non-keyed, 8-position 8-conductor plug.
 - c. 94V-0 rated.
 - d. UL listed.
 - e. Supports Gigabit Ethernet.
 - f. Plenum rated.
 - g. No less than 15.6 dB of signal loss at 250 MHz.
 - h. TIA-568-C category 6 rating printed on the jacket.
 - i. Meets the requirements of ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard.
 - j. Will consist #23 AWG copper wiring, stranded conductors, tightly twisted into individual pairs.
4. Coordinate with the Owner on the active equipment layout prior to the purchase to ensure the correct sizing of the patch cords from the patch panels to the switching equipment.
5. Provide a 10'-0" Station Cord for each work area outlet port.

6. Place each size/length patch cord in a separate container, and mark the containers that hold the patch cords with the length of patch cords contained within.
 7. All rated patch cords shall be round, and consist of #23 AWG copper, stranded conductors, tightly twisted into individual pairs.
 8. Patch cords shall be made and warranted by the manufacturer of the cabling system installed in this project and shall meet or exceed the patch cord specifications as outlined in the TIA standards.
- C. Primary Copper Protectors
1. UL 497, 497A and 497B rated.
 2. Offers both primary and secondary protection of the cabling and circuits
 3. Analog Voice systems will need 240-volt solid-state protection
 4. PA systems will need 75-volt protection
- D. RJ-45 Patch Panels – Data Termination
1. Patch panels shall be rated to match installed cable plant.
 2. The wiring block shall accommodate #23 AWG cable conductors.
 3. All modular cross-connect panels shall be UL-listed.
- E. Data Outlets
1. Universal eight position jack pin/pair assignments.
 2. Jack shall match the rating of the cable plant. Category 5e for remodels, Category 6 for new construction.
 - a. Data: Electric White
 3. Outlet faceplate must match existing, for new construction will match the electrical outlets.
- F. Equipment Rack(s) and Wire Management
1. 1'-7" (19") X 7'-0" relay racks are to be used for mounting and termination of inter-building and intra-building fiber optic/copper cables and components.
 2. The racks shall have adequate horizontal and vertical cable management for the 8P8C patch panels and switches.
 3. Racks with active electronics shall have horizontal rack-mounted power strips.
- G. Cable Support
1. Cable hooks shall be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions
 2. Cable hooks shall have a flat bottom and provide a minimum of 0'-1.625" cable-bearing surface.
 3. Cable hooks shall have 90° radius edges to prevent damage while installing cables.
 4. Cable hooks shall be designed so that the mounting hardware is recessed to prevent cable damage.
 5. Cable hooks for non-corrosive areas shall be pre-galvanized steel. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish.

6. Cable hooks for corrosive areas shall be stainless steel.
7. Cable hooks shall have a stainless-steel cable latch retainer to provide containment of cables within the hook.
8. The retainer shall be removable and reusable.

H. Grounding

1. Communications Grounding Conductors: Copper American Wire Gauge (AWG) wire of the following sizes.
 - a. Bonding Conductor for Telecommunications (BCT): #4/0
 - b. Telecommunication Bonding Backbone (TBB): #3/0
 - c. Telecommunications Equipment Bonding Conductor (TEBC): #4
 - d. Rack Bonding Conductor (RBC): #6
2. All new construction will have a Telecommunications Main Ground Busbar (TMGB). It will:
 - a. Use pre-drilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors.
 - b. Sized for the immediate requirements and allow for 25% growth.
 - c. The minimum dimensions shall be 0'- $\frac{1}{4}$ " thick X 0'-4" wide X 2'-0" long.
 - d. Contain (2) tiers of pre-drilled holes for use with standard sizes of two-hole copper compression lugs.
 - e. ASTM-B187-C11000 Copper bar suitable for use with two-hole compression-type copper lugs.
3. All MDF/IDF rooms will have a Telecommunications Ground Busbar (TGB). It will:
 - a. Use pre-drilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors.
 - b. Sized for the immediate requirements and allow for 25% growth.
 - c. The minimum dimensions shall be 0'- $\frac{1}{4}$ " thick X 0'-4" wide X 1'-0" long.
 - d. Contain (2) tiers of pre-drilled holes for use with standard sizes of two-hole copper compression lugs.
 - e. ASTM-B187-C11000 Copper bar suitable for use with two-hole compression type copper lugs

I. Cable Television

1. Cable Television wiring is no longer installed in AISD facilities

PART 3 EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. During the design phases of the project, the design team must submit, at a minimum, a copy of the 75% Construction Documents to AISD Network Support Services for their review and approval.

- B. Within ten business days of the notice of bid selection from AISD Purchasing the Contractor will complete Attachment A and submit it to the AISD Network Support Services for Approval.
- C. Once Attachment A has been approved by AISD Network Support Services the Technology Consultant will schedule a site survey within 30 days with the Owner and the Contractor.
- D. The Contractor will walk the job site with the Owner and their representative to go over any potential risks or any other known issues with the project within ten (10) days of the Notice to Proceed.
- E. After walking the site with the Owner or their representative, the Contractor will submit a Bill of Materials and any needed design changes to Owner. After the completion of the site survey, the Technology Consultant will schedule a meeting with the Owner and the Contractor to discuss the project schedule, Contractor expectations, and Attachment A.
- F. The Contractor must have an employee on site to receive the delivery of the shipments at their location. All shipments sent to AISD will be refused and returned at the Contractor's expense.
- G. During the Installation of the Project, the Owner or their representative will perform periodic Quality Assessments to ensure that the Project is progressing as needed.
- H. Three weeks prior to completion, the Contractor will notify AISD Network Support Services so the Owner will have sufficient time to schedule the resources that they must have to complete the final Quality Assurance checks once the work has finished.
- I. Prior to acceptance of the Project by the Owner, the Contractor shall have completed the following:
 - 1. Submitted As-Built Documentation based on the installation both in PDF format and editable AutoCAD format. All technology cabling should be included in a separate CAD "technology layer" in the comprehensive AutoCAD As-Built Documentation delivered to AISD.
 - 2. Test results for all installed structured cabling, both in softcopy format (Excel based) and hardcopy printed documentation.
 - 3. Executed warranties from all installed manufacturers.
 - 4. Written certifications attesting the completion of the work installed.

3.2 GENERAL REQUIREMENTS

- A. In the installation of this work, the Contractor shall comply in every way with the requirements of local and City of Austin laws, ordinances, and rules, the laws of the State of Texas, the National Board of Fire Underwriters, and the National Electrical Code. If in the opinion of the Contractor, there is anything in the plans or specifications that will not strictly comply with the above laws, ordinances, and rules, the matter shall be referred to the attention of the Architect/Engineer for a decision before proceeding with that part of the work.
- B. No change in the plans or in the specifications, drawings or construction documents shall be made without full consent in writing from the AISD Network Support Services.
- C. The Contractor shall review the specifications and all associated drawings and construction documents for the location and quantity of drops.
- D. The Contractor shall provide and install a separate J-hook for each cable type (backbone, horizontal, data, video, clock, public address system, speaker, etc.) and shall size the j-hooks for

50% growth. Care must be taken to route STP cabling (PA) away from telephone and data cabling to avoid interference.

- E. The Contractor is responsible for the establishment of all cable pathways supported by J-hooks and as such shall coordinate pathways with all other disciplines. Under no circumstances shall J-hook pathways for communications cable plant be used to support other low-voltage applications such as HVAC, Fire Alarm, etc.
- F. Cable pathways shall be independent of other disciplines and services and shall not touch or be supported by other disciplines or services (i.e., water pipes, electrical pipes, duct work, all-thread, building structure, etc.)
- G. The Contractor shall submit data sheets to the AISD Construction Management or its representatives, for all materials within ten business days of receiving a noticed bid award. Work cannot proceed until the submissions have been approved by AISD Construction Management or its representative.
- H. The Contractor shall not exceed the maximum pulling tension of the manufacturer during the installation of any cable.
- I. All cable used indoors shall be Plenum-rated and shall meet 1996 NEC Article 800 Type CMP Specifications for UTP and NEC Article 770 Type TIA-568 Cays Cu

- D. Contractor shall provide installation in accordance with these written specifications and the installation requirements, recommendations, and guidelines of the product’s manufacturer.
- E. Contractor shall provide in addition to Division 1 requirements, an itemized listing of all equipment, materials, and labor required for the installation of the Communications Cable Plant.
- F. The communication cable plant installation shall include all extended product warranties and assurance warranties offered by the Contractor and Manufacturer.
- G. The Contractor shall be an Authorized Installer for the Manufacturer that they propose in their bid documents, prior to submitting Attachment A. They shall not sub-contract any part of their work without the prior approval of the Owner.
- H. The Contractor must have on staff a full-time BICSI RCDD (Registered Communications Data Designer) to oversee all work.
- I. Installers must be trained and experienced on the specific installation, termination, and testing of the systems that they will install.
- J. The Contractor will have a BICSI Certified Technician on site at all times work is performed.

3.6 CABLING INSTALLATION REQUIREMENTS

- A. All cables shall be installed and terminated in accordance with manufacturer's specifications, guidelines, and requirements. In the case of any discrepancy between these specifications, the Contractor shall immediately bring the discrepancy to the attention of AISD Network Support Services Department or its representative for resolution before proceeding with that portion of the work.

- B. 8 position 8 contact (8P8C) Jack Pin Assignments for all horizontal cable shall match the T-568B wiring scheme.

Pin	T-568B pair	T-568B color
1	2	white/orange stripe
2	2	orange solid
3	3	white/green stripe
4	1	blue solid
5	1	white/blue stripe
6	3	green solid
7	4	white/brown stripe
8	4	brown solid

- C. Data and video cable pathways in classrooms, administrations areas, etc., shall be provided with wall boxes and conduit extending above the applicable areas to an accessible ceiling. The Contractor will also place a string inside the conduit, secured on both ends.
- D. Data drops must include the patch cable if not provided by the data infrastructure subcontractor. The patch cable will match the TIA Category for the wire that has been installed. I.e. Cat 6 cable will have Cat 6 patch cables.

- E. All cables, jacks, patch panels, faceplates, punch down blocks, LIUs, racks and other associated equipment with the cabling system shall be clearly labeled with a unique identification system. Additionally, they will match the ANSI/TIA performance rating for the cable or fiber installed.
- F. All labels shall be a waterproof permanent label with an identification number indicating wiring closet letter and drop number.
- G. Cables in MDF/IDF closets shall be labeled to clearly indicate the locations at the far end.
- H. Labels must be machine generated (i.e. Brady type).
- I. All cable drops shall be within 3 feet of a power source.
- J. All cable used indoors shall be Plenum-rated and shall meet 1996 NEC Article 800 Type CMP Specifications for UTP and 1996 NEC Article 770 Type OFNP specification for non-conductive fiber optic cable.
- K. All cable shall be installed to meet the code and ratings for the environment that it is installed in.
- L. All voice and public-address trunk cables shall be provided with 50% spare pair count capacity.
- M. All data patch panels, voice punch block, and termination blocks shall be provided with 25% spare pair port count capacity.
- N. Cables shall not be tied directly to any building structure and shall be properly supported always using Industry Standard TIA-569 owner approved cable supports such as cable tray, j-hooks, conduits, sleeves, etc.
- O. All J-hooks shall be installed four (4') to five (5') feet on center, using the only manufacturer approved installation methods and materials.
- P. Tie wraps are not to be used on data cable at all, Velcro only in closets.
- Q. Cables shall maintain the following minimum clearances:
 - 1. Fluorescent Lighting: 12 inches
 - 2. Neon Lighting: 12 inches
 - 3. Unshielded Power Cable: 12 inches
 - 4. 2 kVA or less: 5 inches
 - 5. Above 2kVA: 39 inches
 - 6. Transformers: 39 inches
- R. All cable penetrations through walls or floors into rooms shall be sleeved and filled with a re-entenable intumescent fire-retardant putty following the NEC and NFPA standards to maintain the

- S. Cabling concealed by drop tile ceilings shall be run in bundles of a convenient size for ease of installation and shall be supported per TIA-569 standard practices (e.g., conduits, j-hooks) from roof structures, joints, or other building structural members. In no case, shall cable be supported from below by contact with the ceiling system.
- T. Horizontal cabling shall not be exposed where drop ceilings are not available. Cables shall be routed within molding or wall mounted ducts that are securely mounted to permanent structures by mechanical fasteners. Such molding or ducting shall be located to minimize its visual impact.
- U. In areas where drywall construction has been used, vertical cable runs must be run within the wall and not use surface mount molding, or ducts. Power poles should be avoided unless specifically approved by AISD Network Support Services or its representative.
- V. Cables shall not exceed the maximum bend radius of the manufacturer during the installation of any cable.
- W. No more than two (2) 90-degree bends shall occur in a single cable pulling operation. In cases where two (2) 90-degree bends are required, multiple pulling operations shall be performed.
- X. An appropriate cable grip as specified by the manufacturer shall be used for installing cables.
- Y. All cable shall be hand pulled. No cable winches shall be permitted.
- Z. Exposed cables must be protected with overvoltage and/or sneak current protection. When wire pairs from the outside and the cable in which they reside are exposed to lightning, power contact, power induction or ground potential rise, it is necessary to apply electrical protection devices at both ends of the cable.
- AA. Cables demolished due to construction must be removed completely including disconnect from the patch panel and removal of the associated patch cable and panels as necessary.

3.7 MDF/IDF ROOMS

- A. All cable shall be supported inside the MDF and/or IDF via ladder rack either mounted overhead or vertically on the perimeter walls.
- B. Facilities with multiple floors require strain relief for the cable installed in the riser by means of a cable raceway
- C. All cables, jacks, patch panels, faceplates, punch down blocks, LIUs, racks and other associated equipment with the cabling system shall be clearly labeled with a unique identification system. Additionally, they will match the ANSI/TIA performance rating for the cable or fiber installed.
- D. All cables, equipment racks, ladder racks, External IDF, Portable IDF, lightning protection blocks, etc. shall be grounded and bonded per ANSI/TIA-607.

3.8 SYSTEM REQUIREMENTS

- A. Cabling Requirements
 - 1. All cable must have the appropriate jacket rating for the environment that it is installed in.
 - 2. All cable will be installed as a home run to the designated MDF/IDF Room.
 - 3. No cable will be spliced.

4. Cabling should be designed to accommodate 25% growth.
5. All cable will have a 6" service loop unless otherwise noted.
6. All patch panels must be rack-mounted.
7. All 568 C rated cable must not exceed 275' in length.
8. All cable for new construction shall be 4-pair, Category 6 Unshielded Twisted Pair (UTP) cabling meeting or exceeding TIA standards for rates up to 1.2 Gb/s.
9. All cable for existing facilities and/or renovations shall be 4-pair, Category 5e Unshielded Twisted Pair (UTP) cabling conforming to the existing cable plant.

B. Intra-Building Cable Plant

1. Backbone Fiber Optic Cable – Data

- a. All fiber optic cable shall be 50/125 um Multi Mode of the appropriate type for length.
- b. All fiber optic cable shall have the appropriate jacketing for the environment, usage, and location where the cable is installed. Plenum rated inside of the building. Armored and OSP rated for exterior applications or where flooding is possible.
- c. All fiber optic cable shall be home run from the MDF to each applicable IDF.
- d. All fiber optic cable shall be installed with twenty (20) feet of service loop provided at both ends left coiled and secured in the ceiling. Individual cable service loops should be separated, secured by tie wraps and left on the cable tray provided above the lay-in ceiling.
- e. No fiber optic cable shall be longer than 2 kilometers.
- f. All fiber optic cables shall be terminated with ST type connectors in rack-mounted fiber optic Lightguide Interconnection Units (LIU) with a fan-out kit and all panels, covers, connectors, couplings, and blanks installed in each applicable MDF and/or IDF.
- g. All LIUs shall be sized to accommodate 100% growth.
- h. All rack-mounted LIUs shall be installed in 19" x 84" floor mounted open relay racks inside the applicable MDF and/or IDF.
- i. For fiber optic cable, only fusion splicing will be permitted.

2. Backbone High-Pair Count Copper Cable

- a. 100 balanced twisted-pair.
- b. All cable installed shall be rated as appropriate to the environment it is installed in.
- c. Plenum-rated cabling: Cable installed in plenums or air-handling spaces shall meet UL 910 and shall be marked CMP (communications multipurpose plenum) in accordance with the NEC.
- d. Plenum cable shall consist of #24-AWG solid copper conductors insulated with color-coded FEP
- e. ASP-filled multi-pair copper cables shall be utilized for direct buried applications.
- f. All OSP copper cable shall be transitioned to inside cable within 50'-0" of building entry.
- g. The bending radius and pulling strength requirements of all cables shall be observed during handling and installation.

3. Horizontal Cable – Wireless Access Points

- m. All cable shall have the appropriate jacketing for the environment, usage, and location where the cable is installed.
 - n. All end-of-line taps, line extenders, and amplifiers, power supplies, etc. shall be grounded.
 - o. All splicing of PIII.500 coaxial cable shall utilize integral mandrel steel sleeve connectors.
 - p. All splicing outdoors shall utilize heat shrink to keep moisture out.
2. Video Distribution System Backbone (Trunk) Cable
- a. Contractor shall furnish and install coaxial distribution cable. CATV distribution trunk cabling shall be a PIII 500 Plenum CMP and must meet or exceed SCTE attenuation requirements for analog video applications. Under no circumstance shall RG-11 cable be considered backbone/distribution cable.
3. Video Distribution System Drop Cable
- a. Contracto

accordance with the manufacturer's instructions in a weather-tight, secure enclosure. Contractor shall be responsible for safety and security of all AISD furnished materials until the project is complete and accepted by AISD.

6. Video Distribution System AISD Furnished Materials and Equipment
 - a. AISD will furnish television sets and/or video cameras to be used with media carts.

3. All horizontal clock cables shall be installed from each power supply in each respective MDF and/or IDF to each clock served by the respective power supply within each respective MDF and/or IDF wiring boundary. The maximum number of clock faces shall not exceed ten per power supply.
4. All clocks within each respective MDF and/or IDF wiring boundary shall be hall b2 3c.

G. External IDF (EIDF)

1. The EIDF shall be located on the exterior of the main facility and shall provide connectivity between the MDF in the main facility and the portable buildings.
2. The EIDF provides the ability to connect and disconnect portable building easily.
3. The EIDF shall feed no more than four (4) portable buildings.

5. The PIDF serves as the demarcation point for the speakers, telephones and Ethernet switches located inside the portable building.
6. All equipment and terminations provided in the PIDF shall be approved for use in the environment where the PIDF is being utilized.
7. All PIDFs shall be provided with a 12-pair lightning protection block for the voice and public-address system cabling terminations.
 - a. Pairs 1-10 from the portable PIDF are designated voice (no longer applicable in VOIP environment)
 - b. Pairs 11-12 from the portable PIDF are designated PA
8. All Portable voice outlet cable pairs and PA cable pairs must be connected to the PIDF feed cable, EIDF and feed cables to the MDF.

J. Fiber Optic Cable Plant

1. Backbone Fiber Optic Cable – Portables
 - a. All fiber optic cable installed where 62.5/125 um Multi Mode cabling previously exists shall be 50/125 um Multi Mode of the appropriate type for length.
 - b. All fiber optic cable installed where no portables cabling previously exists shall be 50/125 um Multi Mode of the appropriate type for length.
 - c. All fiber optic cable shall have the appropriate jacketing for the environment, usage, and location where the cable is installed.
 - d. All fiber optic cable shall be armor rated fiber optic cable that is clearly identified and tagged as fiber optic cable.
 - e. All fiber optic cable shall be a home run from the MDF to each EIDF and from each EIDF to each PIDF.
 - f. All fiber optic cable shall be installed with twenty (20) feet of service loop provided at both ends left coiled and secured in the ceiling. Individual cable service loops should be separated, secured by tie wraps and left on the cable tray provided above the lay-in ceiling.
 - g. No fiber optic cable shall be longer than 2 kilometers.
 - h. All fiber optic cable from the MDF to each EIDF shall be 24-strands.
 - i. All fiber optic cable from the EIDF to each PIDF shall be 6-strands.
 - j. All fiber optic cables shall terminate in the MDF with ST type connectors in rack-mounted, fiber optic Lightguide Interconnection Units (LIU) with a fan out kit and all panels, covers, connectors, couplings, and blanks installed.
 - k. All LIUs shall be sized to accommodate 100% growth.
 - l. All rack-mounted LIUs shall be installed in 19" x 84" floor mounted open relay racks inside the applicable MDF and/or IDF.
 - m. All fiber optic cables shall terminate in the EIDF and PIDF with ST type connectors in Lightguide Interconnection Units (LIU) with a fan out kit and all panels, covers, connectors, couplings, and blanks installed in each applicable MDF and/or IDF.
 - n. Fiber optic cable shall only be fusion spliced.

K. Backbone High-Pair Count Copper

1. All cable shall be a home run from the MDF to each EIDF and from each EIDF to each PIDF.
2. All copper cable shall be terminated on lightning protection blocks on both ends.

L. Exterior Horizontal Cable

1. All Cable will be rated to the environment for which it is installed in.
2. All 4-pair UTP voice cabling shall be blue.
3. All 4-pair UTP data cabling shall be Electric White.
4. All cables shall be a home run from the applicable PIDF to the applicable workstation outlet within the applicable portable.
5. All voice cables shall be terminated in a 12-pair lightning protection block.

M. Horizontal Cable – Public Address System (Speakers)

1. For renovation of campuses with existing PA systems these standards apply:
 - a. All horizontal public-address system cable in portable buildings shall be a 1-pair, 22 AWG, Shielded Twisted Pair (STP), solid conductor cable with drain.
 - b. All horizontal public-address system cable shall be provided with six (6) foot service loop at each end and at each speaker where daisy-chained left coiled and secured in the ceiling. Individual cable service loops shall be separated, secured by one tie wrap and left on the cable tray provided above the lay-in ceiling.
 - c. The cables shall be terminated on the last two pairs of the 12-pair lightning protection block.
 - d. The shield from each horizontal cable shall be tied together and grounded to the ground bus bar in each applicable portable.
 - e. These cables shall not be terminated by the cable Contractor at the speaker locations but shall be left with six (6) feet of slack for the PA System/Speaker contractor to terminate the cables on the speakers.
 - f. The PA System/Speaker Contractor shall terminate the cables at the speaker location on the ½ watt tap within each classroom or office and 2-watt tap within each large area, etc.
2. For construction of new facilities, IP based PA systems will follow these standards:
 - a. See PA Section for details of IP based Public Address system specifications.
 - b. Standard Cat 5e data cabling will be deployed for new PA system installations.
 - c. All cables shall be a home run from the applicable MDF/IDF to the applicable address port (Pework TwTc

2. For renovation of campuses with existing PA systems the PA cabling is terminated in the MDF or IDF on a 66-block.
3. For construction of new facilities, IP based PA systems will follow use standard data cabling
4. The Public Address System designation shall consist of three fields with a dash between each field.
5. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
6. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
7. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the PA system, it will be D.
8. The fourth field will be a numeric character to identify a specific daisy-chained cable within that daisy-chained group.
9. Example: A035D A036D A037D A038D

F. Clock System Labeling

1. All clocks shall be labeled with the same designation as the clock cables.
2. The clock cabling is terminated in the MDF on a 66-block.
3. The clock system designation shall consist of four fields with a dash between each field.
4. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
5. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
6. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the clock system, it will be C.
7. The fourth field will be a numeric character to identify a specific daisy-chained cable within that daisy-chained group.
8. Example: A035D A036D A037D A038D

G. CCTV Surveillance System Data Drop Labeling

1. All CCTV data outlets shall be labeled with the same designation as the CCTV data drop cables.
2. The CCTV system designation shall consist of three fields with a dash between each field.
3. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
4. The second field shall be a 1 – 3-digit cable number that is unique for that specific wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.

4. The first field shall identify the wiring closet origination of the cable. This field will be a letter of the alphabet with the MDF always being A, IDF 1 being B, IDF 2 being C, IDF 3 being D, etc.
5. The second field shall be a 1 – 3-digit cable number that is unique for a wiring closet. The first cable in a wiring closet shall be 1, the second cable shall be 2, the third cable shall be 3, etc.
6. The third field shall be a 1 – 5-character alphabetic field to identify the system the cable supports. For the clock system, it will be D.
7. Example: A035D A036D A037D A038D

3.10 COPPER CABLE TESTING

2. Testing shall consist of a bi-directional end to end OTDR trace performed per TIA-455-61.
3. Individual connector, splice and fiber insertion loss shall be evaluated using the OTDR trace.
4. Fibers shall be inspected at 250X for Multi Mode and 400X for Single Mode.

D. End-face Image Capture

1. An image of each fiber optic connector end-face shall be taken, recorded and provided as part of the records.

E. Maximum Attenuation

1. Single Mode ISP (Inside) 1.0 dB/km at 1310 nm and 1550 nm
2. Single Mode OSP (outside) 0.5 dB/km at 1310 nm and 1550 nm
3. Multi Mode 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm

F. Test Cords (Jumpers)

1. Testing of the cabling shall be performed using high-quality test cards of the same fiber type and core size as the cabling under test. Use a single patch cord reference for fiber testing.
 - a. OLTS test cords shall be between 3'-3" (1m) and 16'-4" (5m).
 - b. OTDR testing shall be approximately 328'-0" (100m) for the launch cable and at least 82'-0" (25m) for the receive cable. OTDR testing shall be Bidirectional with Pigtails installed.
2. The test jumper, the adapters, and fiber under test shall be cleaned immediately prior to each fiber being tested.
 - a. After cleaning, cleaning solutions shall be given sufficient time to evaporate (approximately 30 seconds) prior to the mating of fiber test jumper to the fiber under test.
3. Test Failure
 - a. Any fiber link that fails these requirements shall be diagnosed and corrected.
 - b. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link meets performance requirements.

G. Acceptable Testers

1. All fiber optic cable links installed shall be tested in accordance with the field test specifications defined in ANSI/TIA-568-C standard.
2. 100% of the installed cable shall be tested and must pass the requirements of ANSI/TIA-568-B. and C
3. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to the Owner's representative in both hard and soft copy.
4. Only BICSI Certified Technicians shall perform all fiber optic link testing.
5. Field test equipment for Multi Mode fiber optic cables shall meet the requirements of ANSI/TIA-526-14A.
6. The light source shall meet the launch requirements of ANSI/TIA-455-50B.

7. Field test equipment for Single Mode fiber optic cables shall meet the requirements of ANSI/TIA-526-7.
8. All fiber optic launch cables and test adapters used for testing shall be of high quality and devoid of excessive wear or exhibit anomalies between strand tests. Test results that indicated anomalies between strands within the same sheath shall be declared a failure unless all strands within the same sheath unconditionally pass testing. The Contractor shall diagnose and repair any fiber optic cable exhibiting strand-to-strand anomalies that result in any test failure(s).
9. The Contractor shall test and certify all fiber optic cable plant with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with unapproved test equipment or tester(s) that are not within their calibration period.
10. The Contractor shall invite the Owner's representative to witness/verify field testing prior to final acceptance. The Owner's representative shall randomly select 5% of the installed links for test verification purposes. The Contractor shall re-test these links in the presence of the Architect/Engineer and the results shall be compared to the previously Contractor submitted test results. If 2% of the verification tests differ in terms of pass/fail from the previously submitted test results, testing shall be declared a failure and the Contractor shall re-test 100% of the installed links with the cost of such tests borne by the Contractor.
11. Fiber optic connector attenuation shall not exceed 0.75dB.
12. Fiber optic splice attenuation (if allowed) shall not exceed 0.3dB.
13. Multi Mode fiber optic cables shall be tested using the following attenuation coefficient parameters:
 - a. 50/125 Multi Mode 850nm < 3.5dB/km
 - b. 50/125 Multi Mode 1300nm < 1.5dB/km
14. Link attenuation for all fiber optic strands shall be calculated using the ANSI/TIA-568-B Standards formula.
15. All Category 6 cable links installed shall be tested in accordance with the field test specifications defined in ANSI/TIA-568-C standard.
16. 100% of the installed cable shall be tested and must pass the requirements of ANSI/TIA-568-C
17. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to the owner or their

ATTACHMENT A

Provide an itemized listing of all equipment and material required to meet the specifications. This listing shall include Part Number, Description, Unit of Measure and Quantity. **Prior to ordering any equipment listed in this attachment, the Contractor must receive approval from the AISD NSS Telecom Manager.**

Part Number	Description	Unit of Measure	Quantity

