Franklin Independent School District Request for Proposal Process

Presented by:

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979.828.7000

RFP Process Tracker

Overview

This RFP is for items that will be purchased for the FISD district. Each item is listed below with specification.

All quotes need to be submitted using the form attached and label 2015 Roland Reynolds Elementary RFP in one email to the above listed email address.

If you have an item that would be a better fit to what we have listed submit that item and explanation.

If you cannot quote all items then just submit quotes for the ones that you can provide.

If you have any question about the items listed email your questions to the above listed email address.

SECTION 00 40 00 – RFP GENERAL INFORMATION

1.01 PURPOSE

The Franklin Independent School District hereby requests proposals from qualified Vendors for providing network equipment for the Franklin Independent School District Additions and Renovations Bond Projects.

1.02 GENERAL INFORMATION

Project scope includes the installation of technology cabling infrastructure, A/V multimedia/IMS systems, CCTV system, and network electronics including wireless and voice systems for the Additions & Renovations at Franklin ISD campuses.

Under no circumstances should the Franklin Independent School District, its staff, its employees, any member of the FISD's Board of Trustees, or any other public official be contacted during the receipt of the RFP and before the awarding of the contract except the Purchasing Office personnel or designated FISD personnel. Violation of this requirement may result in the disqualification of your response from consideration. All communications in regards to the RFP are to be directed to Joe L. Squiers.

All questions must be submitted in writing to Joe L. Squiers jsquiers@franklinisd.net. Questions and their answers will be shared with all RFP participants.

Once the Board of Trustees approves the awarded vendor(s) contract, said vendor(s) shall submit a contract to Mr. Bret Lowry, Superintendent, prior to start of work. The contract period will be through December 31, 2015.

1.03 INTRODUCTION

The Franklin Independent School District (FISD) is located in Franklin, Texas. The District's population is approximately 1,574.

1.04 SUBMISSION REQUIREMENTS.

Responses to the RFP are to be sealed in an envelope and clearly labeled "Franklin Independent School District Additions and Renovations Bond Projects Proposal". Your response must be on the attached excel spreadsheet or it will not be accepted. Any alternate proposal must be in a separate envelope from your main response and clearly marked "Franklin Independent School District Additions and Renovations Bond Projects Proposal Alternate". In addition, your envelope must be marked with the approximate alternate number(s) you are proposing. As an example, should you wish to propose an alternate, you would submit your proposals in two separate envelopes with one marked proposal 1 and the other marked proposal 2. Your written proposal must be received by the office of Joe L. Squiers, Franklin Independent School District, 1216 W FM 1644 P.O. Box 909, Franklin, TX 77856 no later than 2:00 PM on March 9th, 2015. Any proposal(s) received after 2:00 PM shall be returned to the proposer unopened.

1.05 OPENING OF PROPOSAL(S)

Sealed proposals will be publicly opened in the FISD Central Office, or other place designated, after 2:00 PM on March 9th, 2015. At the public opening, proposals will be opened so as to avoid disclosure of contents to competing proposers and kept secret during the process of evaluation and negotiation. All proposals will be open for public inspection after the contract award is made. FISD will attempt to safeguard information identified by the proposer as being proprietary or trade secrets, but cannot guarantee an absolute safeguard.

ALL PROPOSALS MUST BE SIGNED BY PERSONS WHO HAVE LEGAL AUTHORITY TO BIND THE VENDOR.

1.06 WITHDRAWAL OF PROPOSAL(S)

A proposal may not be withdrawn or canceled by the proposer without the permission of the FISD for a period of ninety (90) days following the date designated for receipt of proposals.

1.07 PAYMENT PROCEDURES

i. Terms: Unless stated otherwise in the contract between the Owner and the Contractor, The Owner shall pay the Contractor on a monthly basis for work completed, based on inspection and sign-off by the Owner or Owner's Agent, up to eighty percent (90%) of the total contract amount. The remaining ten percent (10%) shall be paid upon Final Acceptance.

ii. Application: Payments to the Contractor shall be made only after the Contractor has issued the proper Application for Payment. Pay request must be on the Consultant's supplied AIA form(s). Contractor's Application for Payment must be provided on AIA Document G702 with AIA G703 support pages. In accordance with governing AIA Document A201, Fifteenth Edition, 1997. The Owner or Owner's representative must review and sign the Contractor's Application for payment prior to payment being issued. Contractor's payments shall not be processed if any of the following conditions exist:

a. Contractor's submittals are not provided or current as required herein.

b. Contractor's work is not in compliance with the specification.

c. Application for payment has not been submitted on the proper form and with required support documentation Contractor shall submit for approval by the Owner and a "Schedule of Values" on the form AIA G-703 prior to the first application for payment. Retainage shall be 5% of the scheduled contract value for each item listed in the "Schedule of Values". "Schedule of Values" shall include separate lines for each category of the work with separate values for materials and labor

1.08 NEGOTIATIONS

Negotiations may be conducted with responsible proposers who submit proposals that are reasonably susceptible of being selected. Companies selected for final negotiation will be notified when to appear for revisions to proposals. Revisions to proposals may be permitted after submission and preparatory to receipt of the best and final offers. All proposers will get fair and equal treatment for revision of proposals. Oral negotiations must be confirmed in writing prior to contract award. However, contract award may be made without any negotiation of proposals.

1.09 PROPOSAL SELECTION

Criteria for awarding the contract are as follows:

(A) Ability of the proposer to meet the District's requirements.

(B) Ability of proposer to provide the services required.

(C) Effective administration of the contract.

(D) Pricing is important in the context of value.

(E) Special consideration will be given to those proposers willing to commit contractually to reasonable performance standards.

(F) The best value to the District.

1.10 EVALUATION FACTORS

A committee of FISD personnel will consider many objective and subjective evaluation factors (of which price is only one factor) including, but not limited to the following: (not listed in order of priority)

(A) Cost.

(B) Services afforded in relation to cost.

(C) Completeness of proposal.

(D) Reputation and experience of the proposer.

(E) Operational strength of the proposer.

(F) Geographic coverage of the FISD area.

(G) Ability to meet District's anticipated needs.

(H) HUB status

(I) Proximity to District

(J) Past relationship with District

(K) Value-added services

(L) Vendor's ability to provide complete technology services (all technology systems included in RFP).

1.11 AWARD OF THE CONTRACT

The award of the contract shall be made to the responsible proposer(s) whose proposal is determined to be the best evaluated proposal resulting from negotiation taking into consideration the relative importance of price and other evaluation factors set forth in Section 1.9. All proposals submitted in accordance with the requirements of the RFP shall be considered offers to contract on the terms contained in the proposal and in this RFP and at the price offered by the successful proposer. Proposer agrees that this offer shall be valid and effective for a minimum of ninety (90) days from the date that proposals are opened by the FISD. When the FISD awards a contract to the successful proposer, it will constitute an

acceptance of that offer as subsequently amended by contract. Once the contract is awarded, no substitution of products on the orders will be allowed without specific written consent from the Superintendent or designee. An approval for substitution on one order does not equate to automatic approval for substitution on subsequent orders. Application of the product must be reviewed for each project, job, and use.

1.12 RESERVATIONS

The Franklin Independent School District expressly reserves the right to:

(A) Waive any immaterial defect, irregularity or informality in any proposal.

(B) Reject or cancel any proposals, or parts of any proposal.

(C) Reject all proposals.

(D) FISD reserves the right to select the proposer who will offer contractual items and conditions most favorable to the FISD.

END OF SECTION

SECTION 00 41 00 – GENERAL CONDITIONS

1.01 TERMS OF PAYMENT

Funds for completed purchase orders concerning this contract will be available within thirty (30) calendar days of completion and acceptance by the District. No charge, in addition to the item price, shall be made by the vendor for placing or invoicing materials. The delivery by vendor shall be accompanied by a set of commercial invoices (one original and one duplicate copy) on the vendor's regular invoice form. The District will allow for progress payments using standard AIA application forms.

1.02 DEFAULT

The District reserves the right to terminate the contract in case of default of the successful bidder.

1.03 DELIVERY REQUIREMENTS

The contractor shall complete delivery of the removal services named within a reasonable number of calendar days of issuance of the purchase order which has been mutually agreed upon.

Shipping and handling costs must be included in the bid price. If the shipping and handling costs are not included in the bid price of each item, the bid cannot be fairly compared and evaluated and it WILL NOT be considered due to being NOT AS SPECIFIED. Upon failure to deliver the supplies ordered within the mutually agreed upon calendar days, the vendor shall be considered in default.

1.04 INSPECTION REQUIREMENTS

Final inspection shall be made at the site after delivery. In case of rejection of removal services because of failure to meet contract requirements, the vendor shall, without charge, promptly remove such rejected or damaged removal services and replace it by delivering the same inspection point, removal services which meets the contract requirements without any additional expense to the owner for freight or other charges.

1.05 INVOICING

No charge, in addition to the contracted value, shall be made by the vendor for delivering, placing, or invoicing materials. The delivery by vendor shall be accompanied by a set of commercial invoices (one original and one duplicate copy) on the vendor's regular invoice form.

1.06 DELAYS & DEFAULTS

In case of default of the successful bidder, the District reserves the right to terminate the contract and to purchase equal in the open market to meet FISD's requirements, and withhold (or bill for)

$500.00 per deliverable as liquidated damages or to exercise any other remedy available under the law or in equity. A deliverable is defined as a specific contract line item (i.e., module, service, training, etc.) that is identified to be in place by a certain time, to do or provide a certain function.

1.07 COMPLIANCE REQUIREMENTS

Items below apply to and become a part of the terms and conditions of proposals unless superseded by any attached terms and supplemental conditions:

(A) Contract Work Hours and Safety Standards Act, Section 103 and 107 (40USC327-330). For contracts awarded by the school district for $2,500.00 or more, the successful bidder and subgrantees must comply with section 103 and 107 of the Contract Work Hours and Safety Standards Act (40USC327-330) as supplemented by Department of Labor Regulations (29CFR, Part 5) Section 103. Each contractor is required to compute wages of every laborer and mechanic on the basis of a standard workday of eight hours and a standard workweek of 40 hours. Work in excess of eight hours per day or forty hours per week shall be compensated at a rate of not less than 1-1/2 times the basic rate of pay. No contractor may require a laborer or mechanic to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health and safety as determined under construction, safety, and health standards promulgated by the Secretary of Labor.

(B) Equal Employment Opportunity Act. For contracts awarded in excess of $10,000.00 by the school district, the successful bidder and their contractors or subgrantees must be in compliance with executive order 11246 "Equal Employment Opportunity" as amended by executive order 11375, and as further supplemented in Department of Labor Regulations (41CFR, Part 60), executive order 11246, as amended, prohibits job discrimination because of race, color, religion, sex, or national origin and requiring affirmative action to ensure equality of opportunity in all aspects of employment.

(C) Equal Opportunity and Affirmative Action Employer. Neither party shall discriminate because of race, color, religion, sex, age, national origin, handicap, or status as a Vietnam Veteran, as defined and prohibited by applicable government law, in the recruitment, selection, training, utilization, promotion, termination, or other employment related activities concerning personnel. In addition, bidder affirms that it is an equal opportunity and affirmative action employer and shall comply with all applicable federal, state, and local laws and regulations including, but not limited to, Executive Order 11246 as amended by 11375 and 12086; 12138;

(D) 11625; 11750; 12073; the Rehabilitation Act of 1973, as amended; the Vietnam Era Veterans Readjustment Assistance Act, 1975; Civil Rights Act of 1964; Equal Pay Act of 1963; Age Discrimination in Employment Act of 1976; and Public Law 95-507. Energy Policy and Conservation Act (P.L. 94-163). Successful bidders must comply with mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (P.L. 94-163).

(E) The successful bidder must agree to provide to the school district, the Texas Education Agency, the Comptroller General of the United States, or any other duly authorized representatives access to any books, documents, papers, and records of the contractor which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts, and transcriptions. The successful bidder must also agree to maintain all required records for five (5) years after the school district makes final payment and all other pending matters are closed.

(F) For any construction or remodeling contract that is expected to exceed $2,000, you must comply with the requirements of the Davis-Bacon Act and obtain Federal wage determination rates from the U.S. Department of Labor for all applicable trades before bid solicitation and contract award. The U.S. Department of Labor determines prevailing wage rates to be paid on federally funded or assisted construction or renovation. A minimum of 120 days before the date for advertisement of bids, you must obtain the U.S. Department of Labor applicable wage determination rates.

1.08 LEGAL REMEDIES

In case of default of the successful bidder, the District reserves the right to terminate the contract and to purchase equal in the open market to meet FISD's requirements, and withhold (or bill for) $500.00 per deliverable as liquidated damages or to exercise any other remedy available under the law or in equity. A deliverable is defined as a specific contract line item (i.e., module, service training, etc.) that is identified to be in place by a certain time, to do or provide a certain function. The bidder agrees that this is a reasonable cost to compensate FISD for time and effort involved in procuring replacement products, goods, or services, which cost would be difficult, if not impossible, to compute with certainty, and does not constitute a penalty. Assessment of liquidated damages does not preclude FISD

from seeking and obtaining other remedies as set forth in this solicitation or any other remedy at law or in equity available to FISD.

The District may terminate this contract and suspend future business with the vendor for cause, to include, but not limited to, the following reasons:

(A) Lack of funds by the District. Lack of funds includes, but is not limited to, non-appropriation and/or non-availability of funds.

(B) Non-compliance of all federal regulations including, but not limited to the "Contract Work Hours and Safety Standards Act", "Equal Employment Opportunity Act:, and the "Energy Policy and Conservation Act" by the grantee.

(C) Failure to meet proposal conditions as determined by FISD.

(D) Failure of the proposer to deliver item(s) within a specified time.

(E) Delivery of items on two (2) or more occasions that are rejected pursuant to paragraph 2.5.

(F) Breach of warranties or service agreements.

(G) Breach by bidder of any term or condition of the contract.

(H) Proposer becoming insolvent or committing acts of bankruptcy.

(I) Any attempt by the successful proposer to misrepresent the product or service. (i.e., listing a product as the product ordered on the statement of charges and shipping a non-approved alternate)

(J) Any unethical business practice, or attempt to misrepresent or commit fraud against Franklin Independent School District. Notwithstanding any language to the contrary herein, the parties specifically agree that either party may terminate this contract upon 45 day written notice to the other party. Said termination may be for cause or at the discretion of either party.

1.09 INSURANCE REQUIREMENTS

The successful bidder, or proposer, shall, at his/her own expense provide and maintain insurance in a company rated no less than A by A.M. Best and Company, and in a

company licensed to sell insurance as an "admitted carrier" in the State of Texas. Said insurance shall be evidenced by a Certificate of Insurance, delivered to the District, indicating the limits of coverage, and naming the Franklin Independent School District as an additional named insured on all policies. Coverage and limits of liability shall be as follows:

Workers' Compensation		**Statutory**
Employers' Liability –	**B.I. by accident**	**$500,000/accident**
B.I. by disease	**$500,000/person**	
B.I. by disease	**$500,000/aggregate**	

General Liability	**$1,000,000 aggregate**
$1,000,000 products/comp. ops	
$ 500,000 pers. inj./adv. lia.	
$ 500,000 per occurrence	
$ 100,000 fire damage	
$ 10,000 medical expense	
Automobile	
Bodily Injury	**$ 250,000 per person**
$ 500,000 per accident	
Property Damage	**$ 250,000 per accident**

Or

Combined Single Limit	**$ 750,000 per accident**
Hired & Non-Owned Auto	**same limit as owned autos**

1.10 INDEMNIFICATION

Except as otherwise expressly provided, bidder shall defend, indemnify, and hold FISD harmless from and against all claims, liability, loss and expenses, including reasonable costs, collection expenses, and attorney's fees incurred, which arise by reason of the acts or omissions of bidder, its agents or employees in the performance of its obligations under this contract. This clause shall survive termination of this contract.

1.11 WORKERS COMPENSATION

The successful bidders on all construction contracts are required to carry Worker's Compensation

Insurance on its employees and perform services as shown below:

A. Definitions:

Certificate of coverage ("certificate"). A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

Duration of the project. Includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.

Persons providing services on the project ("subcontractor") in §406.096. Includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contacted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes

persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to the project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

B. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the contract providing services on the project, for the duration of the project.

C. The contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

D. If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

E. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

1. A certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have a file certificates of coverage showing coverage for all persons providing services on the project; and

2. No later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

F. The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

G. The contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any

change that materially affects the provision of coverage of any person providing services on the project.

H. The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing service on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

I. The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

1. Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;

2. Provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

3. Provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

4. Obtain from each other person with whom it contracts, and provide to the contractor:

a. A certificate of coverage, prior to the other person beginning work on the project; and

b. A new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

5. Retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

6. Notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affect the provision of coverage of any person providing services on the project; and

7. Contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.

J. By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

K. The contractor's failure to comply with all of these provisions is a breach of contract by the contractor which entitles the governmental entity to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

1.12 PAYMENT & PERFORMANCE BOND

A payment and performance bond, equal to 100% of the proposal value must be received before the work can begin. Insurance and bonds shall be underwritten by a company rated not less than AVII in A. M. Best's latest published Best's Key Rating Guide.

END OF SECTION

SECTION 00 42 00 – SPECIFICATIONS, RESPONSE & CERTIFICATION FORMS

1.01 GENERAL SPECIFICATIONS

MINIMUM SPECIFICATIONS

FOR

ADDITIONS AND RENOVATIONS

GENERAL CONDITIONS:

This is a request for a quote for cabling, A/V, and network electronics equipment as specified in the attached file(s) for the Franklin Independent School District. Please respond to this quote as well as include line item options for installation to include physical placement, installation, configuration and implementation. This equipment will be installed on campuses and support buildings within the Franklin ISD.

Please provide your deepest discounted price for Panduit, SchoolView, and Cisco hardware, equipment, software and SmartNet maintenance for all items listed. Line item options are requested and responses for equipment and installation will be accepted. It is also requested that line item optional pricing be provided for additional years of SmartNet maintenance on a per year basis.

There will be NO SUBSTITION ALLOWED for equipment and no third-party maintenance offers will be considered. All equipment MUST be quoted FOB Destination so we know the pricing is all based on the same factors and all quotes must be for new equipment. The pricing MUST include S&H. Your response must be on the attached excel spreadsheet or it will not be acceptable.

This quote may be awarded to one or more vendor(s). The preference is to have one (1) technology provider and FISD will decide which award will be most advantageous to the district. Upon award of contract, said vendor(s) shall submit a contract to Mr. Bret Lowry, Superintendent, prior to start of work. The new equipment will be installed in accordance with a project plan to be developed between the Franklin ISD and the awarded vendor(s).

The bidder shall note in writing any deviations from the specifications and shall submit those changed specifications as alternates.

1. The following documents are to be attached to and made part of this bid:

(a) Response Forms to include excel spreadsheet(s).

(b) Felony Conviction Notice.

(c) List of at least three references on the attached form.

REFERENCES

2. Please provide reference information by completing the following:

A. Reference 1:

Company Name: _____

Company Address: _____

Point Of Contact: _____

Telephone Number: _____

Type of Service Provided: _____

Length of Service Provided: _____Years_____

B. Reference 2:

Company Name: _____

Company Address: _____

Point Of Contact: _____

Telephone Number: _____

Type of Service Provided: _____

Length of Service Provided: _____Years_____

C. Reference 3:

Company Name: _____

Company Address: _____

Point Of Contact: _____

Telephone Number: _____

Type of Service Provided: _____

Length of Service Provided: _____Years_____

1.02 RESPONSE FORM-FISD ADDITIONS AND RENOVATIONS

Due to the nature of this RFP, facsimile or electronic version of proposals is not accepted. Please complete and print out the attached excel document and attach to the required forms of this proposal.

1.03 PROPOSER CERTIFICATION FORM – FISD ADDITIONS AND RENOVATIONS

The undersigned Proposer, by signing and executing this proposal certifies and represents to

Franklin Independent School District (FISD):

1) The Proposer, has not offered, conferred or agreed to confer any pecuniary benefit, as defined by TEX.PENAL CODE ANN.S218, or any other thing of value, as consideration for the receipt of information or any special treatment or advantage relating to this proposal.

2) The Proposer has not offered, conferred or agreed to confer a pecuniary benefit or other thing of value as consideration for the recipient's decision, opinion, recommendation, vote or other exercise of discretion concerning this proposal;

3) The Proposer has neither coerced nor attempted to influence the exercise of discretion by any officer, trustee, agent or employee of the FISD concerning this proposal on the basis of any consideration not authorized by law;

4) The Proposer has not received any information not available to all other Proposers so as to give the Proposer a preferential advantage with respect to this proposal:

5) The Proposer has not violated any state, federal or local law, regulation or ordinance relating to bribery, improper influence, collusion or the like and that the Proposer will not in the future offer, confer, or agree to confer a pecuniary benefit or other thing of value to any officer, trustee, agent or employee of the FISD in return for the person having exercised the person's official discretion, power or duty with respect to this proposal:

6) The Proposer has not now and will not in the future offer, confer, or agree to confer a pecuniary benefit or other thing of value to any officer, trustee, agent or employee of the FISD in connection with information regarding this proposal, the submission of this proposal, the award of this proposal, or the performance, delivery or sale pursuant to this proposal.

COMPANY NAME _____

SIGNED: _____

PRINTED NAME: _____
TITLE: _____

ADDRESS: _____

TELEPHONE: _____FAX: _____

DATE SIGNED: _____

1.04 FELONY CONVICTION NOTIFICATION – FISD ADDITIONS AND RENOVATIONS

State of Texas Legislative Senate Bill No. 1, Section 44.034, Notification of Criminal History, Subsection (a), states "a person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony."

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

THIS NOTICE IS NOT REQUIRED OF A PUBLICLY-HELD CORPORATION

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

VENDOR'S NAME: _____

AUTHORIZED COMPANY OFFICIAL'S NAME (PRINTED):
_____

A. My firm is a publicly-held corporation, therefore, this reporting requirement is not applicable.

Signature of Company Official: _____

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

Signature of Company Official:_____

C. My firm is owned or operated by the following individual(s) who has/have been convicted

of a felony:

Name of Felon(s): _____

Details of Conviction(s): _____

Signature of Company Official: _____

This form must be completed and submitted with your bid or your bid may be rejected.

END OF SECTION

SECTION 00 43 00 – BID FORM

Franklin ISD – Additions and Renovations

SUBMITTED TO: Franklin ISD

SUBMITTED BY:

_____

Business Name

_____

Address

The undersigned understands and agrees that the Instructions to Bidders, General Conditions and Supplementary Conditions are a binding part of this proposal to perform the Work, and that this Contractor has:

A. Become familiar with the site, site conditions, existing features, access and all related components of the Work.

B. Reviewed the construction documents as prepared by FISD.

C. Reviewed all addenda.

D. Included all work-related items needed to complete the project as provided in the Construction Documents, including construction schedule identified in "Summary of Work".

E. Read, understood, and agrees to the amended AIA General Conditions, Supplementary Conditions and all front end conditions for this project.

1.01 PRICE SUMMARY

A. Base Bid #1 – Premise Cabling Infrastructure (Section 27 10 00 and subsections thereof)

Material **$_____**

Labor **$_____**

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

B. Base Bid #2 – Presentation Systems (Section 27 41 10 and subsections thereof)

1. Complete Schoolview IMS System

Material **$_____**

Labor **$_____**

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

C. Base Bid #3 – Local Area Network and UPS (Section 27 20 00 and subsections thereof)

Material **$_____**

Labor **$_____**

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

D. Base Bid #4 – Voice Systems (Section 27 30 00 and subsections thereof)

Material **$_____**

Labor **$_____**

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

E. Base Bid #5 – Wireless LAN (Section 27 21 33 and subsections thereof)

Material **$_____**

Labor **$_____**

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

F. Base Bid #6 – Security (Sections 27 62 00, 27 00 61 and subsections thereof)

Material **$_____**

Labor **$_____**

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

END OF SECTION

SECTION 27 41 00 - INSTRUCTIONAL MEDIA SYSTEMS (IMS)

PART 1 – GENERAL

1.01 SCOPE-OF-WORK SUMMARY

A. This specification section includes work consisting of Renovations and Additions, in Franklin Independent School District (ISD) for the following project(s):

Franklin Elementary School

B. Described herein are the scope-of-work requirements, criteria, and equipment necessary for the successful Proposer to:

1. Furnish and install campus wide Audio & Video Systems, what is commonly referred to as an Instructional Media System, hereafter referred to as (IMS), with subsystems to include:

    a. IP based Public Address System

    b. Bell & Audio Signaling System

    c. Master & Slave Synchronized Clock System

d. Campus Central Control & Automation System

e. Classroom Audio & Video Media Systems

2. Provide Public Address system with analog 70v distributed common area, corridor and outside loudspeakers.

3. Deliver and install a small venue Performance Sound Reinforcement System for the competition Gymnasium.

4. Deliver and install a multi-channel small venue Performance Sound Reinforcement System for the Cafetorium & Stage with distributed pendant speaker system.

C. The work performed shall be of professional quality and installed in a manner as would typically be delivered by professional Audio &Video Contractors regularly engaged in the primary business of installation of equivalent systems.

D. The Contractor shall provide a 100% performance bond, payable to the Owner, until written acceptance by the Owner of all work and materials. The cost of these bonds shall be included in the Contractor's proposal price by separate line item.

E. The Proposer shall furnish their lump sum price offer to provide a turn-key package in response to the Audio & Video specific work found in the Construction Documents and specifically for the work contained herein.

F. This document is intended to provide the hopeful Vendor/ Contractor, hereafter referred to as Proposer, with information it needs to submit a complete turnkey solution and proposal for The Franklin Independent School District. The Franklin Independent School District shall evaluate the submitted proposals to select a best value Vendor to supply and install the Instructional Media System (IMS) for this project as described herein.

G. The successful (IMS) Proposer shall provide materials & labor to install new equipment as described herein and as depicted in the construction drawings.

H. The Franklin Independent School District shall accept proposals from authorized resellers and desires to have a competitive choice of local authorized resellers / manufacturers' representatives to find the best value for delivery of the systems.

I. The Successful Proposer's responsibilities shall include but are not limited to the following:

1. Provide necessary services to integrate each component into a fully functional package with seamless functionality as described herein

2. Install and make ready for use cabling and devices as described or depicted in the construction package necessary for a complete installation, along with accepted alternates.

3. Integrate into the construction any owner furnished equipment and miscellaneous hardware as may be described herein.

    a. Example: Interactive Video Projector (depending on accepted Alternates).

4. Maintain timely installations according to the project construction schedule.

5. Provide Owner System Training, As-Built documentation, and project manuals as required by this specification section.

1.02 DEFINITIONS

A. General Construction common words, acronyms, and phrases found in this specification and construction documents shall be as defined by and in accordance with AIA Document A201, Fifteenth Edition, 1997

B. Specific special use of common words, acronyms, and phrases found here in this document shall use the following definitions:

1. "Owner" shall refer to the Franklin Independent School District.

2. "Successful Contractor" shall imply the Vendor or Contractor that is awarded the project scope of work described herein and enters into a written contract with the Owner or General Contractor to deliver said work.

3. "Proposer" shall mean Vendor, Contractor or Subcontractor that submits a proposal to deliver the scope of work described in this construction document package.

4. "Lump Sum" shall refer to a total amount to deliver the full scope of work described herein, inclusive of all materials and labor.

5. "Turn Key" shall refer to all work required to provide the full scope of work described herein, inclusive of all materials and labor, and deliver to the Owner a fully functional system.

6. "IMS" shall be an acronym for Integrated Media System

1.03 RELATED DIVISIONS, SECTIONS, AND DOCUMENTS

A. References to the following related documents do not limit or release the Contractor from the responsibility of having the necessary knowledge of other non-referenced related documents that makeup the Construction Document Package.

1. The following are hereby made a part of this Section:
    i. Division 27 documents that collectively make up this Construction Specification Package.

    ii. Section 27-41-00 shall govern the work under this section whether attached hereto or not.

    iii. Section 27-41-00 Submittal Requirements

    iv. Work diagrammatically depicted or noted on Construction Drawings

1.04 RELATED WORK

A. References to the following specific related work does not limit or release the Contractor from the responsibility of coordination with other trades, or from having the necessary knowledge of other related work.

    i. Work by the General Contractor

    ii. Work by the Electrical Subcontractor

B. The IMS Contractor shall examine construction documents for provided Electrical Rough-in.

C. The Project Electrical Contractor shall install electrical rough-in for use by the IMS Contractor. The IMS Contractor shall have the specific responsibility to fully coordinate their needs with the Electrical Contractor for their equipment, including AC Power, Back Box Type & Dimensions, Raceway & Pathways. Needed Electrical back boxes, raceways, and pathways not provided by the Electrical Contractor, but needed for the IMS scope of work shall be the responsibility of the IMS Contractor

1.05 ALLOWANCES

A. The Contractor shall include in their proposal amount a 5% (based on total lump sum proposal) contingency allowance. This allowance shall be shown as a clear line item amount in the proposal and on all cost breakdown documents. Any unused portion at the end of the project shall be deducted from and returned to the Owner in the final application for payment.

1. Use of the contingency allowance shall only be authorized in writing by the Owner and on the proper Change Order to Contract.

1.06 UNIT PRICES

A. The Proposer shall provide unit pricing breakdown for all equipment as a line item materials list submitted with their proposal. In the event the Proposal form does not specifically provide a worksheet for requested unit pricing, the Contractor shall provide the unit price list by separate attachment along with their Proposal.

    1. The unit price may be used to add or deduct, by change order, quantities of units as represented by the unit price.

    2. Failure to provide requested unit prices may result in the rejection of the proposal.

1.07 ALTERNATE &ALTERNATIVE PROPOSALS

Alternates **(Not USED) Typical System Alternates have been made part of the base scope of work. No alternatives will be considered. AMX | SchoolView is the district standard.**

1.08 SUBMITTALS

A. Requirements:

    i. Submittal requirements shall include a full electronic copy in PDF format of all paper document submittals. The PDF Files shall be delivered on DVD or CD format.

    ii. The Contractor shall submit System Shop Drawings as described herein to the General Contractor and Consultant for review within (30) thirty days from the date of the contract. Failure to comply with this requirement may be cause for cancellation of the contract without penalty or cost to the Owner/ General Contractor.

    iii. Contractor shall provide three (3) copies of submittals required by each specific section to Consultant prior to procurement of equipment or commencement of work.

    iv. Present submitted documents in a clear and thorough manner, include original drawings that illustrate diagrammatically Contractor's intent to assemble, construct, fabricate, build, and supply the systems and equipment as described by the collective specifications.

    v. Title each drawing with the Project name, Drawing name, Consulting firm's name and Contractor's name.

    vi. Identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents. Identify field dimensions; show relation to adjacent or critical features of Work or products.

vii. Product Data- submit only pages that are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, capacities; wiring, system, control, and plate diagrams; component parts; finishes; dimensions; and required clearances. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable

viii. Contractor shall not consider the Consultant or Owner's review of submittals to be exhaustive or complete in every detail. Approval of shop drawings or submittals including substitutions indicates only the acceptance of the Contractor's apparent intent to comply with general design or method of construction and quality as specified. The finished product must meet functional requirements, operations, arrangements, and quantities and comply with the contract documents unless specifically approved to the contrary.

ix. Contractor shall be held responsible for delivery of systems as specified any errors or omissions in the submittals shall not relieve said Contractor of responsibility to deliver complete systems as specified, and that fully meet or exceed the minimum requirements set forth by the specifications, drawings and contract documents.

x. The Contractor shall be responsible for deviations in submittals from the requirements of Contract Documents, unless Consultant gives specific written acceptance specifically identifying such deviation. The Consultant shall review and stamp submittals for general conformance to design intent only. This stamped review alone does not imply any specific written acceptance of deviations.

xi. Submittals that, in the Consultant's opinion, are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors shall be returned, without review, for rework and are to be re-submitted.

xii. Submittals of shop drawings and other items shall not be in more than two (2) partial submittals, or as allowed by the Consultant due to the complexity of the systems. If shop drawings are rejected for any reason, Contractor shall correct and resubmit within seven (7) working days. The Contractor shall always be required to obtain stamped approval of submittals prior to any fabrication or installation of equipment.

xiii. The submittals must be received and stamped reviewed by the Consultant prior to procurement of equipment or commencement of work. Any work performed prior to approved submittals is at the Contractor's own risk.

xiv. Failure to obtain shop-drawing approval within forty five (45) days of contract award, where the delay is due to the poor performance of the Contractor, may be

cause for cancellation of the contract without penalty to Owner / General Contractor.

xv. Do not fabricate products or begin work that requires submittals until return of stamped reviewed submittals with Consultant acceptance. If work does progress prior to this the contractor shall have proceeded at his or her own risk.

xvi. Prior to work, corrections and additions, as necessary, shall be made to the design documents and submittals shall clearly show any such changes by a noted cloud around the change

xvii. Submittals shall include at a minimum:

i. Provide complete project material list for each furnished device. The Materials List is required to include the following categories: Quantity provided, Manufacturer, Model number, Description and Value.

ii. Provide 8-1/2" by 11” product catalog specification sheets for each furnished device. The product specification sheets shall be neatly bound in a three-ring binder and divided by manufacturer with tab dividers. The front of the binder shall include a material list as described above. The products shall be organized in the binder such that they match the materials list order. Where more than one item appears on a page, the Contractor shall mark the appropriate item, for easy identification.

iii. The equipment / material list shall identify equipment quantity, equipment manufacturer, equipment model, and equipment description, along with equipment list provide datasheets.

iv. Product Reference Sheets (cut sheets):

v. Construction Drawings:

i. Comprehensive system drawings with device locations overlaid on project floor plans, system schematic diagrams in block format, and detail of all custom fabrications including but not limited to device wall plates. Drawings shall be prepared and submitted on E Size 24” x 36” paper

ii. Drawings shall be executed at an appropriate scale as required to clearly read pertinent detail, but for equipment layouts not smaller than 1/4" = 1'- 0" and the floor plans and reflected ceiling plans not smaller then 1/16” = 1'-0"

iii. The shop drawings shall include: Identification of equipment manufacturer, equipment model numbers, cable types, cable

identification numbers, cable color codes, cable paths, plate and panel details, consoles and enclosure details. Additionally include equipment rack layouts showing locations of all rack-mounted equipment, comprehensive system schematic block diagrams (one-line drawings showing device connectivity), equipment rack elevations and custom fabricated equipment

iv. Shop drawings that depict all devices and device locations to be installed

v. Shop drawings that depict all cabling infrastructure to be installed. Cabling shall be overlaid on floor plan drawings

vi. Comprehensive system schematic wiring diagrams showing detailed point-to-point connections to and between all equipment

vii. Elevation drawings showing intended equipment room layouts

viii. Elevation drawings showing intended equipment rack layouts. The equipment rack layouts shall show locations of all rack mounted equipment and identification of equipment as shown on the system schematic diagram

ix. Detail drawings showing intended fabricated equipment, custom work, and wall plates, etc.

x. Complete wire and cable riser diagram showing path and location of all cable to and between equipment; this cable shall be overlaid on facility floor plan. Include cable types, cable identification numbers and color codes

xi. Plate or panel details

xii. Drawings shall include examples of proposed nomenclature and labeling scheme intended for use in labeling plates, equipment, cables, etc.

xiii. Detail drawings of custom plates or panels

vi. Consoles, enclosures or support tables.

vii. Wire and Cables

viii. The Contractor shall provide their intended Wire and Cable color code strategy for the premise cabling. The Contractor must receive approval of

color code prior to ordering cabling. Example: Data Cat. 5-E (Blue), Data Fiber (orange), Telephone (Green), Audio (Gray), RF (Black), etc.

ix. Provide complete wire and cable riser diagram showing pathways and locations of all wire and cables to and between equipment. The cabling infrastructure shall be overlaid on facility floor plan

x. Owner Training

i. Contractor's proposed owner training plan for installed systems

ii. Training plan shall comply with training requirements herein

xi. Provide complete shop drawings for all systems specified and / or furnished. Each drawing shall have a descriptive title with all parts of each drawing completely described.

xii. All drawings shall have the name of the project Architect, and installing contractor in the title block.

B. RE-SUBMITTALS

1. Assemble re-submittals under procedures specified for initial submittals

2. Identify changes made since previous submittal by clouding or highlighting.

C. SYSTEM DOCUMENTATION

i. Prepare the following system manuals and other information to accompany the finished installed system:

D. System Service Manual shall include the following:

i. Maintenance Instructions: Include clear statements of the terms and coverage period of the Contractor's warranty; Contractor's service department phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes and instructions for the proper use of these maintenance products.

ii. Instructions for Owner to obtain service on installed systems and equipment.

iii. A list of all equipment with manufacturer, model, serial number and physical location, that cross-references to the system schematic diagrams.

iv. A list of correct settings for all semi-fixed controls (this shall be finalized after acceptance testing).

v. Any other pertinent data generated during the project or required for future service.

vi. Manufacturer's Instruction / Technical Service Manuals for all items of equipment, along with manufacturer's warranty statements. Instruction manuals shall be printed originals, not photocopied, unless more copies of a manual are required than the number of units provided. For custom circuits or modifications, provide a thorough description of the purpose, function, specifications, and operation.

E. Warranty Information

i. Warranty information: Include clear statements of the terms and coverage periods for all equipment. Provide Contractor's service department phone number(s) and hours, maintenance schedule and description of products recommended for use in maintenance. Contractor shall complete and deliver to Owner a warranty card for each piece of equipment covered by manufacturer's warranty.

1. CLOSEOUT SUBMITTALS

a. Provide the following system documents prior to the final acceptance walkthrough. System Operations Manual(s)

ii. System Equipment Reference Manual(s)

iii. System Service Manual(s)

iv. As-built Drawings and other Documents

v. Proposed training documentation and materials

vi. Test reports and results

vii. Statements of Contractor’s Warrantee

a. When Contractor considers installation substantially complete, provide to Consultant a written report listing all known system deficiencies compared to specified requirements. Also furnish a timeline for correction of any deficiencies.

b. Contractor shall provide written request, requesting a final acceptance walkthrough and demonstration. This request shall certify Contractor's declaration of completion with the project and that to the best of their knowledge all systems are installed and fully functional and ready for review by Consultant

c. Submit a written report detailing the results of initial adjustments and verification tests including all relevant drawings, charts, and photographs. This report shall be completed and submitted for review at least five (5) days prior to acceptance verification walkthrough by the Owner and Consultant.

d. Submit one complete copy of each manual and other closeout documents for review ten (10) days prior to the final acceptance walkthrough.

e. At the time of the walkthrough, the Contractor shall transfer and turnover to the Owner's or Owner's represent the following: All ancillary and portable equipment such as; microphone cables, patch cables, microphones, camcorders, spare equipment, etc.

f. An installable and actual copy of all software used in the system. Including AMX source code.

g. Passwords

h. Keys

F. After the walkthrough review, make any noted corrections and / or additions required by Consultant. Provide corrected copies of final as-built documents.

G. Closeout Submittals shall be bound in three-ring binders with clear vinyl pockets on cover and spine for title cards with project name and manual volume numbers. Provide table of contents and tabular dividers with legends for each section.

H. Closeout Submittals shall be printed originals, not photocopied, unless more copies of a manual are required than the number of units used in the system. For custom circuits or modifications, provide a thorough description of the purpose, function, specifications, and operation.

I. The System Operations Manual shall assume the reader to be technically inexperienced and unfamiliar with the operation of the system. This manual shall step a user through

common and typical use of each system or subsystem. The manual shall include the following:

a. Overall system operation and instructions

b. Complete and typical operating procedures for the equipment by activity

c. "Quick Setup" instructions for use by inexperienced users working under time pressure

d. The System Equipment Reference Manual

e. Provide an equipment quick reference manual

f. The Contractor may reuse the original submittal of product reference sheets for this purpose. Include a cut sheet for each piece of equipment.

    1. System Service manual shall include the following:

g. A list of all equipment, furnished or installed, indicating manufacturer, model, serial number, and description

h. Warranty information: Include clear statements of the terms and coverage periods for all equipment. Provide Contractor's service department phone number(s) and hours, maintenance schedule and description of products recommended for use in maintenance.

    1. Maintenance Instructions

i. Instructions for the Owner of how to obtain service on installed systems or equipment

j. Original Manufacturer's Instruction / Technical Service Manuals for all items of equipment

k. A list of settings for all semi-fixed controls (to be finalized after Acceptance Testing)

    i. SYSTEM AS-BUILTS

        1. Provide complete and corrected as-built drawings at the time of final system testing and Consultant / Owner demonstration.

        2. Original submittals shall be updated to become As-built drawings at the closeout of the project.

3. Prior to final walkthrough of completed job, Contractor shall supply one (1) corrected as-built set of Drawings showing the work as installed. Consultant, with any necessary noted corrections that may be required, shall return this drawing set to Contractor. Contractor shall have corrected the installation work as noted and have updated the drawings and have them present at final walk-through. Upon final acceptance by Owner, Contractor shall provide five (2) copies of as-built drawings and manuals.

4. Contractor shall also furnish to Owner a copy of the complete set of electronic CAD files, in DFX or DWG format, along with a complete PDF file copy of all As-Builts

5. Include as part of the As-built drawings the original submittals with updates to reflect the actual installed work.

l. Any other pertinent data generated during the project or required for future service

m. System training documents and materials

n. Provide all documents and materials to be used by the contractor for owner training.

1.09 DELIVERY, STORAGE, AND PROTECTION

A. General

a. The Project General Contractor shall have final approval authority for any Subcontractor's needs regarding material Delivery, Storage, and Protection.

b. Installed materials- The installed materials remain the responsibility of the Contractor until the Owner accepts the completed system in writing. The Contractor shall take necessary precautions to ensure the safety of installed materials Delivery

c. The Contractor shall have full responsibility for delivery of all materials needed to meet requirements of the IMS specification package.

d. The Contractor shall coordinate with the General Contractor any delivery requirements they may have

e. Storage of materials shall remain the full responsibility of the Contractor, until the Owner has accepted the work and materials in writing.

f. The Contractor shall coordinate with the General Contractor any need for storage requirements at the site of work.

g. The Contractor shall take necessary steps to protect all materials from:

i. Dents

ii. Scratches

iii. Dust

iv. Temperature

v. Moisture or Weather

vi. Cutting

vii. Other hazardous conditions

h. The Contractor shall replace any damaged material as required by the General Contractor or Consultant.

1.10 PROJECT CONDITIONS

A. Existing Conditions

a. This work is All NEW Construction.

b. The IMS Contractor shall be responsible to closely coordinate with the:

1. Electrical Contractor

2. Data Contractor

c. Electrical rough-ins shall be provided by the electrical contractor, including conduit, raceways and electrical back boxes or box eliminators. Any exceptions shall be specifically noted in the construction document drawings.

d. Locations not requiring electrical rough-ins where (IMS) contractor requires a special device shall be placed in fishable walls. This shall include control system touch panel, push to talk microphone plate, and other device locations noted to need final coordination with the Owner or Consultant

e. In locations where electrical conduits or raceways are shown and not provided by the Electrical Contractor, the installing IMS contractor shall provide their sleeved penetrations, raceways, and cable pathways, including coring as may be required.

1.11 WARRANTY

A. Warranty/Maintenance Program

i. All materials, equipment, parts and labor shall be guaranteed (warranted) for a minimum warranty period of two years (24 months).

ii. Warranty period shall begin immediately following the date of final acceptance in writing by Franklin Independent School District and / or project Consultant.

iii. During the first two (2) year Warranty period all warranty repairs shall include parts & labor.

iv. The Proposer shall, upon notification of any malfunction, make the necessary repairs, including labor and materials, at no cost to Franklin Independent School District.

B. Contractor's Warranty shall include the following provisions:

i. Contractor's statements of long-term commitment to the sales and service of their products in the project's geographic location.

ii. The Contractor shall warrant that the system(s) shall be provided free from defects and shall perform under usual usage and with continued service for a period of two years after written final acceptance by the Owner or Consultant.

iii. The Contractor guarantees replacement of all defective materials, parts, components, equipment, including labor, free of charge to the Owner during the Warranty period, when made necessary from normal usage and / or wear.

iv. The Contractor shall provide on and off sight technical support, software patches, and labor for any necessary site repairs

v. The Contractor shall provide a full service office, capable of troubleshooting and repairing any system failure in a timely fashion as required by these specification documents.

vi. Warranty service shall be delivered within regular facility access hours set forth by the Owner.

vii. More specifically Warranty service shall be provided in accordance with the following:

viii. For major system failures: "major system failures" are failures that prohibit the use of a typical system function in one or more instructional spaces or pose a life safety concern. Such failures are considered a major impact to the Owner. The Contractor shall provide service correcting the impact within eight (8) hours after notification by the Owner or his representative and no later than the next business day if the notification falls after noon of the notification date.

ix. For minor system failures: "minor system failures" are failures that do not inhibit typical system usage in an instructional space or pose no life safety concern. The Contractor shall provide service within forty-eight (48) hours, after notification by the Owner or his representative.

x. The Owner reserves the right to make the final determination of major or minor system failures and the right to coordinate the best times for service of any system failure. The Contractor shall supply Service Request forms and or proper contact procedure to the Owner with instructions for proper notification of the Contractor for warranty service. By following said instructions, the Owner shall constitute proper notification for any need warranty service.

xi. The Contractor shall provide an optional extended one-year limited warranty as an Owner Alternate option. The extended one-year warranty shall extend the warranty as defined in the base proposal for one additional year and cover all technology systems that are a part of this specification package. The warranty shall be equal to the base 2 year warranty described above and shall include on and off sight technical support, materials, software patches, and labor for any necessary site repairs.

xii. The Contractor shall offer this extended warranty price to the (FISD) for their acceptance up to and including thirty days after basic warranty expiration. The Contractor shall be responsible for contacting the (FISD) in writing 30 days prior to the expiration of this offer. Failure to do so shall constitute an extension of the extended warranty offer.

1.12 OWNER'S TRAINING

A. Training Requirements

a. Provide, at a minimum, training as required herein for each Division 27 specification section Scope of Work.

b. Prior to scheduling or delivering Owner Instruction / Training confirm the following:

    i. System as-built documentation must be provided for review to Owner and Consultant. System final walkthrough inspection and punch list must be completed.

    ii. The Contractor proposed training materials and program outline must be provided and approved by the Owner / Consultant.

    iii. Training schedule dates must be coordinated and approved with the Owner and Consultant.

c. System Training for Software Applications

    i. The Contractor and the software developer SchoolView, LLC or their agent, shall provide the IMS system training as specified herein.

    ii. Training is to include:

        i. Detailed training plan and hand out materials that have been reviewed and approved by the Consultant or Owner

        ii. Practical and comprehensive operation of system

        iii. Basic system troubleshooting techniques

        iv. Videotape of each training session. Furnish two final edited copies to the Owner after training

d. Training Hours

        i. Provide each group of users, as defined below, with the minimum training hours as specified.

        ii. Training time is defined as those hours specifically set-aside for the sole purpose of training school personnel. Credited time shall not be given for time spent providing instructions to the Owner's staff for a system not completed or that has not passed final acceptance by the Owner and Consultant, or training performed outside of the approved training plan.

        iii. The Contractor shall issue a certificate of training completion to the trainees, upon completion of their training. Both the trainer and trainee(s) must sign the certificate before Contractor

shall receive training credit. Unless otherwise noted, provide a minimum of (8) eight hours of training for Owner selected trainees.

iv. This training shall be divided into training session "Blocks" as coordinated with the Owner. The first training session shall occur after final acceptance of the system installation and before first Owner scheduled use of the system.

v. The first-training session block shall consist of training intended for the common system operators. The training shall include use of the administration control functions of the PA, Bell, and Clock system.

vi. The second-training session block shall target the classroom systems for the common system operators. The training shall be sufficient to provide Teachers and staff with the necessary knowledge to use the technology systems and equipment found in each classroom and shall include the Teacher's classroom control interface software.

vii. The third-training session block shall consist of training for the IP Video Delivery System and Portable Video Broadcast cart. The training shall be sufficient to provide Administrators, Librarians, and staff with the necessary knowledge to use the technology systems and equipment of the video delivery system, including software functions.

viii. The forth-training session block shall consist of a training session structured for high-level users, for example staff champions that shall provide instruction to other users and shall include Advance System Configuration and Operational Knowledge needed to maintain and manage all technology systems.

ix. Training sessions shall cover at a minimum:

1. Basic System Configuration and Operation Knowledge

2. Advance System Configuration and Operation Knowledge

3. Typical system usage

4. Typical User troubleshooting skills

5. Service and maintenance requirements

2.1 GOVERNING WORK CLAUSES

A. General

a. All equipment furnished for this project shall be new and unused and shall be designed for the intended use and for uninterrupted duty cycle.

b. Acceptance or implied approval of submitted products, product cut-sheets, or substitutions of equipment, equipment manufacturers, or system designs other than that specified herein does not relieve the Contractor of the responsibility to provide the functions and detail of the systems as found in the specified system.

c. The Contractor shall not receive final written acceptance of work and materials until the Contractor provides written release of any and all liens to the Owner.

d. Any equipment using IR control must have a discrete control function for the function to be controlled. Example: Power on as a separate button function to Power off. A toggle on and off shall not be acceptable. This shall apply to power functions, input switch functions, or other necessary positive state functions. The contractor shall confirm any proposed equipment to be consistent with this need before it is used in this installation.

e. Software Terms & Conditions

i. The successful Contractor providing software for this project affirms that it possesses complete and valid title and rights to furnish the said software. Further that it possesses legal right to sell, transfer, or license the software to the Owner.

ii. The Successful Contractor herby agrees to protect, indemnify, and hold the Owner harmless against any and all claims, suits, or proceedings for patent, trademark, copyright, or franchise infringement arising out of, or resulting from, the installation or use of software or any part of the Contractor provided materials or equipment.

iii. Provide the Owner with an installable and exact copy of each software program installed and running on any system furnished. The copy must be a user installable version and be provided on a CD or other format acceptable to the Owner.

f. Ancillary and Accessory Items

i. The Proposer shall provide ancillary and required accessory items necessary to furnish to the Owner a complete and fully functional system.

ii. The exclusion of / or limitation in the language used in the drawings or specifications shall not be interpreted as meaning that ancillary or accessories items of work or equipment necessary to complete or make the installed system fully functional can be omitted.

iii. The mention in writing or representation by depiction materials, services, or operations within this specification document and or Proposal package is binding upon the Proposer to include and provides such items, services, and operations without additional charge to Owner. Exceptions shall be noted by the acronym (NIC) "Not In Contract" or (OFE) "Owner Furnished Equipment". If this notation does not appear then the Proposer shall assume the need to provide the item in question.

iv. The Proposer shall receive no allowances because of omissions in work due to unfamiliarity or their misunderstanding of Proposal package documents.

g. Drawing Symbols
   i. The project scope drawings utilize symbols and schematic block diagrams to indicate various items of work. Neither of these have any dimensional significance nor do they delineate all items that may be required for the intended construction and installation.

   ii. The work shall be installed in accordance with the intent diagrammatically expressed on the drawings and described in the written specifications. The Proposer shall not make limiting interpretation that provides for incomplete work or a nonfunctioning system.

h. Document Discrepancy

   i. In the event of an inconsistency or discrepancy that may exist in or between parts of these Construction Documents, the following direction shall be followed and shall govern:

      1. The document, section, phrase, or requirement with better quality, more stringent requirement, or greater amount or quantity of work or material shall apply and shall be expected, delivered and used. Such work or material shall be provided by the Contractor and installed at no additional cost to the Owner
      2. Omissions - The omission of or express reference to any part(s) necessary for or reasonably incidental to a complete and fully functional system and installation as intended shall not be

construed as a release from the Proposer providing and installing such parts

2.2 THE (IMS) SYSTEM DESCRIPTION

1. General

2. The (IMS) system shall provide for an "Open Architecture Approach" to the Audio & Video Multimedia Systems of the campus that considers flexibility, and is future ready for growth.

3. At the core of the IMS shall be a multi-functional, microprocessor based, highly flexible, centralized control / automation system that shall integrate much of the facility's disparate technologies and unifies them into a single interactive communication platform with control and system signals over a common IP based data network infrastructure. The overall system flexibility shall be the result of shared system communications and a wide range of optional control devices to interface with the outside world for both current and future needs
4. The IMS shall provide encompassing unified user control from an easy to use graphical user control interface for controlling traditional and usually disparate school technology systems.

5. The IMS equipment rack shall consist of:

    a. IMS Central Control System (AMX Netlinx NI-3100 loaded with SchoolView Campus SV software)

    b. Audio Digital Signal Processor / Matrix Mixer for routing and processing of audio signal paths

    c. IP Audio Encoder for creating Bell signaling and event audio (Exstreamer)

    d. Remote IP Audio Decoder Receivers (Exstreamers) for distribution of audio over IP

    e. Master Clock system to synchronize secondary clocks

    f. Telephone Audio Interface for PA announcements from POT Line

    g. Background and foreground Music Sources

b. AM & FM Radio Tuner

c. Programmable CD / MP-3 Player

i. IP audio encoding devices (Annuncicoms)

ii. Zoned Public Address, Bell, Background Music, and other communications audio shall be delivered to the classrooms and other far points via the IP network and through the local room IP audio decoders with amplification and over ceiling speakers

1. Power amplifiers for common area analog distributed speaker zones

2. UPS Power for battery Back-Up
   a. Emergency power from a rack mounted UPS to energize necessary equipment when commercial power is out. The emergency power back-up shall provide the distributed 70v common area ceiling speakers for the Administration, Hallways, and other common areas including outside speakers (if any), as shown in the construction drawings. The emergency power shall maintain live PA for a minimum of 30 minutes.

B. IMS functionality

1. The basic (IMS) Campus System described herein and diagrammatically shown in the construction drawings shall provide at a minimum, but not limited to, the following functionality and features:

2. User Touch Panel and control system Interface

   a. A 10” wall mount touch panel shall be located in the front office at the reception desk and shall provide the main user interface of the (IMS) control system.

   b. The IMS control software and GUI shall include the ability to import a “BMP” or JPEG image file for use as custom graphic screens, such as the school logo, school floor plans, and menu icons, etc to create an user friendly campus specific interface

   c. A secondary remote virtual control panel that shall mimic the main user control panel via networked workstation computer and webbrowser software such as “Real” VNC

3. Campus IP based P.A. Bell, & Clock Systems

C. Campus wide IP based Public Address (PA), Bell, & Clock functions. Audio Public

D. Address shall be either from a gooseneck microphone, Desk cabled Push-to-Talk microphone, Remote "RA1" portable IP Push-to-Talk microphone or telephone interface. The PA system shall include the ability for remote IP audio only zones to send and return audio through the PA or from the PA to a remote local sound system. This feature shall include IP virtual Push-to-talk functionality and the ability to control the power up of the local sound system carrying the announcement

E. Programmable Bell or audio event scheduler that uses common MP3 audio files stored on a USB Thumb-Drive shall provide the user endless choice of sound for classroom changes or scheduled announcements Master clock system with single and double sided 4" digital LED bar display clocks that communicate over RS-232 for synchronization

F. Networked PC and centralized Administration Control Interface for campus wide access of features and functions.

G. Typical Classrooms

    i. Classroom Video display shall utilize a ceiling mounted video projector. The video projector shall be provided by Owner and Contractor installed. The Contractor shall interface the IMS with the Video Projector for typical control functions as follow:

H. Power on and off

I. Input selection

J. Video Mute (if available on the Owner provided projector)

K. Video Freeze (if available on the Owner provided projector)

L. Security Alert (projector missing)

M. Projector Statistics (telemetry of use and power state)

    i. Teacher's PC and other video sources shall connect to the Classroom video projector through a wall input plate with location shown as "AV1" on the construction drawings. This input plate shall have one VGA module that converts analog video and matches it to a UTP / RJ-45 jumper cable. The UTP jumper cable shall connect available video input modules to a media switcher.

N. The Media Switcher shall switch both audio and video signals to the classroom video projector.

i. Located in the “AV1” wall plate box shall be a spare UTP / RJ-45 jumper cable (Cat. 5e cable) for a future HDMI audio & video module.

ii. Classroom audio playback shall be switched and amplified with the unified Audio & Video media switcher as describe above. The amplified audio signal shall be distributed in the classroom over “S2” type ceiling mounted loudspeakers. The “S2” speakers are 2 x 2 format that replace a typical ceiling tile in the classroom drop ceiling grid. The Contractor shall provide “S2” speakers as shown on construction drawings and field coordinated final location to provide the best coverage of the classroom student seating area.

iii. The 4.3” Wall mounted Touch Panel control interface shall provide for teacher’s common control of classroom A/V devices. This is shown as the “CP2” locations on the construction drawings.

iv. The classroom multimedia audio & video devices shall be controlled either by a wall mounted 4.3” touch panel controller or a web browser control interface installed on the teacher’s workstation computer. Additionally, the Contractor shall provide a quick tool bar on the teacher’s computer for quick access to typical room control functions such as:

O. Selection of input

P. Volume up and down

Q. Projector power

i. The Web-browser control interface shall allow teacher’s ability to remotely control Audio & Video features via a networked PC from any data drop location and shall emulate the 4.3” touch panel control from the PC.

ii. Teacher’s shall have the capability of classroom delivery from remote IP video streaming sources such as DVD players, Direct TV receivers, Video Storage Servers, and other local origination IP video sources

iii. The IMS shall provide for communication with the classroom video projection systems and network video delivery devices, to provide remote automated control for zoned video content delivery and video broadcast to the classrooms

iv. IP Streaming Video content shall be delivered to the video projectors and other video display devices via MPEG 2/4 IP video streaming and

decoded by a hardware Set Top Box (STB) located at each video display device

R. CATV Distribution to the CATV RF Jacks i. The Contractor shall extend the CATV Cable Company Service from the service building DMARC to the TR closets as needed to furnish CATV to identified cable TV jacks. ii. The Contractor shall at their discretion utilize 75 ohm ½" hardline or 75 ohm RG-11 cable as needed to maintain adequate signal strength to a multi-port tap(s) to be located in the TRs serving areas requiring CATV service.

1. From the CATV RF multi port taps located in the TR closets, the Contractor shall feed the CATV RF jacks shown on the project drawings as "T1" symbol locations using RG-6 cable.

2. The Contractor shall provide any necessary CATV amplification or equalizer for balancing the signal to supply the CATV jacks with a minimum of +2Dbm signal.

3. The Contractor shall be responsible for calculating the CATV RF distribution system necessary to meet the above requirements. The system shall be part of the submittal package for the project. Blonder Tongue equipment or equal shall be acceptable.

2.3 MANUFACTURERS

A. Governing Clauses

a. It is not the intent of these specifications to limit or restrict submission of proposals for products or systems by manufacturers other than those specified. The products specified are intended to establish a minimum baseline of operational, functional, and performance based system expectations that all proposed products must meet or exceed by features, functionality and quality. The Owner reserves the right to govern over and proclaim whether proposed products are equal to the specified system standards.

b. If the proposed system does not meet all of the following features or functions described herein then the Proposer shall identify and list those exceptions in their proposal submittal by separate cover titled "System Exceptions" in red letters. The Proposer shall not be automatically disqualified for not meeting one or more requirements. The Owner shall evaluate Proposals on their overall value; all proposals shall be fully considered for best value.

c. Reference to a manufacturer that may appear in this specification is not intended to imply that all products available from said manufacturer meet in full all requirements of this specification. The Proposing Vendor shall be responsible for full compliance or the specification requirements.

2.4 EQUIPMENT

A. Governing Clauses

i. The following sets forth the minimum IMS equipment requirements. Described are both technical performance specifications along with certain desired features and functions that the Contractor must provide with their proposed system solution.

a. The Proposer must state clearly in their proposal any exceptions to the equipment and or requirements found in the construction documents to that offered in the Contractors proposal.

b. Additionally to exceptions, the Proposer shall list clearly any value added features and or functions their proposed equipment may offer over and above the stated minimums.

c. IMS equipment provided and installed shall be as depicted or shown on the construction drawings, described herein or more specifically under the System Description above.

d. The Contractor shall be aware that the construction documents in totality identifies the requirements and equipment required to deliver the desired performance, this means the written specifications, drawings, and associated equipment list or generally known in totality as the "Construction Documents".

ii. Proposal Equipment List

a. The Proposer shall provide along with their Proposal Bid Form the following:

1. Provide complete project material / equipment list for each device to be furnished. The Materials List is required to include the following completed categories:

a. Quantity of item provided

b. Manufacturer of item

c. Model number of item

d. Description of item

e. Value of item in the form of Amount declared for item or device

b. The Project Material / Equipment List shall be completed on the provided spreadsheet. See Attachment "C" Equipment List.

c. Attachment "C" Equipment List

1. The Proposing Contractor hereby acknowledges and agrees to be bound by the understanding the Attachment "C" Equipment list is provided as a courtesy worksheet only and further understands that dimensional values, quantity counts, and ancillary items required remain the responsibility of the Proposer.

2. The itemized equipment list found as Attachment "C" in the construction documents along with the described equipment that follows in part 2.5 "BASE(IMS) EQUIPMENT" is typical expected IMS equipment and sets forth standards for the primary equipment items or devices required in this project.

3. The Attachment "C" list does not include every equipment item needed or that may be described herein and depicted on the construction drawings. The Proposer is responsible for determining their complete equipment list needed for a successful project.

4. The list is intended only as an aid and provides supplemental information of certain devices to assist the Proposer with developing a complete list of all items needed. All equipment items on the construction drawings or in the written specifications is required to be provided by the Proposer for this project. Review the construction documents and provide equipment as written herein and / or depicted on construction drawings

5. On the Attachment "C" spreadsheet where item quantities are shown by actual number count or has a "*" in the quantity column, the Contractor shall determine for themselves the required device quantities based on the Construction Documents in totality.

6. The Contractor shall be solely responsible for all equipment needed for a turnkey project based on their lump sum proposal and the construction document's descriptive requirements.

C. Provide

a. All Equipment and Systems as depicted on the project Construction Drawings

b. All features and functions as described herein

c. All Equipment listed in the Attachment "C" Equipment List

D. The Proposer shall complete the "Attachment A." as part of the Proposal Form in its entirety and provide added completed worksheets for devices, equipment, ancillary items, cable and products that they determine required for a complete installation but not currently listed on the Attachment "C" document.

E. The Proposer shall provide one lump sum price for a complete turn-key system installation per the construction documents. This lump sum price shall be inclusive of all work and material needed for fully functional systems.

F. Provide unit pricing on the Attachment "C" Equipment List and submit as a part of the Proposal form document

2.5 CLASSROOM ADDITIONS - AUDIO VISUAL EQUIPMENT

A. Required hardware for all Classroom Additions:

a. Input Plate System and Components – HDMI Input:
   i. RapidRun Digital HDMI Passive Wall Plate – Decora Style, White
      1. Part # 42419
      2. Qty – As Needed
      3. No Substitutions
   ii. RapidRun Digital HDMI Active Flying Lead, 6'
      1. Part # 42417
      2. Qty – As Needed
      3. No Substitutions
   iii. Standard Classrooms: 35ft RapidRun® Digital Runner Cable - In-Wall CL2-Rated
      1. Part # 42404
      2. Qty – As Needed
      3. No Substitutions
   iv. Large Classrooms (Music/Dance/Art): 75ft RapidRun® Digital Runner Cable - In-Wall CL2-Rated
      1. Part # 42407
      2. Qty – As Needed
      3. No Substitutions

b. Input Plate System and Components – VGA with Audio Input:
   i. RapidRun® Integrated VGA (HD15) + 3.5mm - White
      1. Part # 60054
      2. Qty – As Needed
      3. No Substitutions
   ii. 6' RapidRun® VGA (HD15) + 3.5mm Flying Lead
      1. Part # 60050
      2. Qty – As Needed
      3. No Substitutions

iii. Standard Classrooms: 35ft RapidRun® Multi-Format Runner Cable - In-Wall CMG-Rated
    1. Part # 60004
    2. Qty – As Needed
    3. No Substitutions
iv. Large Classrooms (Music/Dance/Art): 75ft RapidRun® Multi-Format Runner Cable - In-Wall CMG-Rated
    1. Part # 60006
    2. Qty – As Needed
    3. No Substitutions

c. Decora Trim Plate:
    i. Leviton 2-Gang Decora/GFCI Device Decora Wallplate, Midway Size, Thermoplastic Nylon, Device Mount, - White
        1. Part # PJ262-W
        2. Qty – As Needed

d. Projector Pass-Through Plate:
    i. 1-Gang Recessed Low Voltage Cable Wall Plate - White
        1. C2G #40594
        2. Qty – As Needed

e. Low Voltage Box
    i. Panduit Single Gang Low Voltage Box
        1. JBP1D-WH
        2. Qty – As Needed
        3. Or Approved Equal
        4. Confirm Finish Match with EC

f. Projector Mounts:
    i. Ceiling Mount
        1. Chief CMS440
        2. Qty – As Needed
        3. No Substitutions

    ii. Projector Mount
        1. Chief RSMAU with Appropriate Length Column
        2. Qty – As Needed
        3. No Substitutions

g. Ceiling Equipment Enclosure
    i. Ceiling Vault
        1. AMX FG1700-01E
        2. Qty – As Needed
        3. No Substitutions
    ii. Equipment Tray
        1. AMX FG1700-01T
        2. Qty – As Needed

3. No Substitutions

h. Standard Classroom Audio Equipment
    i. Classroom AMX SchoolView Amplifier, Stereo Amp, 16W @ 4Ohm
        1. AMX 1702-22
        2. Qty – As Needed
        3. No Substitutions
    ii. Classroom AV System Speakers
        1. Lowell Speaker Package-8in Spkr, 2 x 2 Tile System, 50W, 8 ohm, .8cu ft
        2. Part #: LT2-8A-VB
        3. Qty – As Needed
        4. No Substitutions

i. Large Room (Music/Dance/Art) Projector System
    i. Boxlight 3100 ANSI Lumens Short Throw Interactive WXGA Projector
        1. P6 WX30N
        2. Qty – As Needed
        3. No Substitutions
        4. Provide Boxlight Lamps-For-Life Lamp Replacement Pgm for Each Projector
    ii. Dalite Cosmopolitan Electrol 65"x104" Electric Screen with LVC, Matte White
        1. Dalite Part #: 20892
        2. Provide with Low Voltage Control Option
        3. Qty – As Needed
        4. No Substitutions

j. Standard Classroom Projector System
    i. Boxlight 3100 ANSI Lumens Short Throw Interactive WXGA Projector
        1. P6 WX30N
        2. Qty – As Needed
        3. No Substitutions
        4. Provide Boxlight Lamps-For-Life Lamp Replacement Pgm for Each Projector

    ii. Boxlight 16:10 95" Diagonal (80.56" x 50.33") Wet Erase Marker Board with Projection Surface
        1. Boxlight Part #: BOXWB-87W
        2. Provide with Low Voltage Control Option
        3. Qty – As Needed
        4. No Substitutions

k. Music/Dance Room, Divide/Combine – Audio System
    i. Speakers: Atlas Strategy Series 8" 2-Way Speaker System
        1. Atlas Part #: FAP82T
        2. Qty – As Needed for Complete Coverage of Rooms
        3. No Substitutions

ii. Audio Amplifier: Ashly Power Amplifier 2 x 75W @ 4 Ohms with Xfmr Isolated 25V, 70V, & 100V Outputs
    1. Ashly Part #: TRA-2075
    2. Qty – As Needed
    3. No Substitutions

iii. Audio DSP: Biamp NEXIA 10 mic/line inputs and 6 mic/line outputs. DSP for conference applications such as boardrooms, courtrooms, and council chambers
    1. Biamp Part #: Nexia-CS
    2. Qty – As Needed
    3. No Substitutions

iv. DSP Control: Biamp Remote Control; surface-mounted with high contrast OLED display & 32 selectable system volumes and actions
    1. Biamp Part#: RED-1
    2. Qty – As Needed
    3. No Substitutions

v. Audio Summing: Extron ASA 111 Passive Audio Summing Adapter with Stereo Mini Plug Input and Unbalanced Output
    1. Extron Part #: 60-738-01
    2. Qty – As Needed
    3. No Substitutions

vi. Bluetooth Audio Receiver
    1. C2G Part #: 41321
    2. Qty – As Needed
    3. No Substitutions

vii. Equipment Rack: Middle Atlantic DWR Sectional Wall Mount Rack - 12RU, Fits 20" Deep Equipment
    1. Middle Atlantic Part #: DWR-12-22
    2. Solid Front Door Part #: FD-12
    3. Qty – As Needed
    4. No Substitutions

viii. Equipment Rack Power: Middle Atlantic 9-Outlet, Single 15A Circuit, Surge/Spike Protected
    1. Middle Atlantic Part #: PD-915R
    2. Qty – As Needed
    3. No Substitutions

ix. Rack Blanks: Middle Atlantic 1-Space Rack Blanks
    1. Middle Atlantic Part #: EB1
    2. Qty – As Needed
    3. Or Approved Equal

x. Rack Equipment Shelf: Extron 1U 6" Deep Basic Rack Shelf, Gray

1. Extron Part #: 60-604-11
2. Qty – As Needed
3. No Substitutions

xi. PA Amplifier: Extron Mono 70/100 V Amplifier - 40 Watts
1. Extron Part #: 60-845-01
2. Qty – As Needed
3. No Substitutions

xii. PA Decoder: Barix Annuncicom 200 1-Way Audio Decoder with Amplifier
1. AMT Barix Annuncicom 200
2. Qty – As Needed
3. Or Approved Equal

xiii. PA Classroom Speakers: Lowell 8" Speaker 1'x2' Tile System with Transformer 20W 70V
1. Lowell Part #: LT2-810-72-BB
2. Qty – As Needed
3. No Substitutions

xiv. PA Hall Speakers: Atlas SPK SYS 4" 2-WY S-M T7/16W WHT
1. Atlas Part #: SM42T-WH
2. Qty – As Needed
3. No Substitutions

xv. Clocks: ATS 4" Double Sided Digital Clock -Wall Mount
1. ATS Part #: CC2002W2-24V
2. Qty – As Needed
3. No Substitutions

xvi. Clock Cable:
1. Liberty 18/4
2. Qty – As Needed
3. No Substitutions

xvii. Speaker Cable: Liberty Commercial grade general purpose 16 AWG 2 conductor cable
1. Liberty 16/2
2. Qty – As Needed
3. No Substitutions

3.1 CONTRACTOR REQUIREMENTS AND RESPONSIBILITIES

A. General
a. The Contractor shall provide, furnish, deliver, transport, erect, install, configure, and connect completely all of the material and equipment described herein or depicted on any Proposal package construction document or Drawing. The Contractor shall supply all other incidental material required, such as

interconnecting cables, connectors, and hardware to make the work complete and leave all systems in first class operating condition.

b. The Contractor shall considered this a “Turnkey Project” for use by the Owner
c. The Contractor shall coordinate with all other trades to avoid causing delays in the installation schedule.
d. In the event of any conflicts, delays or improper preparatory work by other trades, notify the General Contractor, Consultant and Owner.
e. Equipment and enclosures shall be mounted plumb and square in relation to the structure.
f. Provide cut-in boxes or approved clamping rings where back boxes are required but not provided by electrical Contractor.
g. The Contractor shall coordinate their requirements for proper ground system to all equipment
h. Coordinate and verify with the Electrical Contractor, the installation of needed cable raceways.
i. Devices, wire raceways, and equipment, except for portable equipment, shall be permanently attached to equipment racks or building structure and held firmly in place with screws or fasteners. Adhesives alone shall not be accepted as fasteners.
j. The Contractor shall not use any other trade’s work or material for support or fastening. Example: ceiling grid support wires cannot be used to support cable hangers, etc. Any exceptions shall be noted or coordinated in writing with the General Contractor.
k. The Contractor cannot shoot, fasten, or screw hangers to the roof deck. Any exceptions shall be noted or coordinated in writing with the General Contractor.
l. The Contractor shall coordinate clearance for cable paths and coordinate clearance for access above cable tray to easily add or remove cable from the Cable tray they install.
m. A Contractor installing any equipment shall be responsible for providing all interconnecting cables to and / or between same equipment that may be required to make equipment fully operational.
n. Equipment shall be fabricated with equipment mounted into racks, enclosures, and consoles and be fully wired and tested, before delivery to job site.
o. Consideration shall be given not only to operational efficiency of installed equipment, but additionally to overall aesthetic factors Contractor shall comply with industry standard practices in the installation of equipment and the wiring of the equipment cabinets.
p. Contractor's construction, fabrication, installation, or delivery of materials must comply with applicable standards and practices.
q. The Contractor shall coordinate and field-verify the electrical rough-ins provided for their use by the Electrical Contractor.
r. The Contractor shall exercise care during installation. Damage to cables or equipment shall not be accepted. Damaged cable or equipment must be replaced.
s. The Contractor shall remove and replace cabling that is found to have been stretched or pulled past the recommended pulling tension during installation.
t. The Contractor shall install all operational software, as required by equipment and ensure that such software is fully functional and operational. In the event of

software conflicts due to upgrades, bugs, or other reasons, the Contractor shall provide solutions suitable to Owner at no additional cost.

u. The Contractor shall be responsible for coordination with Owner's staff the software configuration options of software configurable systems.
v. The Contractor shall provide, the Owner, installable and exact copies of all software used by or running on any system installed.
w. The Contractor shall provide to the Owner keys for all lockable equipment installed.
x. The Contractor shall provide all passwords for any system or equipment that may use or be locked with a password.
y. The Contractor shall provide to the owner a completed warranty card with filled in information for every installed device where the original manufacture provides a product warranty over and above the Contactor's required warranty.
z. The Contrctor must have CTS-I and CTS-D on Staff with current certification.

B. Local Sound Reinforcement System Specific Requirements and Techniques

a. All cabling located above ceilings shall be tied off to and supported by ceiling supports or other structures at a minimum of eighteen inches above the ceiling.

b. Cabling shall be placed in conduit where exposed in gym roof joist. Exposed cables shall not be allowed.

c. Provide shaft locks or security covers, as required by the Consultant, on non-user operated equipment having front panel controls. Install at the conclusion of Acceptance Testing.

d. Install XLR type connector wired pin 2 high, pin 3 low, and pin 1 shield.

e. Loud-speaker suspension

    i. Speakers shall be suspended in a safe, secure and permanent manner

f. Special Audio Techniques

    i. The Contractor shall float cable shields at the output of source devices for line level and audio signals and connect it at inputs. In the installation of equipment and cables, consideration shall be given not only to operation efficiency but also to overall aesthetic factors. Coordination of personnel and subcontractors associated with any part of construction, delivery, installation or testing. Tests and adjustments, written reports, system demonstration to Owner or Owner's agent and final system as-built documentation

g. Audio System Adjusting

i. Prior to energizing or testing the system, ensure the following:

1. All products are installed in a proper and safe manner per the manufacturer's instructions.

2. Dust, debris, solder, splatter, etc., is removed.

3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. All products are neat, clean and unmarred and parts securely attached.

5. Electronic devices re properly grounded.

ii. Prior to energizing the system, perform the following tests in compliance with applicable EIA standards. Record the results of each test in the Project Record Manual. Test each AC power receptacle with a circuit checker for proper hot, neutral and ground connections. Measure the impedance of each speaker line leaving the equipment racks. For full range devices, use a frequency of 1000 Hz, for band limited devices, use a frequency appropriate for the operating range of the transducer. When documenting the results of these tests, include the calculated impedance based on number of units on a line and the size and distance of the run. Correct any field readings that differ more than 20% from the calculated impedance.

1. Speaker Polarity Verification Test

i. Use an electronic polarity checker to test each reinforcement speaker. All speakers should have the same relative polarity.

2. Remote Input Verification Test

(1) Using a microphone or portable signal generator, connect to each microphone receptacle throughout the facility.

(2) Verify that the receptacle under test appears at the correct position on the microphone mixer and is operating properly.

(3) In a similar manner, check all remote line inputs for correct wiring and labeling.

iii. System Equalization

1. Using a TEF 20, SYSID, or a spectrum analyzer with both 1/3 band and narrow band display, equalize all loudspeaker systems to provide a suitable frequency response as follows:

2. Flat from 45hz to 2khz with a 1db per 1/3 octave roll off.

3. Mark normal settings for each device and record settings in the Project Record Manual.

4. Verify system gain and amplifier levels.

(1) When all the above tests have been completed and the system is ready for inspection, formally notify the Owner's Representative at least seven working days prior to inspection. Include in this notice copies of all data recorded, date each test was completed and the results of each test. All test data shall be available during the inspection process.

h. Test Equipment

i. Prior to start of testing, provide a list to the Owner's Representative of test equipment make, model numbers and calibration dates that shall be used. Furnish the following equipment as requested during final test verification by the Contractor and Owner's representative. The Equipment is to be available for the entire test period through the final system testing.

ii. Sound-Level Meter: ANSI S1.4-1971 Type S1A with digital or analog display. Meter to provide ranges of 40 to 120 dBA.

iii. Pink Noise Source – Equal energy per octave bandwidth 20 HZ to 20,000 Hz, □ 2 dB per day.

iv. Impedance Meter – Capable of testing audio lines at three frequencies, minimum, between 250 Hz and 4k Kz. Measurement Range: 1 ohm to 100 kohms.

v. Multimeter – Measurement range, DC to 20kHz, 100mV to 300V, 10ma to 10A.

vi. Provide two portable VHF or UHF business band radios for use during acceptance testing with transmission range sufficient to cover entire project. Include rechargeable batteries and re-charger along with holster for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance

3.1 EXAMINATION

A. The Contractor's responsibilities:

a. This is both new Construction and Additions and Renovations

b. The Contractor shall examine all related construction documents and ensure compliance to them.

c. The Contractor shall coordinate their installation schedule to comply with General Contractor's timeline.

d. The Contractor shall examine the project construction schedule against their need for sequences of completed spaces and coordinate those needs with the General Contractor. Example: MER and TR closets, etc.

e. The Contractor shall coordinate their work with other trades to facilitate a seamless installation.

3.2 PROTECTION

A. Equipment

a. The Contractor shall coordinate with other trades to provide an acceptable environment for installed equipment. For example, provide a dust free environment for VCRs, laser disk players, CD players, etc.

b. Cover installed equipment racks for protection during high dust periods.

ii. Do not operate equipment with fans during high dust periods.

iii. Coil and protect cabling from damage prior to termination to equipment.

3.3 INSTALLATION &CONSTRUCTION

A. Procedures & Methods

1. The Contractor shall provide rack shelves or rack mounting ears for any equipment that is not rack mountable. All equipment installed using shelves shall be fastened to the rack shelf. If Velcro is used to fasten any equipment the Velcro must be affixed with self-fastened screws. Adhesive is not an acceptable means to fasten any equipment.

2. All equipment installed within the equipment racks shall be fastened in an approved manner with serviceability in mind.

3. Supplementary equipment within equipment racks, such as special assemblies that are not rack mountable or fastened to rack shelves shall be mounted on painted black high grade wooden boards running vertically on side rails of equipment racks. The same wooden strips shall also be used to support cable tie support bars for lacing cables to equipment.

4. All equipment mounting boards in head-end rooms, MER's, electrical, or TR closets shall be painted white or black as location dictates with fire retardant paint. The mounting boards shall be made of high-grade plywood.

5. Equipment shall be mounted into racks and consoles, and fully wired and tested, before delivery to job site.

6. With the installation of equipment and cables, consideration shall be given not only to operation efficiency but also to overall aesthetic factors to comply with industry standards and practices.

B. Special Techniques & Requirements

1. The Contractor shall build a typical classroom mockup complete in detail for review by the Owner and Consultant prior to their final equipment install in the rest of the facility. Once reviewed and accepted this mockup shall be the approved configuration model to install in the remaining typical classrooms.

2. Programming the Control System.

    i. SchoolView provides a project checklist of items that must be completed prior to software install. This checklist should be used. It includes needed information for preload prep of the software and but not limited to device IP programming requirements, etc. The Contractor shall adhere to this checklist.

    ii. The Consultant makes periodic site progress inspections. Schedule one of these inspections to coincide with and just before software installation.

    iii. Coordinate with the Independent School District IT staff the assigned data port numbers for use with the IMS system. There shall be two V-LANs one shall be for IP Video and the other Control and IP Audio. The Contractor shall know the port numbers and make sure the patch cables are connected to the correct ports.

    iv. Be sure to have a Laptop computer with SchoolView "Campus Tools" loaded.

3. Equipment Programming and Configuration

i. Most of the network devices (black boxes) that makeup the IP signal platform is what is commonly called "Network Appliances", these devices are relatively ease to configure and connect. Each box has very similar needs and requires the same basic understanding to configure. In most every case where the device you are installing has a data network port you shall need to configure the following:

    a. Device IP Address (This shall be assigned by the School Independent School District)

    b. Network Subnet Mask (This shall be assigned by the School Independent School District)

    c. Default Gateway (This shall be assigned by the School Independent School District)

ii. The School Independent School District's IT department shall provide you with the above needed information in IP ranges it shall be up to the contractor to assign and track what box got what IP address and what room it went into.

iii. When the boxes have been configured and are live on the network additional configuration shall be loaded via the network. SchoolView shall provide a CD with Campus Tools and additional CD or Thumb Drive that contains an automated load process. Following the load instructions shall upload final configuration to the individual boxes across the network.

4. Wire and Cable Requirements

    i. Cable installation must follow related TIA/EIA standards and recommendations, including methodology as noted in TIA/EIA 569 - Part 4.6 Ceiling Pathways. Specifically, including sections 4.6.1 General, 4.6.2 Design Guidelines, and 4.6.5 Cable Support.

    ii. All cables, regardless of length, shall be marked with indelible color-coded labels at each end. Labels shall be directly hot stamped or factory-stamped, closed sleeve method. Adhesive strip labels may only be used if protected by transparent heat-shrink tubing.

    iii. There shall be no unmarked cables at any place in any part of any system this includes both in equipment racks and outside of equipment racks. Label markings codes used on cables shall correspond and be shown clearly on as built drawings.

iv. All cables shall be separated into like groups according to signal or power levels and routed separately to eliminate signal contamination and cross-talk, this includes both in equipment racks and outside of equipment racks.

v. All power cables, control cables, and high level cables shall be grouped to one side of the equipment rack while low level cables shall be grouped to the other side.

vi. All equipment rack wiring and cabling shall be neatly laced, ends dressed with heat shrink tubing, and all cables shall have service loops between the horizontal tie bar and the connection to equipment. Rack cabling shall be adequately supported with tie wraps or Velcro wire wraps and horizontal support bars to rack frame as it enters or exits the front or back of equipment.

vii. Cables between cable support bars and equipment shall have a minimum of 3" of sag between the bar and connector and be consistent with other cables installed in the rack.

viii. All cables within equipment racks shall use Velcro wire wraps to manage and bundle cables. Velcro strips shall be no more than a ¼" wide.

5. Equipment and Cable Labels:

   a. All Cables shall be labeled each end and referenced on the As-Built Drawings

   b. All wall plates shall be labeled with Input and Output identifications and referenced to corresponding operational software or hardware it serves.

   c. Provide all proposed wording and / or numbering scheme for labeling to the Consultant for review and written approval prior to procurement or installation.

   d. All labels used must be permanent and secure. Provide labeling as follows unless otherwise noted in a specific section.

   e. Provide engraved Lamacoid labels at the front of all equipment mounted in the racks.

   f. Labels shall indicate equipment type and model number and correspond to the As-Built drawings for equipment identification. Mount labels on the equipment rack, not on the equipment, and attach in a neat, plumb, and permanent manner. The labels shall be placed on the equipment rack vertical frame (post). If the equipment rack vertical posts have a recessed mid section, then match label width to fit this recessed section.

g. Labels shall be uniform in size.

h. All adjacent labels shall be sized to match the other labels used for same purpose.

i. Similarly, provide engraved labels of like size in other locations.

j. Provide engraved Lamacoid labels on each equipment rack rear door or console rear panel reading "No user serviceable parts. Refer service to qualified technician".

k. All label lettering shall be a minimum of .08" high.

l. Embossed adhesive labels are not acceptable.

m. Position at the left side front top rack space of each equipment cabinet a label that states the name of system **Installer** with contact information**.**

n. Unless otherwise noted, labels on dark panels shall be black with white letters. Labels on stainless steel or brushed natural aluminum plates or light colored panels shall be white with black lettering.

o. All wall plates shall have input and output connectors labeled in a professional and permanent manner, no hand written labels shall be accepted.

p. Cable and Jack labels shall include room identification with unique cable number, jack location within the room, and MER or TR number.

q. The Contractor shall use actual room identifications in their labeling scheme. Contractor shall obtain written approval from the Owner for the actual room numbers, and labeling scheme, to be used prior to installation.

r. Switches, connectors, jacks, receptacles, outlets, cables and cable terminations shall be logically and permanently marked in a manner approved by the Consultant. Custom panel nomenclature shall be engraved, etched, or screened. Markings for these items are purposely detailed in the construction drawings to ensure consistency and clarity. Verify markings and placement with the Consultant prior to procurement. Submit label sample layouts for Project Consultant's review.

s. All labeling information shall appear on the As-Built drawings.

6. Service Loops

a. Provide ample service loops at each termination so that plates, panels, and equipment can be removed for service, re-termination or inspection. Provide the following as a minimum:

b. Wall plate outlet box: minimum of ten (10) inches from wall surface to jack.

c. Termination panel: Six (6) inches behind termination panel from cable tie to jack.

7. Connections and Connectors

a. Connections shall be made with approved connectors on cables, terminal blocks, or punch blocks. Crimp style connectors shall be made with proper crimping tool.

b. Cables shall be terminated with the proper connector specifically produced for use with each type of cable.

c. Connector adapters shall not be allowed in any part of the system.

d. RF cable connectors shall be made with hex crimp.

e. Two point crimps shall not be accepted.

f. Solder joints shall be made with rosin-core solder.

g. Mechanical connectors must be specially made for type of cable or wire used.

h. Twist on connectors shall not be allowed

3.4 CLOSE-OUT QUALITY CONTROL

A. The following should be complete and in place before final system inspection & demonstration is scheduled and performed with Owner's Consultant:

i. Contractor has provided substantial completion report to Consultant.

ii. All equipment shall be operating normally.

iii. All equipment software is installed and configured.

iv. All electronic devices are properly grounded.

v. All powered devices have AC power from the proper circuit.

vi. All patch cables and jumpers are in place.

vii. Insulation and shrink tubing are present on cable ends.

viii. Equipment labels are in place.

ix. The system documentation is complete with "as- built" drawings available.

x. Dust, debris, solder splatter, etc. is removed.

xi. All cables are dressed, routed, and labeled; all connections are consistent with regard to polarity.

xii. To the best of the Contractors knowledge, all contractual system specifications are fully met, in detail and intent.

a. Contractor Testing prior to Consultant proof-of-performance inspection
    i. The installing Contractor shall test the systems prior to Consultant proof-of-performance inspection to include but not limited to the following:

        1. IP boxes have been configured and contractor has IP assignment tables

        2. Confirm audio from PA to each speaker zone by zone

        3. Both the touch panel microphone and PTT microphone works

        4. Audio from Bell is functional

        5. Audio from CD player and radio tuner with control of each

        6. Synchronize Clock control is communicating

        7. Video Display Control is working

        8. Video broadcast cart key switch works

        9. Audio from video broadcast cart is in hallways and classrooms

        10. All video displays responded and received broadcast event

        11. Remote audio from local sound systems are receiving PA and Bell

12. IMS PA is receiving remote audio from local sound systems

13. Automated power up functions are working for remote sound systems

14. The telephone interface works and contractor has the number

15. CCTV IP address are entered into the touch panel

16. Classroom wall controllers are programmed and function

17. IP streaming channel line up is programmed and works

18. Confirm each classroom input is operational

19. Confirm digital signage (Common area LCD TV) are operational

20. Test each video source device in the IP video delivery system

B. System Documentation

a. Prior to final acceptance by Owner, all system closeout documentation must be delivered and made available during final acceptance walkthrough.

i. As-Built drawings

ii. Equipment Manuals

iii. All documentation requirements stated in the Submittal requirements shall be updated and made a part of the As-built documents.

iv. Final Acceptance Testing Verification

1. Acceptance Testing shall be the responsibility of and performed by the Contractor in the presence of the Consultant and other Owner's representatives. Coordinate this testing so that free access, work lighting, and electricity are available on the site.

i. Fully balance all audio systems as directed by the consultant. This also means that all room amplifiers shall be set for equal audio level in the room with equal audio input

ii. The Contractor must complete all previous punch-list items prior to final acceptance test verification by the Owner and Consultant.

3.5 CLEANING

A. Prior to system turnover to Owner:

1. Remove all dirt and debris from equipment racks and equipment rooms.

2. Clean all equipment filters, vents, and fans.

3. Clean all enclosures and back box interiors thoroughly before installing plates, panels, or covers.

3.6 DEMONSTRATION

A. The Contractor shall be responsible for the following:

a. The contractor shall demonstrate all systems to the owner and owner's representatives. This demonstration shall occur after all the submittal documents are supplied, including As-Built drawings, substantial completion report, and test results, and after notifying the Consultant in writing that the system meets the specification and is complete and ready for verification.

b. Demonstrate operation of each major component and functional requirement as specified herein. If any portion of the system does not appear to be functioning properly, further test, along with corrective actions shall be performed by the Contractor. If the need for further adjustments becomes evident during the demonstration and testing, the demonstration shall be discontinued until the system operates properly.

c. The Contractor shall remain responsible for all equipment, labor, hardware and documentation, in part and in total, until Owner accepts such work or material in writing.

d. The Contractor shall be responsible for equipment adjustments to ensure normal and proper operation. Owner required system adjustments shall be made by the Contractor as directed by Owner or Project Consultant during final testing.

e. Provide a minimum of two (2) installation technicians to assist the Owner or Project Consultant, as required during final test verification and final acceptance walkthrough. The technicians shall be equipped to perform necessary corrections to the system. They shall have test equipment capable of testing any and all parts of the equipment, cabling, or systems.

i. The technicians shall be prepared to make final adjustments as directed by the consultant. Equipment adjustments may be either electrical or physical

f. The Contractor shall provide test equipment during final acceptance walkthrough. Minimum required test equipment shall include but not be limited to the following:

i. Multi test meter for reading AC / DC voltage and continuity

ii. Sound level db meter

iii. Audio signal tracer (powered speaker)

iv. Portable video monitor

v. Tone and pink noise generator

vi. Real Time Audio Analyzer (RTA)

vii. An acoustic polarity pulsing phase tester

viii. Three (3) two-way radios for communications between Contractor and Consultant

END OF SECTION

SECTION 27 10 00 – STRUCTURED CABLING STSTEM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Documents: Provisions of General Conditions, Supplementary Conditions, and the sections included under Procurement & Contract Requirements are included as part of this section as though bound herein.

1.02 RELATED WORK

A. Section 27 10 00 – Structured Cable Infrastructure

B. Section 27 11 00 – Communications Equipment Rooms

C. Section 27 13 00 – Communications Backbone Cabling

D. Section 27 15 00 – Communications Horizontal Cabling

E. Section 27 16 00 – Communications Connecting Cords

F. Section 27 18 00 – Communications Labeling and Identification

1.03 DEFINITIONS

A. Documents: The complete package of Procurement and Contract Requirements, General Technology Requirements, related Division 27 sections, Drawings, schedules, and addenda that make up this Request for Bid.

B. Work: The provision of products and/or services to meet the requirements specified in these documents.

C. Owner: The party named in the Procurement and Contract Requirements as the advertising party.

D. Consultant: Joe L. Squiers.

E. NIC: Not in Contract. Item will be the responsibility of others.

F. Approved or Approval: Where approval is called for, only persons with the authorized authority may grant approval. Owner reserves all rights to govern over and grant approval and will appoint authority of agents acting on their behalf.

G. OFE: Owner Furnished Equipment. Item will be provided and integrated by Owner.

H. OFCI: Owner Furnished Contractor Installed. Item will be provided by Owner and installed by Contractor.

I. OFOI: Owner Furnished Owner Installed. Item will be provided and installed by Owner.

J. As Required: Contractor shall provide the quantity of said item that is necessary. Owner and Consultant reserve the right to make the final determination of necessary quantities to provide for a complete system.

1.04 REFERENCE STANDARDS

A. Standards and other procedures referenced by this bid package are as follows:

1. ADA – Americans with Disabilities Act of 1990
   U.S. Department of Justice
   950 Pennsylvania Ave., NW
   Civil Rights Division Disability Rights Section – NYAV
   Washington, DC 20530
   Toll Free: (800) 514-0301

2. AIA – American Institute of Architects
   1735 New York Avenue. N.W.
   Washington, DC 20006
   Toll free: (800) 242-3837
   Email: infocentral@aia.org

3. ANSI – American National Standards Institute
   1819 L Street, NW 6th Fl.
   Washington, DC 20036
   (202) 293-8020

4. ASTM – American Society of Testing and Materials
   100 Barr Harbor Drive
   P.O. Box C700
   West Conshohocken, PA 19428
   (610) 832-9500

5. BICSI – Building Industry Consulting Service International, Inc.
   (RCDD Standards)
   8610 Hidden River Parkway
   Tampa, FL 33637
   Phone: (813) 979-1991 or 1-800-242-7405
   Fax: (813) 971-4311
   Email: bicsi@bicsi.org

6. CFR – Code of Federal Regulations
   (Available from the Government Printing Office)
   732 N. Capitol Street, NW
   Washington, DC 20401
   Toll Free: (866) 512-1800

(Material is usually first published in the Federal Register)

7. EIA – Electronic Industries Alliance
   2500 Wilson Blvd.
   Arlington, VA 22201
   Phone: (703) 907-7500

8. IACS – International Annealed Copper Standard
   CDA – Copper Development Association
   260 Madison Avenue
   New York, NY 10016
   Phone: (212) 251-7200
   Fax: (212) 251-7234
   Email: questions@cda.copper.org

9. IEC – International Electrotechnical Commission
   3, rue de Varembé
   P.O. Box 131
   CH – 1211 Geneva 20
   Switzerland
   Phone: 41.22.919.02.11
   Fax: 41.22.919.03.00
   Email: inmain@iec.ch

10. IEEE – Institute of Electrical and Electronics Engineers
    3 Park Ave. 17th Fl.
    New York, NY 10016
    Corporate Office: Phone: (212) 419-7900
    Standards Activities: Phone: (732) 562-3800

11. ISO – International Organization for Standardization
    1, rue Varembé
    Case Postale 56
    CH-1211 Geneva 20
    Switzerland
    Phone: 41.22.749.01.11
    Fax: 41.22.733.34.30

12. ITU-T – International Telecommunication Union – Telecommunications
    Standardization Sector
    Places des Nations
    CH-1211 Geneva 20
    Switzerland
    Phone: 41.22.730.51.11
    Fax: 41.22.733.72.56
    Email: tsbmail@itu.int

13. NEC – National Electrical Code
    maintained by NFPA – National Fire Protection Association
    1 Batterymarch Park
    Qunicy, MA 02169
    Phone: (617) 770-3000
    Fax: (617) 770-0700

14. NECA – National Electrical Contractors Association
    3 Bethesda Metro Center, Suite 1100
    Bethesda, MD 20814-5372
    Phone: (301) 657-3110
    Fax: (301) 215-4500

15. NEMA – National Electrical Manufactures' Association
    2101 L Street, N.W., Suite 300
    Washington, DC 20037
    Toll Free: (800) 321-6742

16. OSHA – Occupational Safety and Health Administration
    (U.S. Department of Labor, OSHA)
    200 Constitution Avenue, NW
    Washington, DC 20210
    (202) 219-5000

17. TIA – Telecommunications Industry Association
    2500 Wilson Blvd., Suite 300
    Arlington, VA 22201
    Phone: (703) 907-7700
    Fax: (703) 907-7727
    Email: standards@tiacomm.org

18. UL – Underwriters' Laboratories
    333 Pfingsten Road
    Northbrook, IL 60062-2096
    Phone: (847) 272-8800
    Fax: (847) 272-8129

B. Standards: Referenced standards and/or procedures will be binding on the Contractor and work will be judged against such standards and procedures unless otherwise stated in writing.

1.05 EXAMINATION OF EXISTING CONDITIONS

A. Examination: Contractor shall examine the facility and construction documents to the extent necessary to plan for efficient installation strategies prior to the delivery of

materials to the site or the commencement of work. Other documents (architectural Drawings, hardware schedules…) may be made available upon request. Failure to adequately complete the examination shall not result in change order requests.

B. Acceptance of Conditions: Commencement of work by Contractor shall indicate acceptance of existing conditions, unless a written notice of exceptions has been provided to Owner prior to commencement.

C. Observation: If Contractor observes—during preliminary examinations or subsequent work—existing violations of fire stopping, electrical wiring, grounding, or other safety- or code-related issues, Contractor shall report these to Owner in a timely manner.

1.06 DRAWING SYMBOLS

A. General: Work, equipment, or material delineated on any drawing in this package will be expected to be provided by Contractor unless noted otherwise.

B. Interpretation: Work shall be installed in accordance with the intent diagrammatically expressed on the Drawings and described in the written specifications. Contractor shall not make limiting interpretation that provides for incomplete work or a non-functioning system.

1.07 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Storage: Storage of materials shall remain the full responsibility of Contractor until Acceptance.

B. Protection: Contractor shall take all necessary precautions to protect materials from the following:
   1. Theft
   2. Vandalism/Tampering
   3. Dents
   4. Scratches
   5. Dust
   6. Temperature
   7. Weather
   8. Cutting
   9. Paint
   10. Other hazardous conditions

C. Replacement: Contractor shall replace any damaged or lost material as required by Owner or Consultant.

D. Installed Materials: Installed materials remain the responsibility of the Contractor until Acceptance. Contractor shall take necessary precautions to ensure the safety and security of installed materials.

1.08 CONTRACT MODIFICATION PROCEDURES

A. Changes: Changes to the contract may be initiated by Owner, Consultant or Contractor.

B. Proposal Request (PR): If a change originates with Owner or Consultant, Consultant shall issue a Proposal Request to Contract.

C. Request for Information (RFI): If a change originates with Contractor, the Contractor shall submit an RFI for Consultant review. If it is deemed a change is necessary, the Consultant shall issue a PR to address the change.

D. References: A Change Proposal shall reference the work to be performed, and shall include the cost change to the Project (if any) and the time change to the scheduled completion (if any).

E. Additional Information: Consultant may request additional information to be supplied with the Change Proposal for consideration.

F. Acceptance: Owner reserves the right to accept or reject Change Proposals.

G. Change Order: A Change order is a modification of the contract:

1. If a Change Order is approved, Owner will issue a Change Order that references PR. Change Order is not valid until it has been signed by Owner.

2. Work performed or equipment supplied outside of contract without a valid Change Order is done at Contractor's own risk.

1.09 OWNER-FURNISHED PRODUCTS

A. Delivery: Owner is responsible for delivery of Owner-furnished products to the Project site, unless otherwise specified in this document.

B. Placement: Contractor is responsible for locating, inspecting, and moving Owner-furnished products to their final installation position.

C. Inspection: Contractor shall report any damage, discrepancies in quantity, type, or function to Owner and Consultant immediately upon discovery.

D. Warranty: Contractor assumes no responsibility for any material warranty for Owner-furnished products. Contractor shall be responsible for integrating, cabling, and installing Owner-furnished products under the same warranty conditions as other products furnished by Contractor.

1.10 CONSTRUCTION PROGRESS MEETINGS

A. Attendance: Contractor is required to attend job progress meetings in accordance with requirements set by Owner or Consultant.

B. Additional Coordination: Contractor shall request additional job construction coordination meetings it deems to be necessary to ensure coordination of its responsibilities with other parties.

1.11 CONSTRUCTION PROGRESS DOCUMENTATION

A. Completion: Contractor shall complete and submit all construction progress documentation as requested by Owner and Consultant. Progress documents shall be submitted every two weeks, at minimum.

B. Failure to Complete: Failure to complete requested construction progress documentation may result in the withholding of payment by Owner.

1.12 SUBMITTAL PROCEDURES

A. Provision: Contractor shall provide submittals of any corrections or additions to Consultant prior to the procurement of equipment or commencement of work. Blue-line Drawings shall be prepared and submitted on 24" x 36" paper. Equipment lists, data sheets, etc., shall be on 8½" x 11" paper, punched and inserted in a three-ring binder.

B. Prior to Work: Submittals shall be provided to Consultant within ten (10) days after the notice to proceed. Submittals are identified in section(s) following Section 27 00 00.

C. Review: Submittals shall be received and stamped "Reviewed" by Consultant prior to the procurement of material or the commencement of work. Any procurement or work performed prior to this approval is at Contractor's own risk.

D. Project Timeline: Project timeline will not be altered due to lateness of submittals. Contractor will remain bound to deliver a timely, complete, and finished project as stipulated in their contract.

E. Failure to Provide: The failure of Contractor to provide submittals as required herein may result in the withholding of payment for work and/or the cancellation of the contract.

1.13 CLOSEOUT PROCEDURES

A. Notification: Contractor shall provide written notification to Consultant and Owner when Contractor is satisfied that the work has been completed and is ready for inspection.

B. Closeout Submittals: Contractor shall provide closeout submittals to Consultant in accordance with the requirements found in these documents. Consultant shall receive the closeout submittals no less than three (3) business days prior to the scheduled final inspection.

C. Final Inspection: Contractor is required to be present for the final inspection by Consultant.

D. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in these documents, and/or unacceptable to Consultant or Owner shall be documented by Consultant and provided to Contractor to rectify.

E. Re-Inspection: If more than one (1) re-inspection is necessary, the costs of the additional travel, hours, and expenses of Owner and Consultant may be deducted by Owner from the contract amount due Contractor.

F. Punch List Approval: Once all punchlist items are complete, the Contractor shall return an initialed punchlist to the Consultant and Owner for verification. Punch list shall be considered complete only after having been signed by Owner and Consultant.

1.14 SOFTWARE

A. Versions: Consultant uses the following software versions:

1. AutoCAD 2012 or earlier version

2. Microsoft Word 2003 or 2007

3. Microsoft Excel 2003 or 2007

4. Microsoft Visio 2003 or 2007

1.15 PROJECT MANAGEMENT

A. Project Manager: Contractor shall appoint a Project Manager who will be the main point of contact for Owner and Consultant regarding the Project.

B. Responsibility: Project Manager is responsible for the following:

1. Successfully completing the contract in a timely manner.

2. Overseeing work and performance of all employees and subcontractors who have been hired by Contractor and ensuring compliance with specification.

3. Completing and submitting required documentation.

4. Attending Project coordination meetings as required by Owner, Consultant, and Contractor. Contractor is responsible for taking minutes of these meetings and distributing copies to all participants.

5. Coordinating with Owner, Consultant, Architect, General Contractor, and other Contractors involved in the Project to ensure smooth flow of work and on-time Project completion.

6. Providing a written bi-weekly progress update to the Owner and Consultant.

7. Reporting all unexpected conditions and problems that may result in delay or expense to Owner and Consultant immediately upon discovery.

C. Change of Project Manager: If Contractor seeks to change Project Manager during the course of the Project, such change is subject to prior written approval from Owner.

1.16 QUALITY ASSURANCE

A. Assurance: It is the intent of these specifications to describe and provide for a complete, professional, and reliable installation.

B. Qualifications: Contractor employees who are engaged in installation shall be properly trained in the tasks they are expected to perform.

C. Acceptability: Owner shall determine the acceptability of work.

D. Regulatory Requirements: Contractor shall comply with code requirements that apply to the work being performed.

E. Certifications: Where manufacturer certifications are required for warranty or for authorized resale, installation personnel shall have received such certification prior to the start of installation of those manufacturers' materials.

1.17 QUALITY CONTROL

A. Installation: During installation period, when connections are made to the Owner's existing infrastructure, Contractor shall use care to ensure that no negative results occur that could reduce or hamper existing systems.

PART 2 – PRODUCTS

2.01 BASIC EQUIPMENT AND MATERIALS REQUIREMENTS

A. Standards: Equipment and materials used to accomplish the goals of this Project shall meet standards for good engineering practice as defined within this document.

B. Quality: Products specified in these documents are intended to establish a baseline or operational, functional, and performance-based standards that all proposed products shall meet or exceed by functionality and quality.

2.02 FACTORY-ASSEMBLED PRODUCTS

A. Manufacturer: Reference to specific equipment manufacturers does not imply that all products produced by that manufacturer meet the specification requirements.

B. Age of Equipment: Equipment shall be new and unused with full manufacturer's warranties. Contractor shall supplement such warranties as required by the specification.

C. No Modification: Where a product is available from a factory/manufacturer to meet the needs as outlined, that product shall be used without modification to ensure the full factory warranty is maintained.

D. Like Materials: Like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.

E. Software/Firmware: No software or firmware is to be used unless specifically authorized by Owner or its appointed representative.

2.03 RACKS, CABINETS, HARDWARE

A. Equipment Racks and Cabinets: Provide racks and cabinets as specified herein and/or described in accompanying documents, appendices, or Drawings. Verify that any existing racks and/or cabinets provided by others are complete, bringing any discrepancies to the attention of Owner and Consultant prior to beginning the installation.

B. Shelves and Mounts: Contractor shall supply necessary mounting hardware to install rack-mounted equipment. Mounting hardware shall be a product of the manufacturer of the equipment to be mounted, or manufacturer of the rack system, or approved by either for use with their product. Provide supporting channels, shelves, rack mounts, and/or rack ears as recommended by equipment manufacturers.

C. Screws and Washers: Contractor shall provide screw head types appropriate to the level of security required for the equipment and racking. Screws shall include polyethylene or nylon washer.

    1. Public Access Areas: Star post security screws shall be used for hardware and equipment mounted in equipment racks and consoles in areas that are accessible to the public.

    2. Restricted Access Areas: Philips head screws shall be used where a secure room or locked rack/console door prevents public access.

2.04 CABLE AND CONNECTORS

A. Cable: Cable shall be selected and applied in a manner defined by signal type, consistent with best industry practices. Highest quality products shall be used with attention given to

transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Where required by the NEC, substitutions of air handing plenum cable shall exactly match the normally applied product and shall meet the standards of UL Standard #900 and the NEC Articles 800 and 820.

B. Connectors: Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Strain reliefs and cable clamps shall be sized for the connector and the cable.

C. Color: Cable and connector color shall be coordinated with Consultant and Owner to maintain consistency with cable and connector color schemes used by other trades.

2.05 CABLE MANAGEMENT

A. Velcro Cable Ties: Above or below ceiling level and within equipment enclosures, Velcro straps shall be used on all cable bundles. Velcro straps shall be black, with no logo or decoration.

B. Plastic/nylon cable ties shall not be used for voice/data or AV cables.

2.06 ANCILLARY HARDWARE

A. General: Contractor will provide ancillary and required accessory items necessary to furnish to Owner a complete and fully functional system.

B. Interpretation: Exclusion of or limitation in the language used in the Drawings or specifications shall not be interpreted as meaning that ancillary or accessory items of work or equipment necessary to complete or make the installed system fully functional can be omitted.

2.07 GROUNDING HARDWARE

A. Mechanical Connectors

1. Material: Mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers, and lock washers shall be made of Silicon Bronze and supplied as a part of the connector body and shall be of the two bolt type.

2. Split Bolts: Split bolt connector types shall not be used.

3. Standards: Connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size, and manufacturer.

B. Compression Connectors

1. Material: Compression connectors shall be manufactured from pure wrought copper. Conductivity of this material shall be no less than 99% by IACS standards.

2. Standards: Connectors shall meet or exceed the performance requirements of IEEE 837, latest revision.

3. Installation: Installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors.

4. Labeling: Connectors shall be clearly marked with manufacturer, catalog number, conductor size, and required compression tool settings.

5. Protection: Each connector shall be factory filled with an oxide-inhibiting compound.

C. Wire

1. Material: Stranded copper (aluminum not permitted). AWG #3, AWG #4 and AWG #6 as specified on Project Drawings or sections after 27 00 00.

2. Feeder and Branch Circuit Equipment Ground: Size as shown on drawings, specifications, or as required by NFPA 70, whichever is larger. Differentiate between normal ground and isolated ground when both are used on the same facility.

2.08 COMPATIBILITY OF RELATED EQUIPMENT

A. Existing Equipment: Equipment and systems specified in these documents shall be assumed to be compatible with the systems already installed at Owner site(s) and as identified in this document as related to this Project.

B. Installed Equipment: Specified equipment and systems shall be compatible with all other equipment and systems as offered by Contractor, thus placing the responsibility on Contractor to ensure proper interaction.

2.09 MAINTENANCE MANUALS

A. Contractor shall produce a maintenance manual showing interconnection of equipment and any special procedures necessary for proper operation of the systems.

PART 3 – EXECUTION

3.01 GENERAL

A. Contractor shall provide, furnish, deliver, transport, erect, install, configure, and connect completely all of the material and equipment described herein or depicted on any bid package document or Drawing, and shall leave all systems in first-class operating condition.

3.02 COORDINATION

A. General: Contractor shall cooperate with other Contractors for proper provisioning, anchorage, placement, and execution of all work. Interference between the work of various Contractors shall be resolved before installation. In the event of conflict with other trades on space requirements or location, refer the matter to Owner and Consultant for decision.

B. Related Work: References to the following related work do not limit or release Contractor from the responsibility of coordination with other trades or from having the necessary knowledge of other non-referenced work.

    1. Work by General Contractor.

    2. Work by other Technology Contractors.

    3. Work by Electrical Contractor, including electrical rough-ins and surface-mounted raceway.

C. Delays: Contractor shall coordinate with all other trades to avoid causing delays in the installation schedule.

D. AC Power: Contractor shall coordinate with General Contractor its requirements for proper AC power to service all equipment installed by Contractor.

E. Grounding: Contractor shall coordinate with General Contractor its requirements for proper ground system to its equipment.

F. Surface-Mounted Raceway Coordination

    1. General and Electrical Contractors: Contractor shall coordinate with

G. General Contractor and Electrical Contractor the installation of surface-mounted raceway where not provided but made necessary by non-penetrable wall.

    1. Verification: Contractor shall field verify and coordinate the proposed use of surface-mounted raceway at any location with Consultant and Owner.

3.03 BASIC EXECUTION REQUIREMENTS

A. General: Contractor is responsible for following industry standards of good practice for telecommunications and networking equipment.

B. Aesthetic Factors: With the installation of equipment and cables, consideration shall be given not only to operation efficiency but also to overall aesthetic factors. Contractor shall redo, at no cost to Owner, any work deemed by Owner to appear sloppy, hastily done, or unprofessional. Owner shall make final decision over whether work shall be redone.

C. Manufacturers' Recommendations: Manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers or as indicated in their published literature unless otherwise noted herein.

D. Protection of Work Area: Work shall be properly protected during construction, including the shielding of soft or fragile materials, protecting against dust and dirt, protecting and supporting cable ends off of the floor and from other traffic, protecting floor box lids, and temporarily plugging open conduits during construction. Upon completion, installation shall be thoroughly cleaned and all tools, equipment, obstructions, or debris present as a result of work shall be removed from the premises.

E. Waste Materials: Contractor shall keep work area neat, orderly, and free from accumulation of waste materials. Remove trash and debris from the building and job site as required to maintain a clean work environment at all times. Rubbish shall be moved to a common trash point or receptacle on the job site as determined and directed by General Contractor or Owner.

F. Ceiling Grid: Contractor shall not hang cable supports from ceiling grid wire.

G. Roof Deck: Contractor shall not shoot into the roof deck for mounting cable hangers.

H. Mounting: Equipment and enclosures shall be mounted plumb and square in relation to the structure.

3.04 PREPARATION

A. Existing Equipment: Prior to any installation, the Contractor shall prepare the site by removing any remaining debris, leveling equipment racks (where appropriate), and verifying information and systems stated to be in-place are ready for use.

B. Equipment for Installation: Prior to installation, Contractor shall ensure that required major equipment has been secured and is ready for installation.

3.05 CLEANING

A. At the end of each work period or day, Contractor shall remove excess packing, drilling remnants, and other non-equipment related parts, materials, or debris to ensure a clean, safe, and professional working environment.

3.06 FIRE STOPPING

A. Contractor is responsible for applying fire-stopping material in and around all openings that it creates or are created for it, whether or not specifically indicated in specifications or Project Drawings, where code or good engineering practice suggests or requires the use of fire stopping material.

B. Contractor shall ensure that all fire-stopping materials meet appropriate codes and are applied according to good engineering practice.

3.07 WATERPROOFING

A. Contractor shall create a waterproof seal in and around any openings to the outside environment that are created by Contractor or for systems being installed.

B. Contractor shall ensure that all waterproof materials meet appropriate codes and are applied according to good engineering practice.

3.08 RACKS, CABINETS, AND HARDWARE

A. Racks and Cabinets: Contractor shall assemble and install racks and cabinets.

B. Installation Hardware: Install hardware in a secure manner. Screws shall be tightened to a torque just sufficient to secure equipment without deforming washers beyond their original diameter.

C. Considerations: Rack mount equipment shall be secured as recommended by the manufacturer with consideration to airflow, power, and in/out connections.

D. Cross Connections: Where cross connections are required between equipment, interconnections shall be installed using cable management technology to secure cables in a neat and orderly fashion, applying best industry practices.

3.09 GROUNDING

A. General: Install products in accordance with manufacturer's instructions. Mechanical connections shall be accessible for inspection and maintenance. No insulation shall be installed over mechanical ground connections. Ground connection surfaces shall be cleaned and all connections shall be made so that disconnection or removal is impossible.

3.10 CABLE

A. Cable Treatment: Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the rating of the manufacturer.

B. Splicing

1. Length: No splices shall be installed in any multimedia/video cable less than five hundred (500) feet in length.

2. Voice and Data Cables: No splices are allowed in any voice or data cables.

3. Cable Splices for overhead paging system shall occur only at speaker, amplifier or volume control knob locations.

C. Lengths

1. Variations: Where cables are to be of the same length, variations in the length shall be less than plus or minus ½". Lengths of cables are based on the length of the unterminated signal conductors.

2. Labeling: Cables shall be marked with a scheme approved by Consultant.

3. Grouping: Cables shall be separated into like groups according to signal or power levels.

4. Power Cables: Power cables shall be grouped to one side of the equipment rack while low-level cables shall be grouped to the other side.

5. Equipment Racks: Rack wiring and cabling shall be neatly dressed.

6. Service Loops: Cables shall have service loops as defined in sections after 27 00 00.

7. Fastening: Rack cabling shall be adequately supported with Velcro wraps and horizontal support cable managers fastened to rack frame.

8. External Wire Support: External wire and cables shall be supported at least every 5 feet from the structure or as required to maintain not more than 6" cable sag between supports and without over tensioning the cables.

9. Support Hardware: Cables shall be supported by J-hooks, cable tray, or ladder rack. Hardware shall be secured to building structure using 3/8” threaded rod supports.

10. Right Angles: Cables shall run at right angles to the structure, placed above ceiling in halls or corridors.

11. Height: Cables shall not run above red iron joist.

D. Concealment: Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests. Cabling systems installed in public areas shall be installed within walls, ceiling, or floors or within surface wiring pathways, as dictated by codes and good engineering practice.

E. Velcro Straps: Velcro straps shall be installed snugly without deforming cable insulation. Straps shall be spaced at uneven intervals not to exceed 8 inches.

F. Obstruction: Contractor shall notify Owner immediately if any obstruction or hazard is discovered in a pathway provided by others.

3.11 CONNECTORS

A. Preparation: Cables shall be carefully prepared and connectors installed as directed by the manufacturer. Proper stripping devices and crimping tools shall be used.

B. Terminations: Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner suited to the service of the wire and as directed by the manufacturer. Contractor shall use manufacturer specified terminations when those specifications exist.

C. Soldering: A person skilled in that practice shall execute soldered terminations.

D. Adapters: Adapters shall be used only where the identity of the necessary type of connector is unknown at the time of installation, such as for Owner provided equipment or in anticipation of future equipment upgrades, with Consultant's approval.

3.12 EQUIPMENT INSTALLATION

A. General: Contractor shall make system properly operational and physically secure by mounting equipment and related accessories into furniture, consoles, and racks as required. Manufacturer's guidelines for installation shall be followed. Discrepancies in installation procedure or inability to complete a given task due to a shortage of materials or malfunctioning equipment shall be reported to Consultant immediately upon discovery.

B. Equipment Placement: Contractor shall locate equipment as indicated on Drawings and as specified herein. Where such information is not provided, follow industry practices and locate operable devices at convenient positions—heat generating devices at the top and seldom-accessed equipment below. Unless otherwise specified, end user-operable

devices shall be positioned within the range of front wheelchair access per ADA standards.

C. Equipment Installation: Equipment shall be installed as directed by the manufacturer using equipment manufacturer's desktop mounting frames, equipment tubs, installation hardware, and techniques. Contractor shall be responsible for moving equipment from storage and for providing necessary personnel or devices to carry and lift equipment around obstacles and into operating position.

3.13 ROUGH-IN

A. Scheduling: Contractor shall make every effort to install systems per this specification in a timely manner including rough-in of cabling and other apparatus where appropriate to stay on schedule.

B. Protection of Environment: Where cabling and/or equipment is installed prior to other trades completing their work in an area, Contractor shall take necessary precautions to cover, wrap, or otherwise protect to reduce possible damage due to plastering, painting, cleaning, or other such work.

3.14 CUTTING, DRILLING, PATCHING, AND PAINTING

A. Coordination: Contractor shall coordinate the work when any cutting or drilling is required in the performance of installing the specified systems.

B. Restoration: Contractor shall return all surfaces (including walls, floors, and ceilings) to their previous condition after any cutting.

3.15 LABELING

A. General: Rack-mounted equipment and hardware shall be labeled as required herein. Connectors, jacks, receptacles, outlets, cables, cable terminations, terminal blocks, rack mounted equipment, active slots of card frame systems, etc. shall be clearly, logically, and permanently labeled in a manner acceptable to Consultant.
B. Approval: Proposed wording and/or numbering schemes for labeling shall be provided to Consultant for review and written approval prior to procurement or installation.
C. Labels used shall be permanent and secure. Provide labeling as follows unless otherwise noted in a specific section:
    1. Like Size: Labels shall be sized to match other labels used for same purpose. Similarly, provide engraved labels of like size in other locations.

    2. Equipment Racks: For enclosed racks containing equipment, provide labels on each equipment rack rear door or console rear panel reading "No user serviceable parts. Refer service to qualified technician."

3. Installer and Consultant Identification: Position at the front top center section of each equipment rack a label that states the names of system Installer and Consultant.

4. Custom Panels: Custom panel nomenclature shall be engraved, etched, or screened. Markings are to be designed to ensure consistency and clarity within and without of system. Verify markings and placements by submitting label sample layouts to Consultant for approval prior to procurement.

5. Documentation: Labeling information shall appear on the as-built drawings.

3.16 ADDITIONAL ENGINEERING SERVICES

A. General: Contractor shall secure necessary engineering services where needed to meet the needs of the installation.

B. Change Orders: Only when Contractor can show that additional engineering services are needed as a result of changes to the scope of the services being requested will Owner entertain a Change Order for these services.

PART 4 – TESTING

4.01 GENERAL

A. Supplies: Contractor shall supply testing equipment needed to verify compliance with specifications found in these documents.

B. Program: Contractor shall complete required testing prior to the inspection by Owner and Consultant.

C. Data: Test data shall be properly documented and recorded so that it is available for final inspection.

D. Quality Control: Testing may be repeated during the inspection process at the request of Owner or Consultant.

4.02 TESTING

A. Prior to energizing or testing the system, ensure the following:

1. Installation: Products are installed in a proper and safe manner per the manufacturer's instructions.

2. Cleanliness: Products are neat, clean, and unmarred and parts securely attached. Dust, debris, solder, splatter, etc., is removed.

3. Cables and Connections: Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. Grounding: Electronic devices are properly grounded.

5. AC Power: Each AC power receptacle is tested with a circuit checker for proper hot, neutral, and ground connections prior to plugging in equipment.

4.03 GROUNDING

A. General: Inspect grounding and bonding system conductors and connections for tightness and proper installation. Use suitable test instrument to measure resistance to ground of system.

B. Manufacturer's Recommendations: Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

C. Resistance: Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 2 ohms.

END OF SECTION

Unless noted otherwise, "Contractor" refers to the Structured Cabling Contractor.

1.01 SCOPE

A. This section describes the products and execution requirements related to furnishing and installing Category 6 Cabling and Termination Components and related subsystems as part of a Structured Cabling System.
B. Backbone system comprising copper, and fiber optic cabling and horizontal (station) cabling is covered under this document.
C. Others will provide the network electronics for the LAN within the Telecom Rooms (TRs) and will be responsible for connecting the new cabling infrastructure to the LAN. This Contractor, however, shall supply the Category 6 patch cords. The Contractor shall be available on site during the crossover to assist with any cabling issues that may occur during the connection.
D. The Electrical Contractor shall install conduits and surface raceway for new technology outlet locations unless otherwise noted.
E. The Telecommunication Contractor shall provide and install all sleeves through the wall penetrations as required whether or not specifically marked on Project Drawings, unless otherwise noted.
F. All cables and related termination support, and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following section(s).

G. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the TX Electrical Code, and present manufacturing standards.
H. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

1.02 CODE AND STANDARD REQUIREMENTS

1. IEEE – 2007 National Electrical Safety Code
2. NFPA 70– National Electrical Code
3. TIA/EIA 568-B-1, 2, 3 Standards
4. IEEE/ANSI 142-1982 – Recommended Practice for Grounding of
5. Industrial and Commercial Power Systems
6. ASTM B633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel
7. ASTM A653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process
8. ASTM A123 – Specification for Zinc (Hot Galvanized) Coatings on Iron and Steel
9. ASTM A510 – Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
10. ANSI/TIA/EIA 569 - Commercial Building Standard for Pathways and Spaces
11. ANSI/TIA/EIA 568B - Commercial Building Telecommunications Standard
12. ANSI/TIA/EIA 606 - Commercial Building Standard for Labeling and Administration
13. ANSI/TIA/EIA 607 - Commercial Building Standard for Bonding and Grounding

1.03 RELATED WORK

A. Section 27 00 00 – General Technology Requirements

1.04 SUBMITTALS

A. Submit three (3) sets of shop Drawings for all materials proposed. Two (2) of these sets will be returned to the Contractor. Submittals shall be sent to the Consultant for review and approval.
    1. Detail Drawings: Detail Drawings include a complete list of equipment and material. Detail Drawings shall contain complete wiring and schematic diagrams and other details required to demonstrate that the system has been coordinated and will function properly as a system. Drawings shall include equipment rack elevation details, elevation details of telecommunications equipment to be mounted to telecom room walls, and outlet faceplate details for all outlet configurations, sizes, and types of all cables. Drawings shall show proposed overhead telecom room layout(s), as well as equipment relationship to other parts of the work, including clearance for maintenance and operation.
    2. Manufacturer's Recommendations
        a. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be provided

prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received and approved.

b. Work shall not proceed without the approved submittals.

1.05 FINAL CLOSE-OUT DOCUMENTATION

A. Upon completion of the installation, the Contractor shall provide three (3) full documentation sets to the Consultant for approval.
B. Close out documents should include three (3) 3-ring binders with the following:
    1. As-built drawings - Hard copy full size
    2. Certificate of testing/completion
    3. Data cable test results (summary sheets only, we do not want hundreds of pages of test results).
    4. CD containing:
        a. As-built drawings (CAD format)
        b. As-built drawings (PDF format)
        c. Detailed test results in original tester format (Fluke Linkware)
        d. Detailed cable test results in PDF format
    5. Warranty certification from connectivity manufacturer
    6. Three CDs with PDF and .dwg files
    7. Letter of completion
        a. Signed by an Authorized Agent
        b. Includes project description
        c. Includes project completion date and warranty start/finish dates
C. All documentation, including hard copy and electronic forms, shall become the property of the Owner.

1.07 CERTIFICATES

A. Premises Distribution System: Written certification that the premises distribution system complies with the EIA ANSI/TIA/EIA-568B-1, 2, 3, EIA ANSI/TIA/EIA-569A, and EIA ANSI/TIA/EIA-606.
B. Materials and Equipment: Where materials or equipment are specified to conform, be constructed, or be tested to meet specific requirements, certification that the items provided conforms to such requirements. Certification by a nationally recognized testing laboratory that a representative sample has been tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specifications.
C. Installers
    1. The Contractor shall have an RCDD (Registered Communication Distribution Designer) on staff assigned to manage this Project; documented proof shall accompany the proposal response.
    2. All installing personnel shall have completed and be certified in manufacturer training or BICSI (Building Industry Consulting Service International) installation training for UTP infrastructure systems, or the Contractor shall contract with

manufacturer for installation of all proposed components. Company Certifications shall accompany the proposal response.

3. The Contractor's technicians shall be certified and trained in the connectivity hardware that is being installed.
4. The Contractor shall submit certification that installers are factory certified to install and test the provided products. No less than half of the crew to be used for the telecommunications installation shall be trained by that manufacturer for the work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Vendor shall be responsible for all materials until completion of Project.
B. Cable shall be stored according to manufacturer's recommendations at minimum. In addition, cable shall be stored in a location protected from vandalism and weather.
C. If cable is stored outside, it shall be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees Fahrenheit, the cable shall be moved to a heated (minimum 50 degrees Fahrenheit) location. If necessary, cable shall be stored off site at the Contractor's expense.
D. If the Contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.
E. Commercial off-the-shelf manuals shall be furnished for operation, installation, configuration, and maintenance for all products provided as a part of the premises distribution system. Specification sheets for all cable, connectors, and other equipment shall be provided.

1.09 WARRANTY

A. The Contractor shall provide to the Owner a manufacturer's 25 year warranty certificate for all materials, equipment, etc. Upon successful completion of the installation and subsequent inspection, the Owner shall receive a numbered certificate, from the manufacturing connectivity hardware (patch panels, jacks, parch cords 110 blocks, etc.) company, registering the installation. This warranty shall include all labor, materials, and travel time.
B. The warranty shall ensure against product defects and guarantee that all approved cabling components exceed the specifications of TIA/EIA-568B, and ISO/IEC IS 11801 for cabling links/channels, and that the installation will exceed the loss and bandwidth requirements of TIA/EIA 568B ISO/IEC IS 11801 for fiber links/channels, for a twenty five (25) year period. The warranty shall apply to all passive structure cabling system components.
C. The warranty shall cover the failure of the wiring system to support the application that it was designed to support, as well as additional application(s) introduced in the future by recognized standards or user forums that use the TIA/EIA 568B or ISO/IEC IS 11801 component and link/channel specifications for cabling, for a twenty five (25) year period.
D. The warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective products(s), labeling of the new components, and testing of the circuit(s) at no cost to the Owner.

1.10 CODE REQUIREMENTS

A. ANSI/IEEE C2 National Electrical Safety Code
B. NFPA 70-2004 National Electrical Code 4
C. EIA/TIA Standards

PART 2 – PRODUCTS

2.01 FIRE STOPPING MATERIALS

A. All penetrations of walls shall be approved by the General Contractor before any penetrations are made. Should the Contractor find it necessary to penetrate any walls extending to the slab, it will be the responsibility of that Contractor to provide satisfactory sleeving and fire caulking both inside and outside of that sleeving. If existing sleeving is to be utilized, it will be the responsibility of the Contractor to fire caulk the exterior of the sleeve and provide fire putty inside the sleeve.
B. A submitted response to this specification assumes that all fire stopping will be provided as specified. The firestop manufacturer's specifications and instructions shall be submitted with the final documentation.

2.02 PATCH PANELS

A. Cables shall be terminated at the telecommunication closets on high-density integrated patch panels incorporating Category 6 modules (non-keyed 8-pin), meeting the specifications for the telecommunications outlet detailed in the section above.
B. The patch panels shall have a removable 6-port design that allows a 6-port or 8-port faceplate to be removed from the panel without disrupting the other ports.
C. Patch panel configuration shall be 48 ports. The patch panel shall consist of a modular to 110-type connector system.
D. The patch panel blocks shall have the ability to seat and cut 8 conductors (4 pairs) at a time and shall have the ability of terminating 22- through 26-gauge plastic insulated, solid, and stranded copper conductors. Data blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
E. The patch panel shall exceed ANSI/TIA/EIA 568-B.2-1 Category 6 component compliance standard. All pair combinations shall be considered, with the worst-case measurement being the basis for compliance.
F. The patch panels shall be interoperable and backwards compatible to lower performing cabling systems.
G. Panels shall incorporate cable support and/or strain relief mechanisms to secure the horizontal cables at the termination block and to ensure that all manufacturers' minimum bend radius specifications are adhered to.
H. The patch panel shall have color-coded designation strips to identify cable count.
I. Category 6 patch panels shall be manufactured by Panduit – part # CPPL48M6BL

2.04 FIBER OPTIC PATCH PANELS

A. The Contractor shall provide a fiber optic patch panel at each location where a fiber optic cable terminates.
B. All terminated fibers shall be mated to duplex SC couplings mounted on enclosed patch panels. Couplers shall be mounted on a panel that, in turn, snaps into the enclosure. The

proposed enclosure shall be designed to accommodate a changing variety of connector types, including SC, ST, Fixed Shroud Duplex (e.g., "FDDI Connector"), Bionic, and FC by changing panels on which connector couplings are mounted.

C. The patch panel enclosure shall be sized to accommodate the total fiber count to be installed at each location as defined in the specifications and Drawings, including those not terminated (if applicable), PLUS 50% future growth.
D. The Contractor shall provide all required connector panels and connector couplings (sleeves, bulkheads, etc.) adequate to accommodate the number of fibers to be terminated.
E. Patch panels shall be designed for easy installation, front removal, and expansion of snap-in adapter panels.
F. Patch panels shall be enclosed assemblies affording protection to the cable subassemblies and to the terminated ends. The enclosures shall incorporate a hinged or retractable front cover designed to protect the connector couplings and fiber optic jumpers.
G. The patch panel's enclosure shall provide for strain relief of incoming cables and shall incorporate radius control mechanisms to limit bending of the fiber to the manufacturer's recommended minimums or 1.2", whichever is larger.
H. Access to the inside of the patch panel enclosure during installation shall be from the front and rear. Panels that require any disassembly of the cabinet to gain entry will not be accepted.
I. All patch panels shall provide protection to both the "facilities" and "user" side of the coupling. The patch panel enclosure shall be configured to require front access only when patching. The incoming cables (backbone, riser, etc.) shall not be accessible from the patching area of the panel. The enclosure shall provide a physical barrier to access of such cables.
J. Where single-mode fibers are installed, the fibers contained in these cables may be terminated either by (1) splicing of factory-terminated cable assemblies ("pigtails") or (2) use of a "fan-out" kit. In the latter approach, individual fibers are to be secured in a protective covering (such as an Aramid reinforced tube, for example) with connectors mated to the resulting assembly. In both instances, the proposed termination hardware shall incorporate a mechanism by which cable and subassemblies are secured to prevent damage. Splicing shall be by the "fusion" method. Individual splice loss shall not exceed 0.2 dB.
K. Fiber optic patch panels shall be Panduit FRME1 (IDF) and FRME4 in MDF.
L. 50-micron SC connectors shall be Panduit FSCMCXAQ.
M. SC adaptor panels shall be Panduit FAP6WAQSCZ.

2.05 CABLE MANAGEMENT SYSTEM

A. The cable management system shall be used to provide a neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures. The system shall be a complete cable management system comprising 4-post and 2-post floor mount racks, wall mount racks, and vertical and horizontal cable managers to manage cables on both the front and rear of the rack. The system shall protect network investment by maintaining system performance, controlling cable bend radius, and providing cable strain relief.
    1. MDF 4-Post Equipment Rack (as noted on plans)

a. At the MDF rooms, the Contractor shall provide and install 4-post adjustable equipment racks to house cable termination components (e.g., copper data and fiber optic) and network electronics (by others). Prior to installation, the Contractor shall coordinate exact placement with Owner.
b. The 4-post rack shall conform to the following requirements:
    i. Rack shall be 84" in height and shall be self-supporting.
    ii. Channel uprights shall be spaced to accommodate industry standard 19" mounting.
    iii. Rack shall be constructed of aluminum.
    iv. Rack shall be double side drilled and tapped to accept 12-24 screws. Uprights shall also be drilled on back to accept cable brackets, clamps, power strip(s), etc. Hole pattern on rack front shall be per EIA/TIA specifications (5/8"-5/8"-1/2"). Hole pattern on the rear shall be at 3" intervals to accept cable brackets.
    v. Rack shall be supplied with at least 24 spare screws.
    vi. Rack shall be supplied with a ground bar and #6 AWG ground lug.
    vii. Equipment rack shall be Homaco 19-84-SSDA2132 or equal. Contractor shall provide 100 cage nuts and screws with each rack.

2. 2-Post Equipment Racks
    a. Unless otherwise noted on the Project Drawings, at the IDF rooms the Contractor shall provide and install 2-post adjustable equipment racks to house cable termination components (e.g., copper data and fiber optic) and network electronics (by others). Prior to installation, the Contractor shall coordinate exact placement with Owner.
    b. The rack shall conform to the following requirements:
        i. Rack shall be 84" in height and shall be self-supporting.
        ii. Channel uprights shall be spaced to accommodate industry standard 19" mounting and have pass-through holes with smooth edges to protect cables.
        iii. Rack shall be constructed of aluminum.
        iv. Rack shall be double side drilled and tapped to accept 12-24 screws. Uprights shall also be drilled on back to accept cable brackets, clamps, power strip(s), etc. Hole pattern on rack front shall be per EIA/TIA specifications (5/8"-5/8"-1/2"). Hole pattern on the rear shall be at 3" intervals to accept cable brackets.
        v. Rack shall be supplied with at least 24 spare screws.
        vi. Rack shall be supplied with a ground bar and #6 AWG ground lug.
        vii. Equipment rack shall be CPI 55053-703.

B. Vertical Cable Management
    1. At the telecommunication rooms, vertical cable management shall be furnished and installed to adjacent racks to organize cables on front and rear of telecommunication racks.
    2. Vertical cable managers shall include components that aid in routing, managing, and organizing cable to and from equipment. Panels shall protect network

equipment by controlling cable bend radius and providing cable strain relief. Panels shall be a universal design mounting to EIA 19" or 23" racks.

3. Vertical cable management system shall feature the following:
    a. Open cabling section on the rear that provides easy access and routes cable bundles feeding into the back of patch panels and 1 RMU cable guide on the front designed for fanning and managing patch cords.
    b. Edge-protected pass-through ports designed for easy routing of cable from front channel to back.
    c. Vertical slots along the center separator to allow securing cable bundles neatly with management straps.
    d. Door/cover (front only) that is easily opened from the right or left and still easily removed to allow for quick moves, adds, and changes.
    e. Movable wire retainers to retain the cables during cover removal.
    f. Vertical cable management at the end of rack rows shall be Panduit part # PRV6.
    g. Vertical cable management door shall be Panduit part # PRD6.

2.08 WALL MOUNT EQUIPMENT CABINET

A. Where indicated on Project Drawings, the Contractor shall provide and install one (1) wall mount cabinet to house cable termination panels and network electronics. The Contractor shall also provide and install one (1) ¾" plywood backboard for support when mounting cabinet.
B. The Contractor shall coordinate with Electrical Contractor to install a power outlet into cabinet.
C. Cabinets shall come with two (2) fans and one (1) 8-outlet 20 amp rack mount power strip.
D. Fans shall be Chatsworth 12804-701.
E. Power Strip shall be Chatsworth 12820-707.
F. Cabinet shall be Chatsworth 12419-7XX.

2.09 HORIZONTAL CABLE MANAGEMENT

A. Horizontal cable managers shall include components that aid in routing, managing, and organizing cable to and from equipment. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief. Panels shall be a universal design mounting to EIA 19" racks and constructed of steel bases with PVC duct attached. The duct fingers shall include retaining tabs to retain the cables in place during cover removal. The covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.
B. The cable managers shall be provided with movable wire retainers to retain the cables during cover removal and #12-24 mounting screws. An integral strain relief bracket shall be provided on either end of the duct to allow for easy cover placement.
C. Double-Sided horizontal cable managers shall be placed above and below each patch panel. Double-Sided horizontal cable management shall be Panduit part # NCMH2.

2.10 LADDER RACK

A. At each TR, the Contractor shall provide and install ladder rack as shown on the Project Drawings.

B. The Contractor shall provide all necessary labor, supervision, materials, equipment, tests, and services to install complete wire basket runway systems in the telecommunications room as shown on the Drawings.
C. Specifications and Drawings are for assistance and guidance, but exact routing, locations, distances, and levels will be governed by actual field conditions.
D. All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 stainless steel.
E. Cable Drop Out/Waterfall
F. Where cables bundles transition from tray and drop into the racks/cabinets, the Contractor shall provide and install a radius control device. This device shall be a waterfall or drop out device and shall be properly sized to accommodate cable bundle plus 20% future growth.
G. Ladder rack shall be CPI 10250-712 with 12392-709 waterfall.
H. Accessories (connectors, splice plates…) shall be painted to match tray finish.

2.11 CABLE DROP OUT/WATERFALL

A. Where cables bundles with more than 10 cables transition from conduit/sleeve and drop down more than 12", the Contractor shall provide and install a radius control device. This device shall be Panduit CWFx00 and shall be sized for the conduit/sleeve.
B. Where cables bundles with more than 10 cables transition from tray and drop down more than 12", the Contractor shall provide and install a radius control device. This device shall be Cablofil CABLEXIT and shall be properly sized to accommodate cable bundle plus 20% future growth.

2.12 TIGHT-BUFFERED OPTICAL FIBER CABLES FOR INDOOR DISTRIBUTION APPLICATIONS

A. General Considerations
    1. The cable shall meet the requirements of the National Electrical Code (NEC) Section 770.
    2. For plenum applications, the cable shall meet applicable flame tests: ANSI/UL 910 (NFPA 262-1994).
    3. Cables shall be listed OFNP (OFCP).
    4. Finished cables shall conform to the applicable performance requirements of Tables 8-6 and 8-7 of the Insulated Cable Consultants Association, Inc. (ICEA) *Standard for Fiber Optic Premises Distribution Cable* (ICEA S-83-596).
B. Cable Construction
    1. The coated fiber shall have a layer of Teflon placed between the acrylate coating of the optical fiber and the thermoplastic buffer. The diameter of the thermoplastic buffer coating shall be 900 ±50µm. The fiber coating and buffer shall be removable with commercially available stripping tools in a single pass.
    2. Cables with 2 to 24 fibers layered aramid yarns shall serve as the tensile strength member of the cable.
    3. A ripcord shall be applied between the aramid yarns and the outer jacket to facilitate jacket removal.

4. The outer jacket shall be extruded over the aramid yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.
5. The fibers shall be stranded around a dielectric central member.
6. For cables containing 12-24 fibers, the fibers shall be arranged in two layers.
7. The central member shall be over coated with a thermoplastic, when required, to achieve dimensional sizing to accommodate and support the 900 μm buffered fibers.
8. Cables with 24 to 60 fibers shall have unitized riser and plenum constructions.
9. The buffered fibers shall be grouped in six-fiber subunits.
10. The fibers shall be stranded around a dielectric central member in the subunit.
11. Layered aramid yarns shall serve as the tensile strength member of the subunit.
12. A ripcord may be applied between the aramid yarns and the subunit jacket to facilitate jacket removal.
13. The subunit jacket shall be extruded over the aramid yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections .The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.
14. The subunits shall be stranded around a dielectric central member. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. The outer jacket shall be extruded around the subunits. The strength members shall be of a high modulus aramid yarn. The aramid yarns shall be helically stranded around the buffered fibers. Non-toxic, non-irritant talc shall be applied to the yarns to allow them to be easily separated from the fibers and the subunit jacket.

C. Outer Cable Jacket
1. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand stresses. The nominal thickness of the cable outer jacket shall be sufficient to provide adequate cable protection while meeting the mechanical, flammability, and environmental test requirements of this document over the life of the cable.
2. The indoor distribution cable specified herein shall have an interlocking armor made of steel or aluminum. The interlocking armor for plenum cables shall have a PVC jacket.
3. The color of the armor jacket shall match the jacket color of the optical fiber cable located inside of the armor. The armor for these cables shall be comparable to liquid tight flexible metal conduit if jacketed, or flexible metal conduit.

D. Fiber Identification
1. The individual fibers shall be color-coded for identification. The optical fiber color-coding shall be in accordance with EIA/TIA-598 B “Optical Fiber Cable Color-Coding.” The coloring material shall be stable over the temperature range

of the cable, shall not be susceptible to migration, and shall not affect the transmission characteristics of the optical fibers. Color-coded buffered fibers shall not adhere to one another.

2. When buffered fibers are grouped into individual subunits, each subunit jacket shall be numbered for identification, with the exception of filler subunits where used. The number shall be repeated at regular intervals. The subunit jacket color shall be orange for subunits containing multimode fibers, yellow for subunits containing single-mode fibers, and white for filler subunits.
3. The outer jacket for all dielectric cable shall be marked with the manufacturer name or UL file number, date of manufacture, fiber type, flame rating, listing symbol, and sequential length markings every two feet. The marking shall be in contrasting color to the cable jacket. The cable jacket color shall be orange for cables containing multimode fibers and yellow for cables containing single-mode fibers.
4. Cables with a PVC jacket over interlocking armor shall be marked with the manufacturer name, date of manufacture, fiber type, flame rating, listing symbol, and sequential length markings every two feet. The marking shall be in contrasting color to the cable jacket. The cable jacket color shall match the color of the core optical fiber cable.

E. Multimode (50/125 μm)
   1. The multimode fiber utilized in the optical fiber cable shall meet EIA/TIA-492AAAA-A-1997, Detail Specification for 50μm Core Diameter/125μm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers (OM3 type). Cable shall have the following specifications:
      a. Core Diameter: 50 ± 3 μm
      b. Core Non-Circularity: ≤5%
      c. Cladding Diameter: 125± 2 μm
      d. Cladding Non-Circularity: <2.0%
      e. Core-to-Cladding Concentricity: ≤ 3 μm
      f. Coating Diameter: 245 ± 2 mm
      g. Refractive Index Profile: Graded index
      h. Numerical Aperture: 0.275 ± 0.015
      i. Maximum Attenuation: less than 3.0 dB/km at 850 nm and 1.0 dB/km at 1300 nm.
   2. IEEE 802.3z Performance: The fiber shall support laser-based 10 Gigabit Ethernet (10GbE) operation for up to 300 meters.
   3. Attenuation at the Water Peak: The attenuation coefficient at 1380 nm shall not exceed the attenuation coefficient at 1300 nm by more than 1.0 dB/km.
   4. Macrobend Attenuation: The attenuation due to 100 turns of fiber around a 75-± 2 mm diameter mandrel shall not exceed 0.5 dB at 850 nm or1300 nm.

F. Single Mode
   1. The single-mode fiber utilized in the optical fiber cable shall meet EIA/TIA-492CAAA, Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers, and ITU recommendation G.652, and Characteristics of Single-Mode Optical Fiber Cable. The cable shall meet the following specifications:
      a. Core Diameter (Characterized): 8.3 μm

b. Cladding Diameter: 125. ±1.0µm
c. Core-to-Cladding Concentricity: ≤ 0.8 µm
d. Cladding Non-Circularity: ≤1.0 %
e. Coating Diameter: 245 ±10µm

2. Attenuation: The maximum attenuation shall be 0.5 dB/km at 1310 nm and 0.4 dB/km at 1550 nm.
3. Attenuation Uniformity: There shall be no point discontinuity greater than 0.10 dB at either 1310 nm or 1550 nm.
4. Attenuation at the Water Peak: The attenuation at 1383 ± 3 nm shall not exceed 2.1dB/km.
5. Cutoff Wavelength: The cabled fiber cutoff wavelength shall be ≤1260 nm.
6. IEEE 802.3z Performance: The fiber shall support laser-based Gigabit Ethernet (GbE) operation in the 1000BASE-LX (1300 nm) operating window at 5000 m.
7. Mode Field Diameter: The mode field diameter of the fiber shall be 9.30 ±0.50µm at 1310 nm 10.50 ±1.0µm at 1550 nm.
8. 12 Macrobend Attenuation: The attenuation due to 100 turns of fiber around a 75- ± 2mm diameter mandrel shall not exceed 0.05 dB at 1310 nm and 0.10 dB at 1550 nm.
9. Zero Dispersion Wavelength (∂o): The zero dispersion wavelength of the fiber shall be 1301.5 nm ≤ ∂o ≤ 1321.5 nm.
10. Zero Dispersion Slope (So): The zero dispersion slope of the fiber shall be ≤0.092 ps/(nm•km).
11. Maximum Dispersion: The maximum dispersion shall be ≤ 3.2 ps/(nm•km) from 1285 nm through 1330 nm and shall be ≤18 ps/(nm•km) at 1550 nm.

G. The cable shall be manufactured by General Cable or Panduit , or other equivalent products that meet these specifications.

2.13 FIBER OPTIC CONNECTOR

A. The optical connector shall be SC-type.
B. The connector ferrule shall be ceramic or glass-in-ceramic. The optical fiber within the connector ferrule shall be secured with an adhesive.
C. The attenuation per mated pair shall not exceed 0.35 dB (individual) and 0.2 dB (average). Connectors shall sustain a minimum of 200 mating cycles per EIA/TIA-455-21 without violating specifications.

2.01 HORIZONTAL COPPER CABLES

A. All cables and equipment shall be furnished, tested, installed and wired by the Contractor.
   1. All horizontal data cables shall terminate on modular patch panels in the telecommunications closet as specified on the Drawings.
   2. This specification defines the requirements for commercially available high performance Category 6 cable.
   3. This cable shall be suitable for installation free-air, in building risers, in conduit, and/or in cable tray and shall carry CMP rating.
   4. The cable design described herein shall exceed transmission performance of Category 6 cables.
   5. Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code, and meet the

specifications of NEMA (low loss), UL 444, and ICEA. Conductor shall also conform to the requirements for solid annealed copper wire in accordance with ASTM B 3.

6. All cables, termination components, and support hardware shall be furnished, tested, installed, and wired by the Contractor.
7. The jacket color for data cables shall be blue.

B. IMPORTANT: Cable and termination components (jack, patch panel, wiring blocks) are specified to function as a system. The compatibility of the cable to be installed with the proposed termination components shall be recognized and documented by the termination component manufacturer.
C. Category 6 cables shall be Panduit – Part # PUP6004BU-U

2.02 INFORMATION OUTLET

A. General
   1. Station cables shall each be terminated at their designated workstation location in the connector types described in the subsections below. Included are modular jacks, faceplates, and surface mount raceway. The combined assembly is referred to as the Standard Information Outlet (SIO). These connector assemblies shall snap into a mounting frame.
   2. SIOs shall be mounted (1) where existing boxes are in place, (2) on surface mount raceway typically in surface raceway with barrier, (3) on floor mount interface boxes, or (4) on power poles either currently owned or new.
   3. The telecommunications outlet frame shall accommodate or incorporate the following:
      a. A minimum of four (4) modular jacks, when installed on a wall-mounted assembly.
      b. A mechanism for adjusting the surface plate to a plumb position.
   4. Multiple jacks are identified in close proximity on the Drawings. The Contractor shall determine the optimum compliant configuration based on the products proposed.
   5. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the Contractor shall submit the proposed configuration for each SIO type for review by the Consultant.

B. Outlet Faceplates
   1. Faceplates shall be stainless steel and incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.
   2. Any unused jack positions shall be fitted with a removable blank inserted into the opening.
   3. Modular jacks shall have capability to incorporate a dust cover that fits over and/or into the jack opening. The dust cover shall be designed to remain with the jack assembly when the jack is in use. No damage to the jack pinning shall result from insertion or removal of these covers. Dust covers that result in deformation of the jack pinning shall not be accepted.

4. Wall-mounted “voice only” outlets shall be installed where identified on the floor plan Drawings to accommodate wall-mounted telephone sets. The wall plate shall be of stainless steel construction, accommodate one (1) voice jack as defined below, mount on a standard single gang outlet box or bracket, and include mating lugs for wall phone mounting.
5. All standard information outlets and the associated jacks shall be of the same manufacturer throughout each/the building. An allowable exception, however, is the wall-mounted “voice only” outlet described above.
6. Faceplates shall be manufactured by Panduit.

C. Surface Mount Interface Box
1. Low profile, surface mount boxes shall incorporate recessed designation strips at the top for identifying labels. Designation strips shall be fitted with clear plastic covers.
2. The box shall feature built-in cable management for both fiber and copper applications.
3. Any unused jack positions shall be fitted with a removable blank inserted into the opening.
4. Modular jacks shall have capability to incorporate spring-loaded shutter door for added protection from dust and other airborne contaminants. The dust cover shall be designed to remain with the jack assembly when the jack is in use.
5. The box shall have the capability to incorporate optional magnets that can be internally mounted.
6. Surface mount box shall be manufactured by Panduit.

2.03 MODULAR JACK

A. Data jacks shall be non-keyed 8-pin modular jacks.
B. Termination components shall be designed to maintain the cable’s pair twists as closely as possible to the point of mechanical termination.
C. Jacks shall utilize a four-layer printed circuit board to control NEXT.
D. Jack housings shall fully encase and protect printed circuit boards and IDC fields.
E. Modular jack contacts shall accept 2500 plug insertions.
F. Modular jack contacts shall be formed flat for increased surface contact with mated plugs. These contacts shall be arranged on the PC board in two staggered arrays of four to maximize contact spacing and minimize crosstalk.
G. Modular jack contacts shall be constructed of Beryllium copper for maximum spring force and resilience.
H. Contact Plating shall be a minimum of 50 micro inches of gold in the contact area over 50 micro-inch of nickel, compliant with FCC part 68.5.
I. Jack termination shall be110 IDC, integral to the jack housing, laid out in two arrays of four contacts.
J. Jacks shall utilize a paired punch down sequence. Cable pairs shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
K. Jacks shall utilize tin lead plated (60% tin/40%lead) phosphor bronze 110 insulation displacement contacts.

L. Jacks shall terminate 22-26 AWG stranded or solid conductors.
M. Jacks shall terminate insulated conductors with outside diameters up to .050".
N. Jacks shall be compatible with single conductor 110 impact termination tools.
O. Jacks shall be compatible with EIA/TIA 606 color code labeling and accept snap on icons for identification or designation of applications.
P. Jacks shall be ORANGE in color.
Q. Jacks shall be marked as either T568A or T568B wiring.
R. Category 6 jacks shall be manufactured by Panduit.

2.05 CABLE PATHWAY SLEEVES

A. The Contractor shall provide all necessary wall penetration for cable pathways whether or not specifically shown on Project Drawings.
B. All wall penetrations shall have a metallic sleeve(s) as required to maintain a maximum 40% fill ration.
C. All sleeves shall be properly fire stopped by this Contractor.
D. Provide all core holes, pathways and sleeves (minimum 1.25" c).
E. Install non-metallic thread less insulating bushings on end of all conduits.
F. Conduit Core Holes and Sleeves thru Floor: For all floor penetrations, provide IMC conduits with threaded steel couplings set flush with finish floor. Extend 6-feet above finish floor with IMC before any termination.

2.06 ADDITIONAL MODULES FOR COPPER CABLING

A. Additional modules for copper shall include the following:
    1. 50 and 75 Ohm BNC coax coupler modules, male-male
    2. F-type coax coupler module, male-male threaded
    3. RCA connector modules with black, red, yellow, and white inserts
    4. Solder, pass-through and punch-down termination types
    5. S-Video connectors modules - coupler and punch-down termination types
    6. Blank module to reserve space for future additions
B. The connectors shall be designed to allow snap-in installation into the outlet faceplates.

2.07 CABLE HOOK SYSTEMS

A. In the areas where the cables are required to be run in a "free-air" plenum, a cable hook system shall be used.
B. Cable hooks shall be capable of supporting a minimum of 30 lbs with a safety factor of 3.
C. Spring steel cable hooks shall be capable of supporting a minimum of 100 lbs with a safety factor of 3 where extra strength is required.
D. Follow manufacturer's recommendations for allowable fill capacity for each size of cable hook.
E. Installation and configuration shall conform to the requirements of the ANSI/EIA/TIA Standards 568A & 569, NFPA 70 (National Electrical Code), and applicable local codes.
F. Cable hooks shall:
    1. Have a flat bottom and provide a minimum of 1 5/8" cable bearing surface.
    2. Have 90-degree radiused edges to prevent damage while installing cables.
    3. Be designed so the mounting hardware is recessed to prevent cable damage.

4. Have a stainless steel cable latch retainer to provide containment of cables within the hook.
5. Have a retainer that shall be removable and reusable.
6. Be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, and floor posts, to meet job conditions.

G. Factory assembled multi-tiered cable hooks shall be used where required to provide separate cabling compartments, or where additional capacity is needed.
H. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653 G90. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.
I. Cable hooks for corrosive areas shall be stainless steel, AISI type 304.
J. Cable hooks shall be B-Line series BCH21, BCH32 or other manufacturer that meets these specifications.

2.01 CATEGORY 6 PATCH CORDS

A. The Owner has the right to determine the final length of the patch cords after the contract is awarded.
B. All Category 6 UTP patch cords shall be round and consist of eight insulated 23 AWG, stranded copper conductors, arranged in four color-coded twisted pairs within a flame retardant jacket and be backwards compatible with lower performing categories. Modular patch cords shall utilize ISO termination method that is designed to reduce and control near-end cross talk (NEXT) and far end cross talk (FEXT) without compromising signal impedance.
C. Both ends of the cord shall be equipped with modular 8-position (RJ45 style) plugs wired straight through with standards compliant wiring. All modular plugs shall exceed FCC CFR 47 part 68 subpart F and IEC 603.7 specifications, and have 50 micro inches of gold plating over nickel contacts. Cable shall be label-verifiable. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Category 5e cords shall have color-coded insert molded strain relief boot with a latch guard to protect against snagging. Additional color-coding shall be available by the use of snap-in icons.
D. Patch cords shall be wired straight through. Pin numbers shall be identical at each end and shall be paired to match T568B patch panel jack wiring per ANSI/TIA/EIA-568-B. Patch cords shall be unkeyed.
E. The manufacturer of the cords shall be the same as the manufacturer for UTP termination hardware (jacks & patch panels). Cords shall be highest quality Category 6 cords available by connectivity manufacturer.

2.02 FIBER OPTIC PATCH CORDS

A. The Owner has the right to determine the final length of the patch cords after the contract is awarded.
B. All fiber optic patch cords shall be:
    1. Duplex 2-3mm tight buffer design with Aqua jacket.
    2. SC-LC connectors with straight thru connectors –Panduit part # FXE3-10MY15
    3. 50-micron OM3 core.

2.01 LABELS

A. All labels shall be permanent and be machine generated (e.g., Brady or Panduit). No handwritten or non-permanent labels shall be allowed. Labels shall be Brady "I.D. Pro" or XC-Plus or equivalent. Labeling on backboards and/or equipment racks may be pre-cut adhesive type.
B. Characters on all labels shall be black printed on a white background.
C. Label size shall be appropriate to the cable size(s), outlet faceplate layout, patch panel design, or other related equipment sizes and layouts.
D. All labels to be used on cables shall be self-laminating, white/transparent vinyl, and be wrapped around the cable sheath. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminated over the full extent of the printed area of the label.
E. Labels used to identify innerduct carrying fiber optic cable shall be labeled with a durable yellow polyethylene tag that reads "CAUTION Fiber Optic Cable" and includes blank spaces for adding (1) fiber count and (2) destination information. An example of a compliant product is VIP Products' "Caution Write-On Coverall Tag."

PART 3– EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and timely completion.
B. Verify cable lengths comply with published standards.
C. Notify Owner of installation that would exceed maximum lengths prior to installation of cable.
D. Contactor shall consult with Owner regarding alternative routing or location of cable.
E. Do not proceed until unsatisfactory conditions have been corrected.

3.02 EQUIPMENT RACK

A. Prior to permanently securing racks or cabinets, the Contractor shall coordinate a walk through with the Owner to determine exact placement of racks.
B. The Contractor shall bolt the rack to the floor as recommended by the manufacturer. Multiple racks shall be joined and the ground made common on each. Rack shall also be stabilized by extending a brace extending to the wall. Alternately, overhead cable tray over which the cabling accesses the equipment rack(s) shall provide this function.
C. Where possible, a space between the rack upright and the wall (~4") shall be planned to allow for cabling in that area. The rear of the rack shall be ~40" from the wall to allow for access by maintenance personnel. In all cases, a minimum of 40" workspace in front of the rack is also required. Locations where these guidelines cannot be followed shall be brought to the attention of the Consultant for resolution prior to installation.
D. All hardware and equipment is to be mounted at least 18" above floor level. This is to afford easy access and, in the case of the lower limit, prevent damage to the components. Positioning of hardware shall be reviewed and approved by the Consultant and Site Coordinator(s) prior to installation.
E. Equipment rack shall be equipped with cable management hardware to allow an orderly and secure routing of twisted pair cabling to the data patch panels. At minimum, one such

horizontal jumper management panel shall be placed below each fiber optic patch panel installed by the Contractor. Additional jumper management panels may be required pending installation of other cable types on the rack. The rack shall be grounded to the telecommunications ground (TGB) using a #6 AWG (or larger) insulated stranded copper conductor (GREEN jacket).

3.03 INSTALLATION REQUIREMENTS

A. Contractor shall furnish and install all cables, connectors, and equipment as shown on Drawings and as specified above.
B. It is the Contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified. This includes any modifications required to route and conceal horizontal distribution wiring.
C. Beginning installation means Contractor accepts existing conditions.
D. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment shall include, but not be limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge, and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices that may move or wear in a manner to pose a hazard to the cable shall not be used.
E. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a "break-away," or other approved method.
F. The Contractor shall be responsible for identifying and reporting to the General Contractor any existing damage to walls, flooring, tiles, and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway, or other hardware shall be repaired by the Contractor.
G. Repairs shall match preexisting color and finish of walls, floors, and ceilings. Any Contractor-damaged ceiling tiles, floor, and carpet shall to be replaced to match color, size, style, and texture.
H. Where unacceptable conditions are found, the Contractor shall bring this to the attention of the construction supervisor immediately. A written resolution will follow to determine the appropriate action to be taken.
I. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as to feed cable and operate pulling machinery.
J. Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed.
K. All wiring shall be run "free-air," in conduit, in a secured plastic raceway or in modular furniture as designated on the Drawings. All cable shall be free of tension at both ends. PLENUM rated cable shall be used in areas used for air handling.

L. Avoid abrasion and other damage to cables during installation.
M. Pulling lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used. Lubricant shall not harden or become adhesive with age.
N. The cable system will be tested and documented upon completion of the installation as defined in the section below.
O. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit or surface mount raceway. Should it be found by the Consultant that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and Drawings with the respect or regard to the quality, amount of value of materials, appliances, or labor used in the work, it shall be rejected, removed, and replaced by the Contractor and all work distributed by changes necessitated in consequence of said defects or imperfections shall be corrected at the Contractor's expense.

3.02 FIELD TEST REQUIREMENTS FOR FIBER OPTIC CABLING SYSTEM

A. The fibers utilized in the installed cable shall be traceable to the manufacturer. Upon request by the Owner, the Contractor shall provide cable manufacturer's test report for each reel of cable provided. These test reports shall include the manufacturer's on reel attenuation test results at 850-nm and 1300-nm for each optical fiber of each reel prior to shipment from the manufacturer.
B. Factory data shall be provided upon request, showing on-the-reel bandwidth performance results as tested at the factory.
C. Every fiber optic backbone link in the installation shall be tested in accordance with the field test specifications defined by the Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568-B or by the appropriate network application standard(s), whichever is more demanding.
D. The test shall include the representative connector performance at the connecting hardware associated with the mating of patch cords. The test does not, however, include the performance of the connector at the interface with the test equipment.
E. 100% of the installed cabling links shall be tested and shall pass the requirements of the standards mentioned above and as further detailed in this document. Any failing link shall be diagnosed and corrected at no additional cost to the Owner. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation in accordance with RFP.
F. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
    a. The manufacturer of the fiber optic cable and/or the fiber optic connectors
    b. The manufacturer of the test equipment used for the field certification
    c. Training organizations authorized by BICSI
G. Field test instruments for multimode fiber cabling shall meet the requirements of ANSI/TIA/EIA-526-14A. The light source shall meet the launch requirements of ANSI/EIA/TIA-455-50B, Method A. This launch condition can be achieved either within

the field test equipment or by use of an external mandrel wrap (as described in clause 11 of ANSI/TIA/EIA-568-B.1) with a Category 1 light source.

H. Field test instruments for single mode fiber cabling shall meet the requirements of ANSI/EIA/TIA-526-7.
I. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
J. The fiber optic launch cables and adapters shall be of high quality and the cables shall not show excessive wear resulting from repetitive coiling and storing of the tester interface adapters.
K. The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests.
L. Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter.
M. A representative of the Owner shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase five business days before testing begins.
N. A representative of the Owner will select a random sample of 5% of the installed links. The results obtained shall be compared to the data provided by the installation Contractor. If more than 2% of the sample results differ in terms of the Pass/Fail determination, the installation Contractor, under supervision of the Owner representative, shall repeat 100% of the testing. The cost of retesting shall be borne by the installation Contractor.

3.03 FIBER PERFORMANCE TEST PARAMETERS

A. The link attenuation shall be calculated by the following formulas specified in ANSI/TIA/EIA standard 568-B.
    1. Link Attenuation = Cable_Attn + Connector_Attn + Splice_Attn
    2. Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)

The values for the Attenuation_Coefficient are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation_Coefficient (dB/km)
Multimode 62.5/125 µm	850	3.5
	1300	1.5
Multimode 50/125 µm	850	3.5
	1300	1.5
Single-mode (Inside plant)	1310	0.5
	1550	0.4
Single-mode (Outside plant)	1310	0.4
	1550	0.5

    3. Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
    4. Maximum allowable mated connectors_loss = 0.50 dB

5. Splice_Attn (dB) = number of splices (S) * splice_loss (dB)
6. Maximum allowable splice_loss = 0.1 dB

B. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices—i.e., it does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
C. Test equipment that measures the link length and automatically calculates the link loss based on the above formulas is preferred.
D. The above link test limits attenuation are based on the use of the One Reference Jumper Method specified by ANSI/TIA/EIA-526-14A, Method B and ANSI/TIA/EIA-526-7, Method A.1. The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.
E. The backbone link (multimode/single mode) shall be tested in two directions at both operating wavelengths to account for attenuation deltas associated with wavelength.
F. Multimode backbone links shall be tested at 850 nm and 1300 nm in accordance with ANSI/EIA/TIA-526-14A.
G. Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation shall be used to determine limit (acceptance) values.
H. Multimode backbone links are designed to be used with network applications that use laser light sources (under filled launch conditions). However, the link attenuation equation has been based upon the use of a light source categorized as Category 1, Overfilled.
I. Single mode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1. All single mode links shall be certified with test tools using laser light sources at 1310 nm and 1550 nm.

3.03 COOPERATION

A. The Contractor shall cooperate with other trades and General Contractor's personnel in locating work in a proper manner.
B. Should it be necessary to raise, lower, or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

3.01 TWISTED PAIR TEST EQUIPMENT

A. Test equipment used under this contract shall be from a manufacturer who has a minimum of five years' experience in producing field test equipment. Manufacturers shall be ISO 9001 certified.
B. All test tools of a given type shall be from the same manufacturer and have compatible electronic results output. Test adapter cable shall be approved by the manufacturer of the test equipment. Baseline accuracy of the test equipment shall exceed TIA Level III, as indicated by independent laboratory testing.
C. Test equipment shall:
    a. Be capable of certifying Category 5, 5E, and 6 permanent links.
    b. Have a dynamic range of at least 100dB to minimized measurement uncertainty.

c. Be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
d. Include S-band time domain diagnostics for NEXT and return loss.
e. Be capable of running individual NEXT, return loss, etc., measurements in addition to AutoText.
f. Include a library of cable types, stored by major manufacturer.
g. Store at least 1000 Category 5e or 6 autotests in internal memory.

D. The measurement reference plane of the test equipment shall start immediately at the output of the test equipment interface connector. There shall not be a time domain dead zone of any distance that excludes any part of the link from the measurements.
E. The approved manufacturer of the test equipment is Fluke.

3.02 CABLE SUPPORT

A. J-hooks fabricated to contain data/voice and video cables may be used to support 25 or fewer cables in each hook. J-hooks are to be fastened to building steel with beam clamps, suspended from ceiling slab with threaded rod, or anchored to the wall. All J-hooks shall be hung straight and level. No other installation technique will be authorized unless pre-approved.
B. Three tiered double-sided J-hook configurations shall contain a maximum of 25 cables per hook or 150 cables. Smaller configurations may be used as bundles decrease in size, maintaining no more than 25 cables per hook.
C. Bundles surpassing 150 cables shall be supported by hangers, fabricated of 3/8" threaded rod and 24" Unistrut. Hangers shall also be installed where the installation of a three-tiered J-hook system is not appropriate for the ceiling space, or where blocked by other trades' work.
D. Cable bundles consisting of fewer than 10 cables may be supported by single J hooks.
E. All cable support in the main cable path shall be installed every four feet. Small cable bundles (under 25) not in the main path may be supported every five feet.

F. A sag shall be maintained between supports of 6", to reduce cable strain. Velcro is an appropriate method of securing cables, when properly used and not over tightened.
G. Proper cable support is extremely important to the Owner, and care shall be taken by the Contractor to provide and install the appropriate supports. Supports found to be inadequate will be replaced.
H. Cable bundles including voice/data cabling shall not have plastic cable ties.
I. All cable trunks shall have radius controlled cable waterfalls where trunk drops from conduit, sleeve or tray from horizontal path to vertical path.

3.03 STATION CABLING

A. Information outlet cables with copper media (voice & data UTP and "TV" coax) shall be located as detailed on the Project Drawings.
B. The Contractor shall utilize these documents in determining materials quantities and routing.
C. Station cables shall be run to the information outlet from the MER/TR serving each area in conduit, free-air above drop ceiling, in cable tray, and/or in modular furniture.

D. The maximum station cable drop length for UTP cables shall not exceed 295 feet (90 meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the wiring closet to the outlet and shall include any slack required for the installation and termination. The Contractor shall install station cabling in a fashion to avoid unnecessarily long runs.
E. Contractor shall verify cable lengths comply with published standards; prior to installation of any horizontal cabling, this contractor shall verify cable paths and confirm no horizontal cable will exceed 295 total feet. If it is determined that the cable will exceed 295', this contractor shall route the cabling to another MER/TR or determine shorter path so cables are under 295'. If this is not possible, the contractor shall notify the consultant prior to installation. Failure to do this step will not result in a change order from the contractor.
F. The minimum station cable drop length for UTP cables shall be no less than 60 feet. The Contractor shall install station cabling in a fashion to avoid runs less than 60 feet. If cable slack is required to accommodate the minimum length requirements, the Contractor is responsible for storing the slack in a fashion as to protect the cable from damage. The cable slack shall be secure above the ceiling tiles in a figure 8 form by means of J-hooks or D-rings anchored to the building structure. The cable slack shall be coiled to maintain from 100% to 200% of the cable recommended minimum bend radius. Multiple cables may share a common support.
G. All cables shall be installed splice-free unless otherwise specified.
H. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as the feed cable and operate pulling machinery.
I. Avoid abrasion and other damage to cables during installation.
J. All cable shall be free of tension at both ends. In cases where the cable shall bear some stress, Kellom grips may be used to spread the strain over a longer length of cable.
K. Where installed free-air, installation shall consider the following:
    1. Cable shall run at right angles and be kept clear of other trades' work.
    2. Cables shall be supported according to code, using "J-hooks" anchored to ceiling concrete, walls, piping supports, or structural steel beams.
    3. Hooks shall be designed to maintain cable bend to larger than the minimum bend radius (typically 4 x cable diameter).
    4. Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If cable "sag" at mid-span exceeds 6 inches, another support shall be used.
L. Cable shall never be laid directly on the ceiling grid.
M. Cables shall not be attached to existing cabling, plumbing, or steam piping, ductwork, ceiling supports, or electrical or communications conduit.
N. Manufacturers' minimum bend radius specifications shall be observed in all instances. Use of plastic cable ties is not acceptable. Cable bundles shall be neatly dressed with use of Velcro type straps.
O. Cable sheaths shall be protected from damage from sharp edges. Where a cable passes over a sharp edge, a bushing or grommet shall be used to protect the cable.
P. A coil of one foot in each cable shall be placed in the ceiling at the last support (e.g., J-hook) before the cables enter a fishable wall, conduit, surface raceway, or box. At any

location where cables are installed into movable partition walls or modular furniture via a service pole, approximately 15 feet of slack shall be left in each station cable under 250 feet in length to allow for change in the office layout without re-cabling. These "service loops" shall be secured at the last cable support before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.

Q. To reduce or eliminate EMI, the following minimum separation distances from □480V power lines shall be adhered to:
    1. Twelve (12) inches from power lines of □5-kVa
    2. Eighteen (18) inches from high voltage lighting (including fluorescent)
    3. Thirty-nine (39) inches from power lines of 5-kVa or greater
    4. Thirty-nine (39) inches from transformers and motors
R. All openings shall be sleeved and firestopped per prevailing code requirements upon completion of cable installation.

3.04 INFORMATION OUTLET

A. Information outlets shall be flush mounted on wall-mounted boxes, in floor-mounted boxes, on surface raceway, or on modular furniture.
B. Any outlets to be added where these conditions are not met shall be positioned at a height matching that of existing services or as directed otherwise by the Site Coordinator and the Consultant. Nominal height (from finished floor to center line of outlet) in new installation shall be as follows:
    1. Standard Voice & Data Outlet (SIO) shall match adjacent electrical outlets.
    2. Wall-Mounted Telephone Outlet (Standard Voice only) shall meet ADA requirements.
C. The Contractor shall coordinate the style of the telecommunication outlets to be installed in the floor mount boxes and surface mount raceways with the Owner.

3.05 CABLE TERMINATION

A. At the telecommunication closet, all data and voice cables shall be positioned on termination hardware in sequence of the outlet ID, starting with the lowest number.
B. Termination hardware (blocks and patch panels) positioning and layout will be reviewed and approved by the Consultant prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.
C. Cable Termination – Data/Voice UTP
    1. Data/voice patch panels shall be designed and installed in a fashion as to allow future station cabling to be terminated on the panel without disruption to existing connections.
    2. Data patch panels shall be sized to accommodate a minimum of 20% growth in the quantity of stations relative to the initial installation.
    3. At information outlets and data/voice patch panels, the installer shall ensure that the twists in each cable pair are preserved to within 0.5 inch of the termination for data/voice cables. The cable jacket shall be removed only to the extent required to make the termination.
D. Cable Termination – Fiber Optic
    1. All fibers shall be terminated using the specified connector type.
    2. All terminated fibers at the telecommunications closets shall be mated to couplings mounted on patch panels. Couplings shall be mounted on a panel that,

in turn, snaps into the housing assembly. Any unused panel positions shall be fitted with a blank panel inhibiting access to the fiber optic cable from the front of the housing.

3. All couplings shall be fitted with a dust cap.
4. Fibers from multiple locations may share a common enclosure, but they shall be segregated on the connector panels and clearly identified. Fibers from multiple destinations may be secured in a common enclosure, provided they are clearly identified as such. Fibers from different locations shall not share a common connector panel (e.g., "insert").
5. Slack in each fiber shall be provided as to allow for future re-termination in the event of connector or fiber end-face damage. Adequate slack shall be retained to allow termination at a 30" high workbench positioned adjacent to the termination enclosure(s). A minimum of one meter (~39") of slack shall be retained regardless of panel position relative to the potential work area.
6. Contractor shall install a plastic twist-on bushing on each end of interlocking armored fiber to protect cable from sharp edges of the armor.

3.06 COPPER STATION CABLES

A. Station cabling testing shall be from the jack at the outlet in the work area to the termination block on which the cables are terminated at the MER or TR.
B. Testing shall be of the permanent link. Contractor shall warrant performance, however, based on channel performance and provide patch cords that meet channel performance criteria. All cabling not tested strictly in accordance with these procedures shall be retested at no cost to the Owner.
C. Testing shall be from the jack at the SIO to the patch panel on which the cables are terminated at the wiring hub.
D. Horizontal "station" cables shall be free of shorts within the pairs and shall be verified for continuity, pair validity and polarity, and wire map (conductor position on the modular jack). Any defective, split, or mispositioned pairs shall be identified and corrected.
E. Testing of the cabling systems rated at TIA Category 6 and above shall be performed to confirm proper functioning and performance.
F. Testing of the transmission performance of station cables (Category 6) shall include the following:
    1. Length
    2. Attenuation
    3. Pair to Pair NEXT
    4. ACR
    5. PSNEXT Loss
    6. Return Loss
    7. Pair to Pair ELFEXT Loss (Equal Level Far End Cross-Talk)
    8. PSEFEXT Loss
    9. Propagation Delay
    10. Delay Skew
    11. Return Loss
G. The maximum length of station cable shall not exceed 90 meters, which allows 10 meters for equipment and patch cables.

H. Worst case performance at 20°C, based on a horizontal cable length of 90 meters and equipment cord length of 4 meters, shall be as follows:

CATEGORY 6 (Permanent LINK)

Frequency (MHz)	Insertion Loss (Maximum dB)	NEXT Loss Pair to Pair (dB)	PS-NEXT Loss (dB; Worst Case)	ELFEXT Loss Pair to Pair (dB)	PSELFEXT loss (dB)
1.0	1.9	65.0	62.0	64.2	61.2
4.0	3.5	64.1	61.8	52.1	49.1
8.0	5.0	59.4	57.0	46.1	43.1
10.0	5.6	57.8	55.5	44.2	41.2
16.0	7.0	54.6	52.2	40.1	37.1
20.0	7.9	53.1	50.7	38.2	35.2
25.0	8.9	51.5	49.1	36.2	33.2
31.25	10.0	50.0	47.5	34.3	31.3
62.5	16.0	45.1	42.7	28.3	25.3
100.0	18.5	41.8	39.3	24.2	21.2
200.0	27.1	36.9	34.3	18.2	15.2
250.0	30.7	35.3	32.7	16.2	13.2

I. In the event results of the tests are not satisfactory, the Contractor shall make adjustments, replacements, and changes as necessary and shall then repeat the test or tests that disclosed faulty or defective material, equipment, or installation method. The Contractor shall make additional tests as the Engineer deems necessary at no additional expense to the Owner or Consultant.

J. All data shall indicate the worst-case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1 MHz to highest relevant frequency, using a swept frequency interval that is consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combination and in both directions when required by the appropriate standards.

K. Cables shall be tested to the maximum frequency defined by the standards covering that performance category. Transmission Performance Testing shall be performed using a test instrument designed for testing to the specified frequencies. Test records shall verify "PASS" on each cable and display the specified parameters—comparing test values with standards-based "templates" integral to the unit.

3.04 TESTING AND ACCEPTANCE

A. The Contractor shall perform acceptance tests as indicated below for each subsystem (backbone, station, etc.) as it is completed.

B. The Contractor shall supply all equipment and personnel necessary to conduct the acceptance tests. Prior to testing, the Contractor shall provide a summary of the proposed

test plan for each cable type, including equipment to use, setup, test frequencies or wavelengths, results format, etc. The Consultant will approve the method of testing.

C. The Contractor shall visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. The Contractor shall provide the Consultant with a written certification that this inspection has been made.
D. The Contractor shall conduct acceptance testing according to a schedule coordinated with the Consultant. Representatives of the Owner may be in attendance to witness the test procedures. The Contractor shall provide a minimum of one (1) week advance notice to the Consultant and Owner to allow for such participation. The notification shall include a written description of the proposed conduct of the tests, including copies of blank test result sheets to be used.
E. Tests related to connected equipment of others shall be done only with the permission and presence of Contractor involved. The Contractor shall ascertain that testing only as required to prove the wiring connections are correct.
F. The Contractor shall provide test results and describe the conduct of the tests, including the date of the tests, the equipment used, and the procedures followed. At the request of the Consultant, the Contractor shall provide copies of the original test results.
G. All cabling shall be 100% fault free unless noted otherwise. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the Contractor's expense. The applicable tests shall then be repeated.
H. Backbone voice cables shall be free of shorts within the pairs and be verified for continuity, pair validity and polarity, and conductor position on the termination blocks (e.g., 110). Any miss-positioned pairs shall be identified and corrected. The percentage of "bad" pairs shall not exceed 1% in any backbone (riser or tie) cable based on total pair count. All bad pairs shall be identified and documented.
I. The Consultant or Owner may request that a 10% random field re-test be conducted on the cable system to verify documented findings. -
J. If requested, the contractor shall test up to 10% of cable links at no cost to the owner.
K. Tests shall be a repeat of those defined above and under Testing and Acceptance. If findings contradict the documentation submitted by the Contractor, additional testing shall be performed to the extent determined necessary by the Consultant, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.05 FIRE STOPPING

A. Contractor shall seal any openings created for cable pass-through between floors or through fire rated walls. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.
B. Creation of such openings as are necessary for cable passage between locations as shown on the Drawings shall be the responsibility of the Contractor. Any openings created by or for the Contractor and left unused shall also be sealed as part of this work.

END OF SECTION

SECTION 27 21 33 –WIRELESS LOCAL AREA NETWORK

PART ONE – GENERAL

1.01 SCOPE

A. This section describes the products and execution requirements relating to the installation of a wireless local area network. Covered systems include the following:

1. Wireless access points
2. Wireless LAN controllers
3. Equipment/materials used for mounting access points
4. Configuration of wireless local area network
5. Installation labor for mounting access points and controllers
6. Documentation and testing of wireless local area network

1.02 RELATED WORK

A. Section 27 00 00 – General Technology Requirements

B. Section 27 18 00 – Communications Labeling and Identification

1.03 REFERENCE STANDARDS

A. ANSI/NFPA – National Electric Code

B. TX State Electrical Code

C. NEMA, UL, TIA/EIA, and ANSI Standards, where applicable standards have been established

D. IEEE 802.11 wireless standards

1.04 SUBMITTALS

A. Submit in accordance with provisions of Section 27 00 00 and shop Drawings of all materials proposed.

B. A detailed diagram showing switch connectivity shall be included with the submission of the bid form.

PART TWO – PRODUCTS

2.01 EQUIPMENT

A. Refer to attached Appendix "B" for equipment and quantities required.

B. Quantities shown may be reduced and all pricing should be based on a minimum quantity of one (1) per line item.

C. Any access point installed in air plenum spaces must be plenum-rated or enclosed in a plenum rated enclosure.

D. The WLAN Contractor shall include one (1) plastic Panduit WAP NEMA enclosure for mounting access point in the gymnasium. Cost to mount the enclosure with associated access point should be included in the cost of the enclosure. Enclosures should meet the following requirements:

   1. Be made of high impact plastic

   2. Be moisture resistant

   3. Sized to fully conceal the access point and antennas

   4. Have sealed grommets for external cable access

E. Wireless controller/management systems

   1. System shall have interference detection and avoidance

   2. Controller should be capable of and configured for dynamic channel assignment and dynamic radio power adjustment.

   3. Wireless system should be capable of and configured for dynamically shifting wireless users to adjacent access points to better distribute users on the wireless system.

   4. Products must include the most recent management software with appropriate licensing for three (3) simultaneous users.

   5. Must provide licenses for all existing and new access points – District wide. License count must cover all AP's in the district regardless of the listing in the appendices.

F. Include all necessary power supplies, memory, cables, connectors, and other items needed for a fully functional WLAN system.

2.02 SYSTEM LOCATIONS/ACCESS POINT QUANTITIES

A. The locations of the access points have been located on the floor plans used with the cabling infrastructure bid (separate contract). Refer to the project floor plans for quantities of access points. Category 6 cables have been pulled to each of the locations located on the floor plans. The floor plans will be provided to the successful wireless LAN bidder.

PART THREE – EXECUTION

3.01 GENERAL

A. The WLAN work shall include all necessary site survey and planning work as well as configuration, installation, testing, relocation of access points (as needed after testing) and documentation (all labor).

B. The wireless design shall be based on establishing -75 dBm in 90% of each building (excluding boiler rooms, mechanical rooms, and restrooms).

C. Cabling to which the APs will be connected will be provided by another contractor. If cabling needs to be moved or added to accommodate proper positioning of access points, the WLAN Contractor must provide a written notice to the Owner for each instance. It will be the Owner's sole discretion whether and how to act upon such notifications.

D. Patch cords to connect the access point to the access point outlet will be provided by the district.

E. Pricing for wireless LAN system must include shipping and delivery.

F. Include 1 year maintenance on all wireless controller components (if controller is part of design). Pricing for this must be included in proposal.

G. Physical installation of access points by the WLAN Contractor at all buildings must be included in pricing. Installation includes security affixing the APs to ceilings or walls as appropriate. All locations will be a single gang outlet box flush mounted in the ceiling and or walls. All final mounting positions shall be reviewed and approved by the Owner prior to installation of any access points.

H. The WLAN Contractor, at minimum, shall configure wireless access levels for 1) staff, 2) students, and 3) guest access. The WLAN Contractor will work with the District to setup this access and the appropriate security measures for each access group to insure they only reach areas on the network authorized only for that specific group. The WLAN Contractor shall work with the District to implement the existing wireless authentication scheme onto the newly installed wireless local area networks.

I. All products must be configured to allow wireless roaming among the various network segments throughout all wireless coverage areas.

J. Bids must include all software updates and upgrades for twelve (12) months after completion. Any cost for such software must be included in the base bid.

K. All rubbish, debris, and dirt resulting from the WLAN Contractor's work shall be cleaned up and removed from the building daily. The premises shall at all times be kept in a clean, safe, and professional condition.

3.02 TESTING

A. WLAN Contractor shall perform post-installation site surveys to verify wireless coverage throughout all buildings. Heat maps displaying overall signal strength and signal to noise (SNR) readings shall be provided to the Owner.

3.03 DOCUMENTATION

A. WLAN Contractor shall provide network diagrams showing the integration of the WLAN with the existing District LAN.

B. Wireless heat maps showing wireless coverage and the location of all access points shall be provided to the Owner.

C. All maps and diagrams shall display the equipment labeling scheme of all equipment as deployed in the field.

END OF SECTION