Town of Tolland - Invitation to Bid

Birch Grove Primary School – Technology Equipment
State Project Number 142-0083-N

The Town of Tolland seeks sealed bids for the Technology Equipment for the new Birch Grove Primary School located at 247 Rhodes Road in Tolland, CT 06084. The work described herein includes furnishing, installing and configuring all materials and equipment into the project as well as performing or providing all labor, supervision, equipment and services unless otherwise noted within the bid documents.

Sealed Bids for the **"Birch Grove Primary School – Technology Equipment"** will be received at the Office of the Town Manager, Town of Tolland, 21 Tolland Green, Tolland, Connecticut 06084, until **10:00 a.m. on Tuesday, April 13, 2021**, at which time the Bids will be opened publicly and read aloud. **Since the parking is located in the rear of the building, please allow ample time to reach the Town Manager's Office located on the 5th Level of the Hicks Memorial Municipal Center.**

The hours of operation are:
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Closed on Friday

A drop box will not be provided for the bids.

Bids transmitted by facsimile will not be accepted and all bids must be in a sealed envelope. The envelope containing the bid shall be clearly labeled as "**Sealed Bid – Birch Grove Primary School – Technology Equipment"** and marked with the name of the Bidder on the front of the envelope. Bidders are required to **submit one original and two paper copies** for each of the Bid Lists they are bidding on, along with **a USB Drive containing the entire submission**. Bid forms for all five Bid Packages may be included in one envelope if the related documents are fastened together by Bid Package. Bids received after the designated time for receipt of bids will be returned unopened.

No Bidder may withdraw their bid within 60 days after the actual date of bid opening thereof. Should there be reason why the contract cannot be awarded within the specific period, this time may be extended by mutual agreement between the Town and the designated, qualified low Bidder.

KEY DATES:

Friday	**March 26, 2021**	**Project Manual and Plans available electronically**
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Or call 1- 929 - 205- 6099 and input:
Meeting ID: 964 4616 8219
Passcode: 04122021

To obtain documents: Proposed forms of Contract Documents, including Plans and Specifications dated January 29, 2021, as prepared by JCJ Architecture, may be downloaded by each Bidder from the DAS State Contracting Portal https://biznet.ct.gov/SCP_Search/default.aspx?Src=CISplash

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Neither the Owner nor the Architect will be responsible for full or partial sets of Bid Documents obtained from any other source.

All questions during bidding period must be sent by email to: Guillen Technology Consultants - Linda Fredrickson: lfredrickson@gtc.us.com and/or Jorge Guillen: jguillen@gtc.us.com .

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Because of the current COVID-19 crisis, a group walk-through will not be held, but bidders will be able to schedule a site visit. Please email this request to Guillen Technology Consultants as shown above.

Please follow the Standard Instructions to Bidders provided in the Supplementary Instructions, Instructions for Bidders – Technology Equipment, and Supplementary Conditions.

Bid Packages for Technology Equipment are as follows:

Bid Package #1

TE.1 Network Switches
TE.2 Wireless Access Points
Labor with Prevailing Wage Rates

Bid Package #2

TE.3 Telephones
Standard Labor Rates

Bid Package #3

TE.6 Charging Cabinets

Standard Labor Rates

Bid Package #4

TE.10 Classroom and Conference Room Interactive Displays
Labor with Prevailing Wage Rates

Bid Package #5

TE.11 Audio Visual Systems
Labor with Prevailing Wage Rates

TE.12 Classroom and Conference Room Audio Amplification Systems
Standard Labor Rates

Please Note: BIDDER MUST SUBMIT A TOTAL PRICE FOR ALL ITEMS IN THE BID PACKAGE THEY ARE BIDDING ON.

Other Requirements: This project is subject to state DOL prevailing wages, and other provisions outlined in the bid documents.

DAS Prequalification:

1. If the Bidder seeks to receive an award for any combination of Bid Packages with a value greater than $500,000, the Bidder must be included on the current listing of DAS Prequalified Telecommunications Systems Vendors, as published on the DAS website: https://portal.ct.gov/DAS/Procurement/PreQual/DAS-Construction-Contractor-Prequalification-Program-Prequalified-Companies.
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4. All Bidders or subcontractors must be an authorized reseller of the AV products provided. Documentation from the manufacturer must be submitted.
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6. Bidder is required to submit at least 3 references with contact information and a brief description of the work completed for similar projects.
7. Successful Bidder for Bid Package #4 will be required to install a mock-up of the Classroom AV System including the Display, Mount, concealed Cabling, to connect the Teacher Station Computer, and Wall Plates. Pathways and Back Boxes with Power and Data have been provided as a part of the Base Bid.

Vendors are to refer to the Project Manual for additional instructions:
Tab 2 – Submit completed form – Statement of Bidder's Qualifications

Tab 5 – Submit completed Bid List Summary and Bid List for each Package Vendor is bidding on. Bidders may provide quotations in their standard format instead of completing Bid Forms 1 – 5, but they must submit a Bid List Summary. Additional pages may be attached if Vendor chooses to include supplemental information.

Bidders must review the project information and instructions provided in all the documents. In addition to the specifications included in the Project Manual Successful Bidder to follow:

1.1 RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES

A. Work includes, but is not limited to the following:
   1. All work shall be conducted in coordination with Owner and other building trades.
   2. The work covered by the qualified Audio-Visual System Integrator/Contractor(s) consists of furnishing all materials, accessories, connectors, supports, electrical protection, equipment, tools, setup, preparation, labor, supervision, incidentals, transportation, storage, and related items and appurtenances, and performing all operations necessary to complete the work as indicated in the project contract documents. It is the intent and purpose of this specification to have, upon completion of the project, a "turn-key" system designed, built, coordinated, complete and operable in all respects. Completely install, connect, and test all systems, equipment, devices, etc., shown or noted or required to final connections and leave ready for satisfactory operation. Provide any minor items omitted from the design, but obviously necessary to accomplish the above intent.
   3. Where the Drawings, Specifications, Codes, Regulations, Laws, or the requirements of the local Authority conflict, provide the higher quality and higher quantity indicated or required, and follow the strictest requirement.
   4. The qualified Audio-Visual System Integrator/Contractor for the applicable system/solution shall provide all inter-trade coordination, all additional hardware, software, cabling, interfaces, etc. for a completely operational system.
   5. Furnish office, field, factory, manufacturers' representatives, and contractors' shop engineering, supervision, labor, materials, and methods required to provide the complete System work, in first class condition, as indicated on the Contract Documents.
   6. Testing, identification, and administration for the systems.

Bonds: The successful bidder will be required to furnish and pay for 100% Performance and Labor & Material Payment Bonds. The successful bidder must have the minimum insurance coverage stated within the bid documents under Bonding and Insurance Requirements. The State of Connecticut and the Town of Tolland shall be listed as an additional insured on all insurance certificates.

A satisfactory Bid Bond or Certified Check, in an amount equal to five percent (5%) of the base bid, shall be submitted with each bid. The Bid Bond shall be made payable to Town of Tolland and shall be properly executed by the Bidder and acceptable sureties. All bonds must be from sureties registered in the State of Connecticut. Contractors will also have to submit with the bid proposal all attachments stated within the bid documents under Required Documents – List of Bid Requirements. No bid will be accepted unless accompanied by the required bid deposit.

Insurance: The Town will not enter into Agreement with successful bidder for any work under this project until required insurance as detailed in the Project Manual has been obtained and the

Town has received the requested certificates of insurance and policies, nor shall the successful bidder permit any subcontractors to commence work until similar insurance has been obtained and the Town has received the requested certificates of insurance and policies.

Right to Reject Bid: The Town reserves the right to reject any or all bids. Any bid that contains any omissions, alterations of form, additions or alternates not called for, erasures or corrections, or any irregularities may be disregarded or rejected as improper except that the Town may waive any defects or irregularities should it be deemed in the best interest of the Town.

Additional Conditions:
All bidders are requested to note that the award of a Contract is subject to the following conditions and contingencies:

a. Necessary approvals of the Town Manager's Office.
b. Acceptable bids within the funding limitations of the project.

The Town of Tolland is an Affirmative Action/Equal Opportunity Employer, Minority/Women's and Small Business Enterprises are encouraged to apply.

PROJECT MANUAL
TECHNOLOGY EQUIPMENT

BIRCH GROVE PRIMARY SCHOOL
247 RHODES ROAD
TOLLAND, CONNECTICUT

State Project #142-0083 N
PHASE 5 OF 5

JCJ PROJECT #H19006.00 Tech

January 29, 2021

Guillén Technology Consultants
Technology Designers & Planners

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END OF
TABLE OF CONTENTS

FORM SCG-3000

PROJECT TEAM CONTACT LIST

Facility: Birch Grove Primary School (PreK-2)

Date: 01/15/2021 **LEA:** Tolland

State Project No.: 142-0083-N

Name	Title/Firm	Phone	E-mail
Owner Tolland Public School			
Walter Willett PhD.	Supertindent	(860) 870-6850 x1	wwillett@tolland.k.12.ct.us
Peter Sztaba	Facilties Director	(860) 870-6855	psztaba@tolland.k.12.ct.us
Owner's Representative/Project Manager (Consultants)			
Antonietta DiBenedetto	Construction Advocacy Professionals	(860)371-6451	antonietta@capyourbudget.com
Design Team			
Bruce Kellogg	Architect - PM	JCJ Architecture	(860) 240-9316 bkellogg@jcj.com
Brian Stone	Architect - PA	JCJ Architecture	(860) 247-9226 bstone@jcj.com
Jeffrey Gebrian	Landscape Arch.	Jeffrey Gebrian	(860) 751-9807 jgebrian@yahoo.com
Herb May	Civil Engineer	Macchi Engineers	(860) 549-6190 x110 hmay@macchiengineers.com
Peter Pycela	Mech. Engineer	IES	(203) 467-4370 x236 ppycela@iesllc.biz
Peter Pycela	Elec. Engineer	IES	(203) 467-4370 ppycela@iesllc.biz
Jorge Guillen	Technology	Guillén Technology Consultants LLC	(860) 341-1206 jguillen@gtc.us.com
Peter Folino	Environ. Cons.	Eagle Environmental, Inc	(860)589-8257 pfolino@eagleenviro.com
Cheri Lawton	Int. Designer	JCJ Architecture	(860) 240-9097 clawton@jcj.com
Mike Plickys	Structural	Macchi Engineers	(860) 549-6190 x111 mplickys@macchiengineers.com
Fawn Pellegrini	Architect-PM	JCJ Architecture	(860) 240-9310 fpellegrini@jcj.com
Lauren Braren	Architect Designer	JCJ Architecture	(860) 247-9226 lbraren@jcj.com
Construction Manager / General Contractor			
Ed D'Amato	D'Amato Construction Co.	(860) 583-3489	edamatojr@damatoconstruction.com
Tony D'Amato	D'Amato Construction Co.	(860) 583-3489	adamato@damatoconstruction.com
Paul Geda	D'Amato Construction Co.	(860) 583-3489	pgeda@damatoconstruction.com
Town Code Officials	**Jurisdiction:**		
Jim Paquin	Building Inspector		jpaquin@tolland.org
Robert DaBica	Fire Marshal		rdabica@tolland.org
Holly Hood	Health Inspector / Sanitarian	(860) 871-3608	hoodhd@ehhd.org
Peter Sztaba	ADA 504 Coordinator	(860) 870-6855	psztaba@tolland.k.12.ct.us
Others			
Scott Lappen	Director Public Works		slappen@tolland.org
Cynthia Kaplan	CT High Performance		cmk.leed@gmail.com
Bennet Brooks	Brooks Acoustic Corp.	(860) 896-1081	bbrooks@brooksacoustics.com
Michael Gannon	Commissioning Agent, BVH integrated Engineers	(860)286-9171	MikeG@BVHis.com

SUPPLEMENTARY INSTRUCTIONS FOR INVITATION AND INSTRUCTIONS TO VENDORS FOR QUOTATIONS FOR TECHNOLOGY EQUIPMENT

GENERAL

A. These Supplementary Instructions contain modifications to AIA Document A751 - 2019 "*Invitation and Instructions to Vendors for Quotations for Furniture, Furnishings and Equipment* (FF&E)."

B. Where a portion of the Instructions for Quotation is modified or deleted by these Supplementary Instructions for Quotation, the unaltered portions of the Instructions for Quotation shall remain in effect.

C. Technology Equipment will be purchased through State Contracts and through Public Bids. The products have been divided into categories to simplify procurement. Categories are as follow:

STATE CONTRACT

1. Category TE.4 Network Accessories and Patch Cables
2. Category TE.5 Network UPSs
3. Category TE.7 Printers
4. Category TE.8 Computers
5. Category TE.9 Digital Signage
6. Category TE.12 Classroom and Conference Room Audio Amplification Systems

PUBLIC BID

1. Category TE.1 Network Switches
2. Category TE.2 Wireless Access Points
3. Category TE.3 Telephones
4. Category TE.6 Charging Cabinets
5. Category TE.10 Classroom and Conference Room Interactive Displays
6. Category TE.11 Audio Visual Systems
7. Category TE.12 Classroom and Conference Room Audio Amplification Systems

ARTICLE 1 - DEFINITIONS

Add the following to Section 1.8:

"Unit prices include all costs, overhead and profit for all parties involved, including the Vendor and subcontractors."

ARTICLE 2 - PROSPECTIVE VENDORS'S REPRESENTATIONS

Add the following new Section to Article 2:

"**§2.2** Failure to receive or examine any form, instrument, or document, or to visit the sites to become acquainted with field conditions, shall in no way relieve Vendor from any obligation with respect to their Quotation."

ARTICLE 3 - QUOTATION DOCUMENTS

Add the following Subsection to Section §3.1.3:

"**§3.1.3.1** In case such ambiguity, inconsistency, or error exists and is not noted or resolved at the time Quotations are due, the Quotation Sum shall include, as applicable, the better quality, the greater quantity, or the more costly procedure for the work involved."

Delete Section 3.3. Substitutions.

ARTICLE 4 - QUOTATION PROCEDURES

Delete Section §4.1.1 and substitute the following new Section, Subsections and clauses:

"**§4.1.1** Quotation shall be submitted on forms identical to the forms included in the Bidding Documents. Each Vendor shall complete a Pricing Form with a Continuation Sheet, if necessary. Vendor shall also provide a formal quotation on company letterhead along with the Pricing Form. Pricing Form and quotation shall include Product List Price, Discount %, Unit Net Cost, Total Net Cost, Eligible Costs, and Ineligible Costs.

Delete Section §4.2.2 and insert the following:

""**§4.2.2** Vendor shall submit to the Architect quotation forms in PDF electronic file format by the date and time listed in the request for quotation. Clearly identify quotation with the words "**QUOTATION ENCLOSED – TECHNOLOGY EQUIPMENT, JOHN F. KENNEDY MIDDLE SCHOOL**."

ARTICLE 5 - CONSIDERATION OF QUOTATIONS

Add the following new Sections and Subsections to Article 5:

"**§5.1.1** If a Vendor cannot meet some of the terms and conditions of the Contract Documents, especially as related to insurance amounts, or delivery conditions, they may still submit a Quotation to the Owner for consideration. The Proposed Vendor shall note on their Quotation the areas not in compliance with the terms and conditions of the Contract Documents. The Proposed Vendor shall be advised that Quotations received by the Owner which meet all the terms and conditions will be given first consideration."

"**§5.1.2** In determining the qualifications of a Proposed Vendor, the Owner will consider his record in the performance of contracts for furnishings' work into which he may have previously entered. The Owner expressly reserves the right to reject the Quotation of such Proposed Vendor for any reason, including but not limited to, that such record discloses that such Proposed Vendor, in the opinion of the Owner, has not properly performed such contracts or has habitually and without just cause, neglected the payment of bills or has otherwise disregarded their obligations to

subcontractors, suppliers or employees."

ARTICLE 6 - POST-QUOTATION INFORMATION

Add the following new Subsections to Section §6.1:

"**§6.1.5** Upon request by the Architect, Proposed Vendor shall give evidence of their responsibility by furnishing information concerning their ability to meet the following requirements:

§6.1.5.1 Adequate physical facilities and personnel for performing a project of this type and size.
§6.1.5.2 Qualified engineering department to provide layout and shop drawings, if required, for approval prior to fabrication of equipment.
§6.1.5.3 The Owner may make such investigation as he deems necessary to determine the ability of the Vendor to perform the Work, and the Vendor shall furnish the Owner such information and data for this purpose as the Owner may request.
§5.1.1.4 The Owner reserves the right to reject any Bid if the evidence submitted by, or investigated of, such Vendor fails to satisfy the Owner that such Vendor is properly qualified.

Add the following new Article to the Invitation and Instructions for Quotation for Furniture, Furnishings and Equipment:

"**ARTICLE 8 - MISCELLANEOUS INSTRUCTIONS**

§8.1 The Vendor shall be prepared to make delivery of the equipment items they are providing under its contract in accordance with the Technology Plans based on the six phase installation schedule. Refer to attached Phasing Diagram. Delivery shall not be made until directed by the Architect. The Vendor shall be responsible for all costs for storage through the completion of the project, scheduled for November 1, 2022. If the delivery/installation completion date is delayed, the Owner will allow the Vendor one week to complete the delivery and installation of the furniture, furnishings and equipment items from the date of availability of access to the building as directed by the Architect.
§8.2 Deliveries and installations will be permitted on holidays and weekend days, only upon prior approval by the Owner. The building will be accessible from 7:00 a.m. until 4:00 p.m. weekdays, following the project schedule as updated by the Owner.

END OF
SUPPLEMENTARY INSTRUCTIONS

Town of Tolland
Town Manager
21 Tolland Green
Tolland, CT 06084
Contact: Beverly Bellody, Director, Human Services Tel: 860-871-3611 bbellody@toland.org

STATEMENT OF BIDDER'S QUALIFICATIONS

(To be submitted by the Bidder with the Bid)

All questions must be answered, and the data given must be clear and comprehensive. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information it desires.

1. Name of Bidder: _____

2. Bidder's Tax Identification Number: _____

3. Permanent Main Office Address: _____

_____

4. When Organized: _____

5. If a Corporation, Where Incorporated: _____

6. How many years have you been engaged in construction under your present firm or trade name:

_____

7. Contracts on hand: (Schedule these, showing gross amount of each Contract and the

Approximate anticipated dates of completion).

_____

_____

_____

8. General character of work performed by you:

_____

_____

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9. Have you ever failed to complete any work awarded to you? If so, where and why:

_____

_____

10. Have you ever defaulted on a Contract? If so, where and why.

_____

_____

11. List the more important contracts recently completed by you, stating approximate gross cost for each, and the month and the year completed.

_____

_____

_____

_____

12. List your major resources available for this Contract such as inhouse installers, size of technical staff, loaner equipment during repairs, and standard response time.

_____

_____

_____

_____

_____

Signature of Authorized Representative Title Telephone No. Email

_____

Printed Name

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   6. Testing, identification, and administration for the systems.

Bonds: The successful bidder will be required to furnish and pay for 100% Performance and Labor & Material Payment Bonds. The successful bidder must have the minimum insurance coverage stated within the bid documents under Bonding and Insurance Requirements. The State of Connecticut and the Town of Tolland shall be listed as an additional insured on all insurance certificates.

A satisfactory Bid Bond or Certified Check, in an amount equal to five percent (5%) of the base bid, shall be submitted with each bid. The Bid Bond shall be made payable to Town of Tolland and shall be properly executed by the Bidder and acceptable sureties. All bonds must be from sureties registered in the State of Connecticut. Contractors will also have to submit with the bid proposal all attachments stated within the bid documents under Required Documents – List of Bid Requirements. No bid will be accepted unless accompanied by the required bid deposit.

Insurance: The Town will not enter into Agreement with successful bidder for any work under this project until required insurance as detailed in the Project Manual has been obtained and the

Town has received the requested certificates of insurance and policies, nor shall the successful bidder permit any subcontractors to commence work until similar insurance has been obtained and the Town has received the requested certificates of insurance and policies.

Right to Reject Bid: The Town reserves the right to reject any or all bids. Any bid that contains any omissions, alterations of form, additions or alternates not called for, erasures or corrections, or any irregularities may be disregarded or rejected as improper except that the Town may waive any defects or irregularities should it be deemed in the best interest of the Town.

Additional Conditions:
All bidders are requested to note that the award of a Contract is subject to the following conditions and contingencies:

a. Necessary approvals of the Town Manager's Office.
b. Acceptable bids within the funding limitations of the project.

The Town of Tolland is an Affirmative Action/Equal Opportunity Employer, Minority/Women's and Small Business Enterprises are encouraged to apply.

INSTRUCTIONS FOR BIDDERS - TECHNOLOGY EQUIPMENT

ARTICLE 1. QUALIFICATIONS OF BIDDERS

1.1 In evaluating Bids, the Birch Grove Primary School and its representatives will consider the qualifications of only those Bidders whose Bids, among other factors, are in compliance with the requirements set forth elsewhere in the Bid Documents.

ARTICLE 2. COPIES OF BID DOCUMENTS

2.1 Complete sets of Bid Documents shall be used in preparing Bids; neither Birch Grove Primary School nor their representatives assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bid Documents.

2.2 Birch Grove Primary School and its representative, in making copies of Bid Documents available, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

2.3 A digital set of the Contract Documents will be available starting at (Date and Time to be determined) from the web-link indicated in Advertisement for Bidders. **Bidders are responsible for printing their own set of Contract Documents and shall pay all costs associated with printing**. No hard copies of any portion of the set will be provided. All documents in the bid Project Manual are standard letter size. The Drawing Set is formatted on 30" x 42" paper, oriented in landscape. The scale of the drawings is as noted on the individual sheets.

ARTICLE 3. EXAMINATION OF BID DOCUMENTS AND SITE

3.1 Before submitting a Bid, each Bidder must (a) examine the Bid Documents thoroughly, (b) familiarize itself with all Federal, State and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (c) study and carefully correlate the Bidder's observations and findings with the requirements of the Bid Documents.

3.2 The submission of a Bid will constitute an incontrovertible representation by the Bidder that they have complied with every requirement of this Article 3 and that the Bid Documents are sufficient in scope and detail to indicate and convey all terms and conditions necessary for the Bidder's proposed performance of the Work.

ARTICLE 4. CONTRACT DOCUMENTS

4.1 The Contract Documents shall be any and all sections, terms, conditions, forms, drawings, data, etc., listed in the Table of Contents of the Project Manual.

4.2 The Contract Documents are to be considered as one, and whatever is called for by one shall be as binding as if called for by all. Any discrepancies or questions as to quantities of any items listed in the Specifications and/or shown on the Drawings shall be immediately brought to the attention of the Architect for correction. Any such discrepancies, not corrected by

Addenda, shall be resolved on the basis of furnishing the greater quantity and/or quality without change in contract price.

ARTICLE 5. INTERPRETATIONS

5.1 All questions regarding the content or intent of the Bid Documents must be submitted VIA EMAIL ONLY (no phone calls regarding bid questions will be taken). Refer to the Advertisement for Bidders for information for whom shall receive Requests for Interpretations (RFI's) and specific formatting requirements. **Questions will not be accepted after the date and time indicated in the Advertisement for Bidders.**

5.2 JCJ will issue written clarifications or interpretations by Addenda not later than **four (4) calendar days before the date herein set for the opening of Bids**. Only information issued by such written Addenda will be binding. Oral and other clarifications or interpretations will not be binding and will be without legal effect. All Addenda will be uploaded to the same folder at the same site listed in Article

5.3 All bidders will be responsible for checking the site and downloading all issued Addenda

5.4 Each Bidder shall be responsible for determining that it has received all Addenda issued and shall acknowledge receipt of all Addenda in the Bid Form and the Bidder shall list therein all written Addenda number(s) issued.

ARTICLE 6. PRE-BID CONFERENCE

6.1 A pre-bid conference will not be held. Please contact Linda Fredrickson to help coordinate an appointment to visit the site due during the current COVID-19 crisis:

Email: lfredrickson@gtc.us.com or Tel: (860) 651-3150.

ARTICLE 7. PRICING FORM

7.1 Each Bid shall be submitted on the Pricing Form included in the Bid Documents. **The Pricing Form Sheets you are bidding on** shall be removed from the Bid Documents, filled in as required below, and submitted. Bid Forms shall be completed in ink or typed.

7.2 Bidders must submit cut sheets for all technology equipment substitutes that have not been pre- approved, showing manufacturer, style, dimensions, and finish option. **Substitutions must be submitted during the allowed time for questions during the bidding period to be reviewed and approved by the Architect/ Designer. Items that are submitted in the bid that are not pre-approved or reviewed prior to the bid submission may be rejected and may result in disqualifying the submitted bid for the related category.**

7.3 If an error in calculation is found on the submitted bid form discrepancies between unit prices and their respective total amounts will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

7.4 Categories and items not listed in the Advertisement to Bid and not included in the Bidding documents are not being bid and are not part of this package. Do not include bids for items not

included on the Bid Package Form, Item Description Sheets and Pricing Forms. No questions will be answered, and no information will be provided regarding items that are not included in the bid documents.

7.5 All names shall be typed or printed below the signature.

7.6 The name and address to whom communications regarding the Bid are to be directed shall be shown.

7.7 **One (1) original, two (2) paper copies, and one USB Drive** of each Bid shall be submitted in a sealed opaque envelope bearing on the outside the name of Bidder, its address, and the Project Title for which the Bid is submitted. (If forwarded by mail, Bid and sealed envelope marked as described above shall be enclosed in another envelope with the notation "BID ENCLOSED" on the face and addressed as indicated in the Invitation to Bid.)

7.8 In accordance with Connecticut General Statutes, Section 49-41, and other sections as applicable, all bid proposals exceeding one hundred thousand dollars shall be required to provide a payment and performance bond for 100% of the bid.

7.9 A 5% Bid Bond is required, regardless of the total amount of the bid, payable to the Town of Tolland and returnable upon award of the project. The Town of Tolland will accept a certified check for 5% of the amount of the total bid in lieu of the 5% bid bond. Certified checks will be returned to the unsuccessful bidders upon awarding of the project.

ARTICLE 8. RECEIPT OF BIDS

8.1 Sealed Bids for the Work of this Project will be received at the time and place indicated in the Invitation to Bid.

8.2 The Town of Tolland, and those representing them, in its sole discretion, may refuse to consider any Bid not prepared and/or not submitted in accordance with the Bid Documents.

8.3 Bidders are cautioned that it is the responsibility of each individual Bidder to assure that its Bid is in the possession of the recipient listed on the Bid Advertisement prior to the stated time, and at the place of the Bid Opening. Birch Grove Primary School, the Town of Tolland, the Architect/Designer, or any party associated with the project is not responsible for Bids delayed by mail and/or delivery services of any nature.

ARTICLE 9. MODIFICATION AND WITHDRAWAL OF BIDS

9.1 Bids may be modified only by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to that time scheduled for the opening of Bids.

9.2 A Bid may be withdrawn by the Bidder prior to the scheduled time (or authorized postponement thereof) for the opening of Bids.

9.3 Any Bid received after the time and date specified as the time for the Birch Grove Primary School opening of Bids shall not be considered. Once bids are opened by the Owner, no Bidder

may withdraw its Bid for a period of ninety (90) calendar days after the actual date of opening of the Bids.

ARTICLE 10. BASIS OF AWARD AND LOWEST RESPONSIBLE QUALIFIED BIDDER

10.1 Bids will be awarded to the lowest responsible bidder BY BID PACKAGE, or by combination of Bid Packages if combined bids presented is lower than the sum of the individual lowest bids per package.

10.2 A contract shall be awarded to the lowest responsible bidder, on a lump sum basis, for each Bid Package subject to the following reservations. The Owner or their authorized representative, shall have the right, both in total and/or on a category by category basis if it so desired, to reject all Bids and in partial to reject a bid not accompanied by any required bid security or data required by the Bidding Documents or a Bid in any way incomplete or irregular. The right is reserved to reject any and all bids, to waive any informality in the bidding and to make awards in any manner that is the most beneficial to the Owner and the project.

10.3 A purchase order may be awarded to the Lowest Responsible Qualified Bidder. The term "Lowest Responsible Qualified Bidder" as used herein shall mean the Bidder whose Bid Price is the lowest of those Bidders possessing, without limitation, the skill, ability, expertise, experience, qualifications and integrity necessary for the faithful performance of the Work, as determined by the Town of Tolland and its authorized representatives.

10.4 After review of these and other factors, including without limitation, responsiveness, qualifications and price, the Town of Tolland, and those representing it, reserve the right to reject any and all Bids, to decline to make an award, to waive any and all informalities if it is in Birch Grove Primary School's best interest to do so. The Town of Tolland, and its authorized representatives, reserve the right to disregard all nonconforming, nonresponsive, conditional Bids, and Bids taking exception(s) to the Bid Documents.

10.5 A Bid, which includes, for any Item(s), a Bid Price that is abnormally low or high may be rejected in its entirety.

10.6 The Town of Tolland, and those representing it, reserve the right to reject the Bid of any Bidder that they consider not to possess the qualities set forth in Article 10.1 herein.

10.7 The Town of Tolland, and those authorized to represent it, reserve the right to award each Category individually and/or in any combination deemed to be in the best interest of the Birch Grove Primary School, the Owner and the project.

ARTICLE 11. SUBMITTALS

11.1 Before ordering any Technology equipment, the successful bidder must send submittal(s) of all awarded items, including but not limited to; cut sheets, drawings and finish samples, as necessary, to the Technology Designer for final review and approval, and if request for resubmittal is necessary.

11.2 Submittals should be in order by category, and item number with the quantity clearly marked accordingly. **IF YOU ARE BIDDING PER SPECS, SUBMITTALS MAY STILL BE REQUIRED FOR APPROVAL PRIOR TO PURCHASING.**

ARTICLE 12. PURCHASE ORDER/CONTRACT TIME

12.1 BIDDER agrees and covenants that the Contract Time shall commence upon delivery of Birch Grove Primary School, or those representing it, written notice to proceed, which shall occur after contract execution by both parties.

12.2 BIDDER agrees and covenants that the purchase order time shall commence upon issuance and terminate on (a date to be determined), unless the purchase order provides otherwise.

12.3 A Purchase Order, if awarded, shall include without limitation the Invitation to Bid, Bid Form, The Statement of Bidder's Qualifications, Bid Specifications, Drawings, Quantity/Specification Matrix and Location Requirements (collectively the "Contract Documents").

ARTICLE 13. PURCHASE ORDER ISSUANCE/AWARD AND EXECUTION OF CONTRACT

13.1 A purchase order(s) will be issued within ninety (90) calendar days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids.

13.2 If a contract is to be awarded, the Lowest Responsible Qualified Bidder will receive a Notice of Award within ninety (90) calendar days after the actual date of the opening of the Bids.

Subsequent to a Notice of Award, if any, to the Lowest Responsible Qualified Bidder, multiple unsigned copies of a contract and all other applicable contract documents will be made available to the Lowest Responsible Qualified Bidder for its execution. Within five (5) calendar days, excluding Saturdays, Sundays and legal holidays, thereafter, Vendor shall sign and return all copies of the contract and all other applicable contract documents, including without limitation, all required bonds and certificates of insurance to the Town of Tolland. Thereafter, upon all required reviews, approvals, and signature of authorized party, one fully signed copy of the contract will be delivered to the VENDOR/VENDORS. The Town of Tolland, Birch Grove Primary School, and those authorized to represent it, shall incur no obligations, contractual or otherwise, unless and until a contract is signed by authorized parties, delivers a signed copy of the contract to the VENDOR/VENDORS and a Town written notice to proceed is delivered to the VENDOR.

ARTICLE 14. ACCESS TO SITE, FIELD DIMENSIONS AND PRODUCT HANDLING

14.1 Representatives of the State and any local or federal agencies having an interest in the Work shall have access to the Work wherever it is in preparation or progress and the VENDOR shall provide proper facilities for such access and inspection.

14.2 The supplier shall be solely responsible for the accuracy of field dimensions. Any differences found shall be submitted to Owner and Architect/Designer, for review and approval before proceeding. No extra compensation will be permitted because of differences between actual dimensions and measurements indicated on the Project Drawings.

14.3 The successful bidder is responsible for details and dimensions not controlled by job conditions. All required field dimensions beyond their control should be communicated to the

Architect/Designer, and the Technology Designer, through either Shop Drawings or other written method. The successful bidder shall cooperate to establish and maintain these field dimensions.

14.4 The successful bidder shall take all required precautions to protect furniture and equipment against damage, theft and deterioration on the site and shall respect the work of others. Any additional damage incurred to the work of others shall be promptly repaired or replaced at the expense of the successful bidder. All items shall be left in the proper location within the building and completely assembled, polished, cleaned, and in proper operating condition, inclusive of utility connections and hookups.

14.5 Storage of Equipment prior to installation is the sole responsibility of the supplier as on- site storage is not available.

14.6 All items specified herein shall be delivered in an undamaged condition as packaged by the manufacturer, with the manufacturer's seal and label intact.

ARTICLE 15. PRODUCTS AND MATERIALS

15.1 The intent of this Specification is to ensure the installation of quality Technology Equipment as listed. The Owner, and those authorized to represent them, shall be the judge as to the acceptability of anything other than that specified.

15.2 All materials furnished shall be provided by a manufacturer regularly engaged in the manufacture or production of these products.

15.3 Materials shall conform to all applicable and current specific local, state and federal regulatory safety codes and Specifications.

15.4 In order to meet the needs of persons with disabilities, when applicable all items shall comply with the current ICC/ANSI A117.1, Section 504 Rehabilitation Act 1973, including the 2010 ADA Standards for Accessible Design and Section 504 Regulations, and the Americans with Disabilities Act Title II, including the 2010 ADA Standards for Accessible Design and ADA Regulations. Accessible knee and toe clearances shall comply with 2010 ADA Standards for Accessible Design, Section 306. Compliance with the current Connecticut Fire Safety Code and current O.S.H.A - Title 29/Labor is also required. The items shall include, but are not limited to, fixtures, furnishings, equipment, workstations (including built- ins), playground equipment, laboratory fume hoods, darkroom equipment, welding stations, shop equipment and etc. Secure Attachment of Technology Equipment Items. Refer to Article 16.4 for Secure Attachment information.

15.5 Product & Manufacturers:

a. Item Description Sheets (specifications) are written with a Basis of Design for product and manufacturer. Where no specific alternate product is listed provide an equal product by one of the manufacturers listed that complies with the requirements. Other Manufacturers will not be considered unless deemed an acceptable alternate by the Architect/Designer during the question period of the bidding process. If unforeseen circumstances cause the approved manufacturer and/or product to not be available, then the Architect/Designer will determine accepted alternate manufacturers and/or products.

b. Adequate information on the proposed substitution such as images, dimensions, full specifications, actual color/material samples and any pertinent information must be provided with your bid in order to be considered.

15.6 This successful bidder shall furnish for approval, as required by the Architect/Designer, Riser Diagrams of proposed Audio Visual System solutions.

15.7 Vendors shall contact the Technology Designers, Linda Fredrickson Tel: 860-651-3150, Email:lfredrickson@gtc.us.com or Jorge Guillen Tel: 413-439-5571, Email:jguillen@gtc.us.com to schedule a delivery a minimum of two (2) weeks in advance. The Technology Designers will coordinate with the Project Manager.

15.8 The successful bidder's delivery schedule MUST be approved by the Project Manager, in the expressed time frame, otherwise the delivery may be denied.

15.9 The vendor and/or installers must report to the Technology Designer or Project Manager as soon as they arrive on site, prior to unloading or installing any equipment. **The Vendor must have a local representative assigned to be responsible for meeting the delivery truck, initial verification of delivery, coordinating with the Technology Designer for all aspects of the delivery and installation process, as well as directing installers with necessary instruction for completing installation in accordance with direction given by the Project Manager.** Installers arriving onsite without a Vendor Representative will not be allowed to unload, deliver or install any items until the Vendor Representative is onsite. If no Vendor Representative is available, or does not arrive as scheduled, the delivery may be denied.

15.10 The vendor and/or installer shall provide moving equipment and protection appropriate for the floor finishes encountered. The vendor shall provide protection of all finished surfaces. Payment for repairs required for damages caused by the Vendor and/or installers is the responsibility of the vendor.

15.11 Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

15.12 Provide a minimum of 72 hours' notice to the Technology Designer and Project Manager of activities that will affect the Owner's operations.

ARTICLE 16. INSTALLATION AND ASSEMBLY

16.1 Install all items in accordance with the manufacturer's instructions, the Technology Equipment Drawings and/or verbal direction from the Technology Designer and Project Manager.

16.2 Technology items are to include installation and assembly for all items, as well as imaging for all computers.

16.3 **To ensure proper attachment of Technology Equipment items, where "items" are attached to wall, ceiling, and /or floor, specifications shall require Vendor to provide information adequate for architect to verify that equipment attached to wall, ceiling and/or floor is attached securely. Review may be implemented during submittal process.**

16.4 All freight claims & signage will be the responsibility of the installer. All delivery receipts must be marked on arrival for any concealed damage claims to be effective. Any damages after the seven-day period will be the sole responsibility of the installer. Notice of any damaged items must be determined as replaceable at 100% as new. All material associated with delivery and packaging must be removed from the site by the installer at the end of each day. No dumpster will be provided and no accumulation of trash in any area of the job site will be tolerated.

16.5 **Provide a set of (3) keys per lock for all lockable items.** (2) keys are to be attached to its corresponding item and additional master set of keys (1 per item, if applicable) is to be tagged with item number and room and provided to the Project Manager upon completion of installation.

16.6 The Technology Vendors are responsible for supplying their installation crew with plans & a distribution list for correct placement and installation. Refer to 16.3 for Secure Attachment Requirements. The use of the Owner's or Construction Manager's documents will not be permitted.

16.7 All delivery and installation shall be performed in a workmanship like manner with skilled labor in accordance with manufacturer's instructions. Refer to 16.3 for Secure Attachment Requirements.

16.8 The successful bidder shall be required to demonstrate & provide the Birch Grove Primary School Staff with training session(s) on all equipment furnished at times and places scheduled through the Owner. More than one session or several hours will be required.

16.9 It shall be the responsibility of the successful bidder to adjust all Technology devices such that they are level and true. All equipment is to be installed at the height determined by the Architect and confirmed by the Technology Designer. For all equipment with adjustment devices requiring Allen, Hex-Head, or Set Screw Wrenches, or other special tools, tools are to be provided to the owner.

16.10 All installations must be conducted during normal weekday business hours: 7:00am to 3:30pm, unless otherwise approved by the Project Manager.

16.11 All premium costs required by the Supplier to perform the work that is required during the non-school hours and/or to comply with the completion dates on the construction schedule are to be included in the Supplier's base bid. Additional Supplier costs related to the use of overtime or additional personnel necessary to complete the work within the stated time completion will not be considered after the award of Contract.

ARTICLE 17. CLEANING, MAINTENANCE AND ACCEPTANCE

17.1 All wrapping, scrap and debris resulting from delivery, packaging and this work shall be removed from the premises by this Supplier/Installer AT THE END OF EACH WORKDAY. Use of the Construction Manager or Owner's dumpsters is not permitted and accumulation of any kind of trash beyond one workday will not be tolerated.

17.2 The successful bidder shall carefully and thoroughly clean, to the Project Manager's approval, the installed items provided and their entire installation work area.

17.3 The successful bidder shall be responsible for furnishing the services of a competent representative to demonstrate and instruct the Owner's representative of the proper operating

and maintenance procedures.

17.4 Provide, three bound copies of Operation and Maintenance manuals to the Technology Designer, that includes the following in order by group and item number: emergency instructions, spare part list, copies of all warranties and bonds, wiring diagrams, and shop drawings & product data on each item.

17.5 Final review for written acceptance of the delivery will commence subsequent to written request by the successful bidder to the Technology Designer stating bidder's completion of its work in compliance with the drawings and specifications.

ARTICLE 18. CORRECTIONS AND GUARANTEES

18.1 All work and equipment and any items found not in conformance with the contract documents shall be repaired or replaced promptly without additional charge.

18.2 Defective or rejected equipment shall be temporarily repaired by the successful bidder to permit use until suitable replacement is replaced.

18.3 All products shall be guaranteed, for the manufacturer's standard period or a minimum period of one (1) year, whichever is greater, from date of written acceptance by the Project Manager.

18.4 Guarantee(s) shall be submitted in writing with the Bid response and shall cover both material and installation.

18.5 Each Trade Vendor agrees to remedy all punch list items within 30 days of issuance of said list. If this Vendor is unable to remedy any item due to occupancy, then this Vendor agrees to perform the work during non-occupancy hours, including, but not limited to 2nd shift, 3rd shift, weekends and holidays. If the punch list work renders the item unusable in any way, the Vendor will provide temporary equipment, of the same quality, as a place holder until punch list items are remedied, and will absorb all costs associated with ordering, shipping, delivering, and installing temporary equipment. If the punch list work remains incomplete at the end of said 30-day period, the Project Manager will have those items remedied at the expense of the Vendor.

ARTICLE 19. SALES TAX

19.1 The goods and services to be provided under any contract or purchase order awarded pursuant to this Invitation to Bid are exempt from the sales taxes of the State of Connecticut. The Town of Tolland will provide a tax exemption certificate upon request.

ARTICLE 20. INSURANCE

20.1 The Vendor shall not commence Work until all insurance required in the Town of Tolland until a contract has been obtained by the Vendor and such insurance has been reviewed and approved in writing by the Town of Tolland, Birch Grove Primary School authorized representative. The Vendor shall not allow any Sub-Vendor to commence Work until all insurance required of any Sub-Vendor in Vendor's contract has been obtained and reviewed and approved in writing by Town of Tolland, Birch Grove Primary School authorized representative. Insurance shall be provided by insurers satisfactory to Town of Tolland, Birch Grove Primary School authorized

representative and authorized to do business in the State of Connecticut, and rated at least A-/VIII by A.M. Best as shown in the most current A.M. Best Company ratings.

20.2 At no additional cost to the Town of Tolland, beyond the Bidder's Total Bid Price, the Vendor shall purchase and maintain the insurance coverage noted below which shall protect Birch Grove Primary School and the Town of Tolland from claims which may arise out of or result from the Vendor's obligation under the Town of Tolland contract, whether such obligations are the Vendor's or Sub-Vendor or person or entity directly or indirectly employed by said Vendor or Sub-Vendor, or by any person or entity for whose acts said Vendor or Sub-Vendor may be liable.

20.3 The following policies with stated limits shall be maintained, in full force and effect, at all times during which the services are to be performed by the Vendor:

Refer to the Project Manual, Tab 3 – Conditions of Contract, Supplementary Conditions, Page 3, Article 13, for Insurance Requirements.

Failure to Maintain Insurance: In the event the Vendor fails to maintain the minimum required coverage as set forth herein, the Town of Tolland may at its option purchase same and offset the Vendor's invoices for the cost of said insurance.

20.4 Cancellation: THE TOWN OF TOLLAND AUTHORIZED REPRESENTATIVE SHALL RECEIVE WRITTEN NOTICE OF CANCELLATION FROM THE INSURER AT LEAST 30 CALENDAR DAYS PRIOR TO THE DATE OF ACTUAL CANCELLATION, REGARDLESS OF THE REASON FOR SUCH CANCELLATION.

20.5 VENDOR'S costs for all VENDOR insurance required by the contract shall be included in its Total Bid Price and shall include only the VENDOR'S direct and actual costs for such insurance, without any mark- ups by either the VENDOR or SUBVENDORS of any tier.

ARTICLE 21. CODE COMPLIANCE REQUIREMENTS

21.1 In order to meet the needs of persons with disabilities, when applicable all fixtures, furnishings and equipment shall comply with:

a. The current Connecticut State Building Code including 2003 ICC/ANSI A117.1;
b. Section 504 Rehabilitation Act l973 including 2010 ADA Standards for Accessible Design and Section 504 Regulations;
c. Americans with Disabilities Act Title II including 2010 ADA Standards for Accessible Design and ADA Regulations.

21.2 Accessible knee clearances shall comply with 2010 ADA Standards for Accessible Design, Section 306.

21.3 The "items" shall include, but are not limited to fixtures, furnishings, equipment, workstations (including built-ins), shop equipment, etc.

21.4 Compliance with the current Connecticut Fire Safety Code and current O.S.H.A. - Title 29/Labor is also required when applicable.

ARTICLE 22: PROPOSAL REQUESTS/ CHANGE PROPOSALS/ LABOR RATES

22.1 All Vendors shall respond to proposal requests within seven (7) calendar days. All Bidders shall respond to requests for additional information or additional break downs within one (1) calendar day. Failure to respond within the prescribed time will result in the assumption of a zero cost change for added work or the value for added or deleted work will be determined by the Architect/ Designer. The added or deleted work will become part of the Trade Contractor's scope of work. Also, failure to respond to requests for proposals in the prescribed time will be grounds for Vendor caused delays. Proposed change orders shall be presented in accordance with the procedures outlined below. Allowable costs for change proposals, ticket work and allowance work shall be limited to the following:

1. Costs of labor directly attributable to the change as described below under "labor rates".
2. Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed.
3. Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others.
4. Costs of premiums for all bonds and insurance, fees, permit fees and inspection fees related to the work.
5. Additional costs of supervision and field personnel directly attributable to the change.

22.2 All change proposals must be itemized completely including a complete breakdown of all material, labor, equipment and mark ups. Change proposals must be submitted on a form provided by or approved by the Architect/Designer. This form shall be used by all trade contractors and by all tiers of their subcontractors. Failure to submit change proposals on an approved form will result in an immediate rejection of the change proposal and possibly a delay notice. The detail shall include itemized material costs and quantities, labor costs with labor rates itemized as described below, vendor costs, equipment costs with equipment rates and overhead and profit. Vendor proposals and vendor quotes shall include the same detail. Labor Rates: Labor rates for change proposal pricing, time and material work and work performed under an allowance shall be the prevailing wage rate or, if applicable, the labor agreement rate for the applicable work classification with allowable additions as follows: Labor rates shall be limited to the base rate plus fringe benefits required by law or labor agreement, social security, old age and unemployment insurance (FICA,FUTA,SUTA, Medicare), general liability and workers' compensation insurance. No other add-ons will be allowed. Foreman's hours are limited to those hours directly attributable to the work involving the change, allowance or time and material ticket. For time and material tickets and allowance work include the name and work classification of all personnel listed. All trade contractors shall submit for approval, within fifteen (15) days of notification of contract award, itemized labor rates, as described above, for each applicable work classification. All labor rate disagreements will be resolved by utilizing the rates from the submitted certified payrolls.

22.3 Equipment rental rates will be determined by local market rental rates. Equipment rental charges shall not exceed the market value of the equipment.

22.4 All Changes- Overhead and profit (O&P) shall include all costs for home office support, as-built drawings, project management, estimating, safety, small tools, pick-up trucks, travel, on site (includes foreman's time unless the foreman is performing the task) and off site supervision.

Foreman's hourly rates shall be set by the actual rate verified by certified payroll. Foreman's time cannot be added on to any change proposal or time and material ticket (including allowance work) and is chargeable only if the foreman is directly working on the change or time and material work (including allowance work). For projected changes, the foreman's hours shall not exceed ten percent (10%) of the total labor hours directly attributable to the change and shall be part of the hours attributable to the change. Allowable combined overhead and profit on self-performed trade contractor or self-performed subcontractor is 10%.

22.5 Overhead and profit shall not be applied to lower tier mark ups. When both additions and credits covering related Work are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any. For work performed by a subcontractor the trade contractor mark-up for combined overhead and profit shall be five percent (5%) of the net cost of the work. The total mark up to the Owner, shall not exceed fifteen percent (15%) of the net cost of the work. Change proposals shall indicate the number of additional calendar days, if any, which are required to complete the change. If no additional time is indicated, it will be assumed that no additional time is required. The Vendor shall, when requested, promptly furnish in a form satisfactory to the Architect/Designer, itemized statements of the cost of the Work so ordered, including, but not limited to certified payrolls and copies of accounts and subcontracts, bills and vouchers to substantiate the above estimates. Estimated bond costs may be shown on each change proposal request, but not included in the total. Additional bond fees actually incurred will be reconciled at the end of the Project upon presentation of an invoice from the Vendor's bonding company.

22.6 Vendor O&P is not allowed on bond costs. Change orders issued to Vendors shall be executed and returned to the Architect/ Designer within seven (7) days. Failure to return change orders in the prescribed time will result in withheld payments to the Vendors.

END OF DOCUMENT

CATEGORY SUMMARY SHEET - BID

TAG	Item Description	Mfg.	Eligible Costs	Ineligible Costs	CT State Contract #	Sole Source - Mfg.
TE.1 NETWORK SWITCHES						
TE1.01	Data Switch Chassis - HP 5406R zl2 - Part # J9821A	HPE Aruba	✓		To be bid	✓
TE1.02	Expansion Module w. 24 Ports - Part # J9987A	HPE Aruba	✓		To be bid	✓
TE1.03	Power Supply - 5400R 1100W PoE+ zl2 - Part #J9829A#ABA	HPE Aruba	✓		To be bid	✓
TE1.04	10Gbit Transceiver- Part # J9151E	HPE Aruba	✓		To be bid	✓
TE.2 WIRELESS ACCESS POINTS						
TE2.01	AP-303 Indoor Wireless Access Point #JZ321A	HPE Aruba	✓		To be bid	✓
	1-Year Central License for AP-303 #JY925AAE	HPE Aruba	✓		To be bid	✓
	1-Year Central Cloud Services License for AP-303 #JY928AAE	HPE Aruba	✓		To be bid	✓
	1- Year Extended Service plan with Replacement #H9VR8E	HPE Aruba		✓	To be bid	✓
TE2.02	Wall Mount Kit	HPE Aruba	✓		To be bid	✓
	Installation -35 new and 42 Existing		✓		To be bid	
TE2.04	Installation for Existing Outdoor WAPs		✓		To be bid	
TE.3 TELEPHONES						
TE3.01	J169 IP Phone Global No Power Supply	Avaya	✓		To be bid	✓
TE3.02	1-Year License w. Voicemail and Seat set-up	Avaya	✓		To be bid	✓
TE3.03	J139/J159/J169/J179/J189 Wall Mount Kit With 1 Foot Cat5e Cable	Avaya	✓		To be bid	✓
TE3.04	IP Phone 9620/94xx/95xx Wall Mount	Avaya	✓		To be bid	
TE3.05	Software Activation for Installation	Avaya	✓		To be bid	✓
	Installation by Tolland IT					

TAG	Item Description	Mfg.	Eligible Costs	Ineligible Costs	CT State Contract #	Sole Source - Mfg.
TE.6 CHARGING CABINETS						
T6.01	Revolution 32 Charging Cabinet for Devices up to 17" , 31.7"W x 16.5"D x 55.7"H, with Installation	LocknCharge	✓	$ -	To be bid	
T6.01.1	Additional Revolution 32 Charging Cabinet for Devices up to 17" , 31.7"W x 16.5"D x 55.7"H, with Installation	LocknCharge	✓	$ -	To be bid	
T6.02	Carrier 10 Charging Cabinet for 10 Devices with 2 Baskets and Rack for Devices up to 17", with Installation	LocknCharge	✓	$ -	To be bid	
T6.02.1	Additional Carrier 10 Charging Cabinet for 10 Devices with 2 Baskets and Rack for Devices up to 17", with Installation	LocknCharge	✓	$ -	To be bid	
TE.10 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS						
TE10.01	70" ActivPanel Titanium Interactive Display	Prome-thean	✓	$ -	To be bid	✓
TE10.02	OPS-M WIN Windows Module with License	Prome-thean	✓	$ -	To be bid	✓
TE10.03	Installation of 70" ActivPanel - Cabling, Cables, Custom Wall Plates	Prome-thean	✓	$ -	To be bid	✓
TE.11 AUDIO VISUAL SYSTEMS						
TE11.01	Music Room Audio Visual System		✓	$ -	To be bid	
TE11.02	Gymnasium Audio Visual System		✓	$ -	To be bid	
TE11.03	Cafeteria Audio Visual System		✓	$ -	To be bid	
TE11.04	Media Center Audio Visual System		✓	$ -	To be bid	
TE.12 CLASSROOM AND CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEMS						

TAG	Item Description	Mfg.	Eligible Costs	Ineligible Costs	CT State Contract #	Sole Source - Mfg.
TE12.02	Assistive Listening System with Conference Microphone, Table Top Tripod, Carrying Case, Charger, 2 Ear Speakers, 2 Neckloop Lanyards, 2 Receivers, 1 Transmitter	**Listen Technologies**	✓	$ -	To be bid	

Purchase Order

Fiscal Year 2016

THIS NUMBER MUST APPEAR ON ALL INVOICES, PACKAGES AND SHIPPING PAPERS.

Purchase Order Number	**87654321**
Purchase Order Date	**01/01/2016**
Department	**Purchasing Department**
Contract	**1234567-01**
Required By	**03/31/2016**
Freight Terms	**30 Days**

Bill To
TOWN OF TOLLAND
21 TOLLAND GREEN
TOLLAND, CT 06084

Ship To
See Shipping Information Below

Vendor
TYLER TECHNOLOGIES, INC.
TOWN OF TYLER
DBA: TT
123 MAIN ST.
SUITE 100
TYLER TOWN, MAINE 04096

Delivery must be made within doors of specified destination.

VENDOR PHONE NUMBER	VENDOR EMAIL	VENDOR NUMBER	REQUISITION NUMBER	BUYER NAME	DELIVERY REFERENCE
207-555-1212	tyler.town@tylertech.com	1	12345678	JOHN W. SAMPLE	JOHN W. SAMPLE

NOTES

This is the Purchase Order POConfirmNote
This is the Purchase Order POConfirmNote 2
This is the Purchase Order POConfirmNote 3

This is the Purchase Order General Comment
This is the Purchase Order General Comment 2
This is the Purchase Order General Comment 3

This is the Purchase Order Blanket Note
This is the Purchase Order Blanket Note 2
This is the Purchase Order Blanket Note 3

This is the Purchase Order PostItNote Note
This is the Purchase Order PostItNote Note 2
This is the Purchase Order PostItNote Note 3

ITEM #	DESCRIPTION		QUANTITY	UOM	UNIT PRICE	EXTENDED PRICE
1	Computer Desk		1.0000	EACH	$1,000.0000	$1,000.00
	Ship To: DetailShipToAddr01 DetailShipToAddr02 DetailShipToAddr03 DetailShipToCity, ME 04096					
	GL #: 150-3100-673107-000-000-000-00-000-0000-	$1,000.00				
2	Computer Desk - Adjustable Height		2.0000	EACH	$2,000.0000	$4,000.00
	Ship To: DetailShipToAddr01 DetailShipToAddr02 DetailShipToCity, ME 04096					
	GL #: 0001-403-4300-0000-44102	$4,000.00				

Technology Equipment for Birch Grove Primary School
247 Rhodes Road, Tolland, CT 06084
State Project #142-0083-N

DAS Contract #_____

All purchases are to comply with the Technology Drawings, Specifications, and Conditions stated in the Project Manual, dated January 15, 2021, entitled "PROJECT MANUAL, TECHNOLOGY EQUIPMENT, BIRCH GROVE PRIMARY SCHOOL" prepared byJCJ Architecture, Hartford, CT and Guillen Technology Consultants, Enfield, CT.

Lisa A. Hancock
Director of Finance & Records

Michael Rosen
Town Manager

Total Ext. Price	$5,000.00
Purchase Order Total	$5,000.00

FINANCE COPY

SUPPLEMENTARY CONDITIONS

GENERAL CONDITIONS

A. The work of this Contract shall comply with the American Institute of Architects Document "A251™-2007, *General Conditions of the Contract for Furniture, Furnishings and Equipment*," herein referred to as the General Conditions.

SUPPLEMENTARY CONDITIONS

A. The following Supplementary Conditions modify the above referenced General Conditions. Where a portion of the General Conditions is modified or deleted by the Supplementary Conditions, the remaining unaltered provisions shall remain in effect.

ARTICLE 3 - VENDOR

§3.5 TAXES

Delete Subsection §3.5. and insert the following new Subsection in its place:

"**§3.5.** The Vendor shall include no amount for State Sales Tax or for Federal Excise Tax on products purchased for this Project. The Owner will furnish tax exemption number."

§3.6.1 PERMITS, FEES, AND NOTICES

Add the following Sub-subsection to the end of Subsection 3.6.1:

"**§3.6.1.1** The Town of Tolland will waive its fees for the permits and inspections for the proper execution and completion of the Work" except for the State Education Fund fee which cannot be waived. The cost will be $0.26 per $1,000 of construction value.

ARTICLE 5 - DELIVERY AND INSTALLATION

Add the following Subsection to §Section 5.1:

"**§5.1.1** All deliveries and installation of technology related equipment shall be conducted between **7:00 a.m. and 4:00 p.m.** weekdays only."

ARTICLE 7 - WARRANTIES

Add the following Subsection §7.1.1:

"**§7.1.1** This warranty shall be in effect for a minimum of one year from the date of issuance of the Certificate of Substantial Completion for the Project or designated portions thereof and shall be in addition to, and not a substitute for, any other rights of Owner under the Contract Documents or existing in law."

Add the following new Sections to Article 7:

"**§7.4** The Contractor shall submit copies of warranties, maintenance and operating manuals within two weeks following installation and prior to submitting any application for Final Payment.

§7.5 The Contractor shall not charge the Owner for any shipping, boxing or restocking costs in the event that items must be returned for any reason. If items must be returned under warranty, the Contractor shall bear cost of boxing and shipping, both ways and if necessary, expedited shipment of items that may be required to be replaced immediately."

ARTICLE 8 - PAYMENT

Add the following to the end of §Section 8.1:

"...Payment for materials suitably stored will be made on the condition of receipt of the following from the Contractor with each application on which such payment is being requested"

Add the following new Subsections to §Section 8.1:

"**§8.1.1** Submit a separate quotation schedule for each Category.
§8.1.2 Submittal of Bills of Sale (up to 85% of Bid Price for each item) in a form suitable to the Owner.
§8.1.3 Statement by Contractor which confirms that items in Storage, for which payment is being sought, is protected by insurance coverage for total replacement value.
§8.1.4 Statement by Contractor that payment includes cost of transportation to site and cost of installation in accordance with Contract Documents.
§8.1.5 Contractor shall itemize daily storage charges separately for Owner's purposes."

Add the following new Subsections to Section 8.2:

"**§8.2.1** Provide a separate invoice for each Category.
"**§8.2.2** Retainage will be a written requirement of the Agreement. Five percent (5%) of the amount due the Contractor will be retained by the Owner until installation is completed satisfactorily. This retainage shall be in addition to amounts due for any incomplete work or any work deemed unsuitable by the Architect."
"**§8.2.3** Stipulated overhead and profit percentage amounts for Change Orders shall be a maximum of 20% allowable for State reimbursement. Documentation shall be submitted."

ARTICLE 10 - RELATED ACTIVITIES OF OWNER OR OF SEPARATE VENDORS

§10.2 MUTUAL RESPONSIBILITY

Add the following clause to Subparagraph §10.2.4:

"**§10.2.4.1** If such separate contractor sues or initiates an arbitration proceeding against the Owner

on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings at the Contractor's expense, and if any judgement or award against the Owner arises therefrom the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorney's fees and court or arbitration costs which the Owner has incurred."

ARTICLE 13 - INSURANCE

Add the following Sub-subsections and clauses to Subsection §13.1.2:

"**§13.1.2.1** The Contractor shall furnish a certificate of insurance to the Town of Tolland for the following insurance coverage within ten (10) days from Contract execution. All insurance coverage shall be written with an insurance company licensed to conduct business in the State of Connecticut. Insurance coverage shall remain in full force for the duration of the contract term, including any and all extensions, and shall name the town as an additional insured. Such certificate of insurance shall specify that the Town of Tolland will receive thirty (30) days notice of any cancellation, non-renewal or reduction in coverage and limits originally provided.

INSURANCE

The selected Firm shall procure insurance coverage against claims which may arise from, or in connection with the performance of the work hereunder by the firm, his agents, representatives, employees or subcontractors. The insurance coverage shall remain in full force for the duration of the contract term including any and all extensions. The cost of such insurance shall be paid by the firm.

For the purpose of this section, the term "Firm" shall also include the firm's respective agents, representatives, employees or subcontractors; and the term "Town of Tolland" (hereinafter called the "Town") shall include its respective officers, agents, officials, employees, volunteers, boards and commissions.

A. Minimum Scope and Limits of Insurance:

The insurance required shall be written for not less than the scope and limits of insurance specified in this section, or required by applicable federal, state and/or municipal law, regulation or requirement, whichever coverage is greater. It is agreed that the scope and limits of insurance coverage specified in this exhibit are minimum requirements and shall in no way limit or exclude the Town from additional limits and coverage provided under the firm's policies. Exceptions to the requirements are subject to the sole discretion of the Town of Tolland. The successful bidder shall provide coverage through carriers rated at least A-/VIII by A.M. Best and licensed to conduct business in Connecticut.

MINIMUM INSURANCE REQUIREMENTS

(Exception to the Town Insurance Requirements is subject to the sole discretion of the Town)

Commercial General Liability

Each Occurrence:	$1,000,000
Personal/Advertising Injury Per Occurrence:	$1,000,000
Explosion, Collapse and Underground Hazards	Included

General Aggregate:	$2,000,000
Product/Completed Operations Aggregate:	$2,000,000
Fire Damage Legal Liability	$ 100,000

Automobile Liability

Each Accident:	$1,000,000
Hired/Non-Owned Auto Liability:	$1,000,000

Excess (Umbrella) Liability

$1,000,000 per occurrence and covering over the commercial general liability, auto liability and employer's liability coverage. $1,000,000 general aggregate.

Workers Compensation/Employers Liability

Workers Compensation	Statutory Requirement set forth by State of Connecticut
Employers Liability	
Each Accident	$100,000
Disease-Policy Limit	$500,000
Disease-Each employee	$100,000

B. Acceptability of Insurers:

Firm's policies shall be written by insurance companies licensed to do business in the State of Connecticut, with a A.M. Best's rating of at least A-/VIII, or otherwise deemed acceptable by Tolland's Town Manager.

C. Subcontractors:

Firm shall include all subcontractors as insured under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverage for subcontractors shall be subject to all of the requirements stated herein.

D. Waiver of Subrogation and Indemnification/Hold Harmless:

Selected Firm shall provide that all insurance policies include a waiver of subrogation clause that states that it is agreed that in no event shall the insurance company have any right of recovery against the Town. When the firm is self-insured, it is agreed that in no event shall the firm have any right of recovery against the Town. Selected Firm agrees to indemnify, defend and hold the Town harmless from any and all claims, demands, fines, damages, or liabilities arising from any negligent or wrongful act of the Firm or its employees, consultants or contractors. This provision shall survive the termination or expiration of the contract.

E. Other Insurance Provisions:

The policies are to contain or be endorsed to contain the following provisions:

a. Liability Coverage:

i. **The Town of Tolland and its respective officers, employees, volunteers, boards and commissions are to be named as additional insured** with respect to liability arising out of the activities performed by or on behalf of the firm; products and completed operations of the firm; premises owned, leased or used by the firm; or automobiles owned, leased, hired or borrowed by the firm. The coverage shall contain no special limitations on the scope of protection afforded to the Town.

ii. The selected Firm's insurance coverage shall be primary insurance with respect to the Town. Any insurance or self-insurance maintained by the Town shall be excess of the firm's insurance and shall not contribute with it.

iii. Coverage shall state that the selected Firm's insurance shall apply separately to each insured against whom a claim is made or suit is brought, except with respect to the limits of the insurer's liability.

iv. Verification of Coverage: Selected Firm shall furnish the Town with Certificates of Insurance effecting coverage required by this exhibit. The Certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf and reference the specific contract or job number. The Certificates and endorsements are to be received and approved by the Town before work commences. Renewal of expiring Certificates shall be filed thirty (30) days prior to expiration. Also, please provide either a full copy of the in-force general liability policy with endorsements, or a list with copies of all endorsements and exclusions for that policy. The Town reserves the right to require complete, certified copies of all required policies, at any time. The Firm must give the Town 30 day notice of cancelation of their insurance either directly or through their carrier.

§13.1.2.2 The Contractor hereby agrees to indemnify, defend and hold harmless the Town of Tolland and its respective officers, employees, agents and/or servants, the Architect and the Architect's consultants, and The General Contractor against all demands, claims, actions or causes of actions, losses, damages, liabilities, court costs and reasonable attorney's fees, asserted against, resultant to, imposed upon or incurred by the Town of Tolland resulting from or arising out of :

a. Any breach by Contractor of the terms of the bid specifications, or
b. Any injuries (including death) sustained by or alleged to have been sustained by the officers, employees, agents and/or servants of the Town of Tolland or the Contractor or subcontractors or material men, or
c. Any injuries (including death) sustained by or alleged to have been sustained by any member of the public or otherwise any or all persons, or
d. Any damage to property, real or personal, (including property of the Town of Tolland or its respective officers, agents and servants) caused in whole or in part by the acts or omissions of the Contractor or any subcontractor or any material men or anyone directly or indirectly employed by them while engaged in the performance of any work for the

Town of Tolland.

§13.1.2.3 The Town of Tolland and its respective officers, employees, agents and/or servants, the Architect and the Architect's consultants shall be named additional insureds on the Contractor's General Liability Insurance policy."

ARTICLE 15 - CLAIMS AND DISPUTES

§15.4 ARBITRATION

Delete Section §15.4 and subsequent Subparagraphs in their entirety.

END OF
SUPPLEMENTARY CONDITIONS

Building Rates

County	Town	Classification	Hourly Rate	Hourly Benefit
Tolland	Stafford	15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	$38.90	39.46
Tolland	Stafford	16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	$44.63	32.95
Tolland	Stafford	------TRUCK DRIVERS------		
Tolland	Stafford	17a) 2 Axle	$29.86	25.79 + a
Tolland	Stafford	17b) 3 Axle, 2 Axle Ready Mix	$29.97	25.79 + a
Tolland	Stafford	17c) 3 Axle Ready Mix	$30.03	25.79 + a
Tolland	Stafford	17d) 4 Axle, Heavy Duty Trailer up to 40 tons	$30.08	25.79 + a
Tolland	Stafford	17e) 4 Axle Ready Mix	$30.13	25.79 + a
Tolland	Stafford	17f) Heavy Duty Trailer (40 Tons and Over)	$30.35	25.79 + a
Tolland	Stafford	17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	$30.13	25.79 + a
Tolland	Stafford	18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	$45.92	26.08 + a
Tolland	Stafford	19) Theatrical Stage Journeyman	$25.76	7.34
Tolland	Tolland	1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
Tolland	Tolland	1c) Asbestos Worker/Heat and Frost Insulator	$40.21	30.99
Tolland	Tolland	2) Boilermaker	$38.34	26.01
Tolland	Tolland	3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	$35.71	33.31 + a
Tolland	Tolland	3b) Tile Setter	$34.90	25.87
Tolland	Tolland	3c) Terrazzo Mechanics and Marble Setters	$31.69	22.35

As of: July 1, 2020

Building Rates

County	Town	Classification	Hourly Rate	Hourly Benefit
Tolland	Tolland	3d) Tile, Marble & Terrazzo Finishers	$26.70	21.75
Tolland	Tolland	3e) Plasterer	$33.48	32.06
Tolland	Tolland	------LABORERS------		
Tolland	Tolland	4) Group 1: Laborers (common or general), acetylene burners, concrete specialists, wrecking laborers, fire watchers.	$31.00	22.15
Tolland	Tolland	4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	$31.25	22.15
Tolland	Tolland	4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	$31.50	22.15
Tolland	Tolland	4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is $26.80.	$32.00	22.15
Tolland	Tolland	4d) Group 5: Air track operator, sand blaster and hydraulic drills.	$31.75	22.15
Tolland	Tolland	4e) Group 6: Blasters, nuclear and toxic waste removal.	$34.00	22.15
Tolland	Tolland	4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	$32.00	22.15
Tolland	Tolland	4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	$29.28	22.15
Tolland	Tolland	4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	$28.74	22.15
Tolland	Tolland	4i) Group 10: Traffic Control Signalman	$18.00	22.15
Tolland	Tolland	5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	$34.53	25.64
Tolland	Tolland	5a) Millwrights	$34.94	26.19
Tolland	Tolland	6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	$40.25	29.17+3% of gross wage
Tolland	Tolland	7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	$55.12	34.765+a+b

As of: July 1, 2020

Building Rates

County	Town	Classification	Hourly Rate	Hourly Benefit
Tolland	Tolland	-----LINE CONSTRUCTION----		
Tolland	Tolland	Groundman	$26.50	6.5% + 9.00
Tolland	Tolland	Linemen/Cable Splicer	$48.19	6.5% + 22.00
Tolland	Tolland	8) Glazier (Trade License required: FG-1,2)	$39.18	22.55 + a
Tolland	Tolland	9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	$36.67	37.62 + a
Tolland	Tolland	----OPERATORS----		
Tolland	Tolland	Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required)	$42.45	25.30 + a
Tolland	Tolland	Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	$42.11	25.30 + a
Tolland	Tolland	Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	$41.32	25.30 + a
Tolland	Tolland	Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	$40.91	25.30 + a
Tolland	Tolland	Group 5: Specially Railroad Equipment; Asphalt Paver; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24	$40.28	25.30 + a
Tolland	Tolland	Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	$40.28	25.30 + a
Tolland	Tolland	Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	$39.95	25.30 + a
Tolland	Tolland	Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24	$39.59	25.30 + a
Tolland	Tolland	Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.;	$39.17	25.30 + a

As of: July 1, 2020

Building Rates

County	Town	Classification	Hourly Rate	Hourly Benefit
		transfer machine.		
Tolland	Tolland	Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	$38.71	25.30 + a
Tolland	Tolland	Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	$36.54	25.30 + a
Tolland	Tolland	Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	$36.54	25.30 + a
Tolland	Tolland	Group 12: Wellpoint operator.	$36.48	25.30 + a
Tolland	Tolland	Group 13: Compressor battery operator.	$35.86	25.30 + a
Tolland	Tolland	Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	$34.66	25.30 + a
Tolland	Tolland	Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	$34.23	25.30 + a
Tolland	Tolland	Group 16: Maintenance Engineer/Oiler.	$33.54	25.30 + a
Tolland	Tolland	Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	$38.11	25.30 + a
Tolland	Tolland	Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	$35.53	25.30 + a
Tolland	Tolland	------PAINTERS (Including Drywall Finishing)------		
Tolland	Tolland	10a) Brush and Roller	$35.62	22.55
Tolland	Tolland	10b) Taping Only/Drywall Finishing	$36.37	22.55
Tolland	Tolland	10c) Paperhanger and Red Label	$36.12	22.55
Tolland	Tolland	10e) Blast and Spray	$38.62	22.55
Tolland	Tolland	11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	$44.63	32.95
Tolland	Tolland	12) Well Digger, Pile Testing Machine	$37.26	24.05 + a
Tolland	Tolland	13) Roofer (composition)	$38.40	21.35
Tolland	Tolland	14) Roofer (slate & tile)	$38.90	21.35

As of: July 1, 2020

Building Rates

County	Town	Classification	Hourly Rate	Hourly Benefit
Tolland	Tolland	15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	$38.90	39.46
Tolland	Tolland	16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	$44.63	32.95
Tolland	Tolland	------TRUCK DRIVERS------		
Tolland	Tolland	17a) 2 Axle	$29.86	25.79 + a
Tolland	Tolland	17b) 3 Axle, 2 Axle Ready Mix	$29.97	25.79 + a
Tolland	Tolland	17c) 3 Axle Ready Mix	$30.03	25.79 + a
Tolland	Tolland	17d) 4 Axle, Heavy Duty Trailer up to 40 tons	$30.08	25.79 + a
Tolland	Tolland	17e) 4 Axle Ready Mix	$30.13	25.79 + a
Tolland	Tolland	17f) Heavy Duty Trailer (40 Tons and Over)	$30.35	25.79 + a
Tolland	Tolland	17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	$30.13	25.79 + a
Tolland	Tolland	18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	$45.92	26.08 + a
Tolland	Tolland	19) Theatrical Stage Journeyman	$25.76	7.34
Tolland	Union	1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
Tolland	Union	1c) Asbestos Worker/Heat and Frost Insulator	$40.21	30.99
Tolland	Union	2) Boilermaker	$38.34	26.01
Tolland	Union	3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	$35.71	33.31 + a
Tolland	Union	3b) Tile Setter	$34.90	25.87
Tolland	Union	3c) Terrazzo Mechanics and Marble Setters	$31.69	22.35

As of: July 1, 2020

SECTION 010100 PROJECT CONDITIONS & PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General and Supplementary Conditions, apply to the work of this Section.

1.2 SUMMARY:

A. This Section includes:

1. Description of the work.
2. Delivery, storage and handling of furniture, furnishings, and equipment.
3. Installation and assembly of furniture, furnishings, and equipment.
4. Vendor's use of the premises.
5. Operating and maintenance instructions.
6. Code compliance.

1.3 DESCRIPTION OF THE WORK:

A. The work includes providing Technology Equipment for the Birch Grove School, Town of Tolland, Connecticut, as required by this Project Manual.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Vendor shall receive all items at his warehouse or place of business and transport to Project site by his own means. No drop shipping directly to the site will be permitted.

1. Vendor shall have personnel available on site to receive and unload equipment. General Contractor nor School Department personnel will not be available to receive and/or unload technology equipment.
2. Vendor shall notify Architect of all deliveries a minimum of 72 hours prior to scheduled delivery.
3. Vendor shall have shipper include "Item #'s" on shipping manifest corresponding to Item Data Sheet.

B. Vendor shall provide storage for technology equipment until items are delivered and installed at the Project site.

1. If Construction Completion date is delayed, the Vendor shall provide storage for technology equipment for up to an additional 30 calendar days at no additional cost to the Owner.

C. Delivery to the site and on-site installation operations shall occur in accordance with the

attached Phasing Diagram, during the hours from 7:00 a.m. and 4:00 p.m. weekdays. Request for deliveries at other times (evenings, holidays and weekends) shall made at least 4 days prior to the proposed delivery.

1.5 INSTALLATION AND ASSEMBLY:

A. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and vendors involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Construction Manager of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Purchases.
    c. Deliveries.
    d. Submittals.
    e. Possible conflicts.
    f. Compatibility requirements.
    g. Time schedules.
    h. Manufacturer's written instructions.
    i. Warranty requirements.
    j. Acceptability of substrates.
    k. Temporary facilities and controls.
    l. Space and access limitations.
    m. Installation procedures.
    n. Coordination with other work.
    o. Required performance results.
    p. Protection of adjacent work.
    q. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

B. All items shall be located or placed by the Vendor in accordance with the installation drawings which will be issued by Architect, or the direction of the Owner.

C. All items shall be fully assembled, erected, fastened, connected and otherwise prepared for use in accordance with the manufacturer's directions, and/or in accordance with the instructions, directions, and Drawings of the Architect.

D. All drawers, drawer slides, doors, hinges, locks, catches, latches, slides and other moving parts of all items specified herein shall be fully fastened, lubricated and adjusted for free and proper

operation.

E. All technology equipment shall be free from defect or fault, visible, hidden or concealed.

F. All technology equipment , after placement, shall be clean, free of dust, packing marks, tape, tape marks and shall be treated with such oil, polish, or other preparation as recommended by the manufacturer of that item.

G. Adjustable and Moving Parts:

1. All items equipped with adjustable glides or leveling devices shall be adjusted so they are level and true.
2. All technology equipment having casters shall be checked to confirm that the casters are appropriate for the type of floor surfaces on which they are to be used, and that all casters are lubricated and free-wheeling.
3. All equipment having height adjustment devices requiring Allen, Hex-head or set-screw wrenches, or other tools, shall be provided with such tools.

H. All equipment having accessories shall have such accessories unfastened from shipping positions, and placed as appropriate for their use. All keys for locks shall be taped on equipment.

I. All furnishings and equipment intended for permanent attachment to the building structure shall be so affixed. All adjustable and moving parts of such furnishings and equipment shall be lubricated and/or adjusted for free and proper operation.

1.6 VENDOR'S USE OF THE PREMISES:

A. Vendor shall not be allowed to drive delivery vehicles onto sidewalks. Vehicles shall remain on paved driveways.

B. Vendor shall use proper dollies or hand trucks to move items into the building.

C. Vendor shall protect existing building components, including but not limited to floors, walls, doors and door frames, during process of making deliveries to and within the building.

1. Vendor is responsible for damage to the existing facility, exclusive of pre-existing damaged conditions which have been previously identified to the Owner.

D. Vendor shall be responsible for daily clean up and removal of all shipping and packing materials and for cleaning equipment once installed.

1.7 CODE REQUIREMENTS:

A. In order to meet the needs of persons with disabilities, when applicable, all items shall comply with:

1. Current Connecticut **2018 State Building Code** including amendments to **2015**

ICC/ANSI A117.1;

2. Section 504 of the Rehabilitation Act 1973 including **current ADA Standards for Accessible Design** and Section 504 Regulations; and
3. Americans with Disabilities Act Title II including the **current ADA Standards for Accessible Design** and ADA Regulations.

B. Accessible knee and toe clearance shall comply with **current ADA Standards for Accessible Design**, Section 306. Compliance with the current **Connecticut State Fire Safety Code** and current O.S.H.A. - Title 29/Labor is also required. The items shall include, but are not limited to technology equipment, workstations (including built-ins), etc.

C. The "items" shall include, but are not limited to technology equipment, etc.

D. Workstations, desks, appliances, etc.:

1. For **Adults**, both students and staff (Including for persons with disabilities). Provide product data sheets with manufacturer's dimensions of knee and toe clearance (30"w, 27"h, 19" d) and height of tables, counters, and work surfaces (28" to 34" to top).

1.8 SECURE ATTACHMENT OF FF&E AND TECHNOLOGY ITEMS:

A. To ensure proper attachment of technology equipment items, where "items" are attached to wall, ceiling, overhead structure, floor and/or furniture component, Contractor shall provide information adequate for architect to verify those items, are attached securely and per manufacturer's recommendations. Architect's review may be implemented during submittal process.

B. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. to securely attach items to existing structure as required to meet field conditions and meet applicable codes.

1.9 USE OF EXISTING ELEVATORS:

A. The Vendor will be permitted use of the elevator for delivery of technology equipment during the delivery period.

B. This elevator shall also be available to the Owner at all times; coordinate use with the Owner.

C. Provide protective pads for the cab and maintain other appropriate protective measures for the entrance doors and frames.

D. At Substantial Completion, restore the elevators used during construction to original condition. Replace worn cables, guide shoes and similar items of limited life.

1.10 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Vendors shall Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.

END OF SECTION 010100

SECTION 017000 CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes:

1. General Procedures to be used in administering Substantial and Final Completion of the Work.

1.3 SUBSTANTIAL COMPLETION:

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
3. Advise Owner of pending insurance change-over requirements.
4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
5. Deliver tools, spare parts, extra stock, and similar items.
6. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finished.

B. Inspection Procedures:

1. On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Vendor of unfilled requirements.
2. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Vendor of work that must be completed or corrected before the certificate will be issued.
3. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.
4. The Architect will invoice the Owner for services performed in inspections beyond the

original inspection and the first reinspection. The Owner will, in turn, pass this cost on to the Vendor and require a "deduct" Change Order due to the Owner.

5. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting inspection for certification of completion, submit the following. List exceptions in the request.

1. Final payment request with releases and supporting documentation not previously submitted and accepted.
2. Certificates of insurance for products and completed operations where required.
3. Updated final statement, accounting for final additional changes to the Contract Sum.
4. Certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and that the list has been endorsed and dated by the Architect.
5. Consent of surety to final payment.
6. Evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure:

1. The Architect will reinspect the Work upon receipt of written notice from the Vendor that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.
2. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advise the Vendor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
3. If necessary, reinspection will be repeated.
4. The Architect will invoice the Owner for services performed in inspections beyond the original inspection and the first reinspection. The Owner will, in turn, pass this cost on to the Vendor and require a "deduct" Change Order due to the Owner.

1.5 MAINTENANCE MANUALS:

A. Organize operating and maintenance data into suitable sets of manageable size.

1. Format: Submit maintenance manual as scanned PDF electronic file(s) of product information.
2. Include the following types of information:

a. Spare parts list.
b. Copies of warranties.
c. Wiring diagrams.
d. Shop drawings and product data.

B. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES:

A. Operating and Maintenance Instructions:

1. Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance.
2. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

a. Maintenance manuals.
b. Record documents.
c. Spare parts and materials.
d. Tools.
e. Identification systems.
f. Hazards.
g. Cleaning.
h. Warranties and bonds.
i. Maintenance agreements and similar continuing commitments.

3.2 FINAL CLEANING:

A. Employ experienced workers or professional cleaners for final cleaning.

B. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program.

C. Comply with manufacturer's instructions.

D. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

E. Clean-up and repair:

1. Remove waste, foreign matter, and debris resulting from the Work, from the building areas and the site.
2. Restore material, property and construction damaged by Vendor’s personnel and equipment during performance of the Work.

3. Remove temporary protection and labels which are not required to remain.
4. Replace damaged or broken glass and other damaged transparent materials.

F. Surface Cleaning:

1. Clean exposed hard-surfaced finishes to a condition free of dust, stain, film and similar detracting substances.
2. Clean and restore reflective surfaces to their original reflective condition.
3. Thoroughly clean floors. Remove temporary protections. Vacuum carpeted surfaces. Leave concrete floors broom clean.
4. Remove marks, stains, fingerprints, and other soil from finished, painted, decorated, and stained surfaces.

3.3 REMOVAL OF PROTECTION:

A. Remove temporary protection and facilities installed for protection of the Work during construction.

3.4 COMPLIANCE:

A. Comply with regulations of authorities having jurisdiction and with safety standards for cleaning.

B. Remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION 017000

SECTION 27 2000 TECHNOLOGY EQUIPMENT – BID

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Div. 00 Documents "Instructions to Bidders" and Supplemental Instructions to Bidders", and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The following Scope of Work shall apply to furnish materials, configure and install equipment/software which are products of manufacturers and providers that are equal in quality, design, and workmanship to current State of Connecticut Department of Administrative Services contracts. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer.
   1. TE.1 Network Switches
   2. TE.2 Wireless Access Points
   3. TE.3 Telephones
   4. TE.6 Charging Cabinets
   5. TE.10 Classroom and Conference Room Interactive Displays
   6. TE.11 Audio Visual Systems
   7. TE.12 Classroom and Conference Room Audio Amplification Systems

B. The contract is for all Technology equipment, with installation included. Patch cables for installation of the Network Switches to be provided by the General Contractor as part of the base bid. Cables, and connectors required for installation of the Wall Phones and new Desk Phones, and Audio Visual equipment to be provided by vendor.

C. The Technology Equipment for all areas shall be new and of first-class quality.

D. The Birch Grove Primary School is new construction and will be ready for occupancy in the fall of 2021. One Purchase Order will be issued to each successful bidder and the bidders must be prepared to store any materials ordered for the school in their own facilities because onsite storage will not be available for Technology Equipment

E. Any bidder receiving an award equal to or greater than $500,000 shall be included on the current listing of DAS Prequalified Telecommunications Systems Vendors, as published on the DAS website: https://portal.ct.gov/DAS/Procurement/PreQual/DAS-Construction-Contractor-Prequalification-Program-Prequalified-Companies
   1. Bidder is required to submit an Update (Bid) Statement for this project.
   2. Bidder is required to submit a current DAS Prequalification Certificate
   3. Bidder or subcontractor must be an authorized reseller of the major system components.
   4. Bidder or subcontractor must be an authorized reseller of the major system components Documentation from the manufacturer must be submitted.

F. The Technology Equipment for all areas shall be new and of first-class quality.

1.03 DEFINITIONS

A. ADA: Americans with Disabilities Act

B. Bid: Herein, used interchangeably with “proposal”

C. NIC: material and work which is Not in Contract and for which the Installer is not responsible except as otherwise detailed herein.

D. OFE: “Owner Furnished Equipment” which will be provided by The Owner. Be responsible for installing and integrating this equipment as detailed herein.

E. OFCI: “Owner Furnished Contractor Installed” Equipment which will be provided by The Owner. Be responsible for installing and integrating this equipment as detailed herein.

F. The term “shall” is mandatory.

G. The term “will” is informative.

H. The term “should” is advisory.

I. Term “provide” means furnish and install.

J. Bidder: Qualified firm intending to tender a bid on the systems described herein.

K. Construction Manager (CM) or General Contractor (GC): The representative responsible for general building construction and onsite coordination between sub-contractors

1.04 SUBMITTAL

A. Product Data: Submit manufacturer’s product data, installation instructions, use limitations and recommendations for each material used. All materials to be used must be approved by the Owner, The Town of Tolland IT Staff, and the Technology Designer.

B. Authorizations: The vendor must submit, with this bid, proof of any manufacturer's authorizations that may be required to sell, install and configure proposed cabling and equipment.

1.05 DELIVERY, STORAGE AND HANDLING

A. All deliveries must be scheduled with the Technology Coordinator ten to fourteen business days prior to arriving on site for a coordinated date and time. Deliver materials and products in unopened, factory labeled packages. Delivery/Shipping documents indicating quantities and product descriptions must be present at time of acceptance. Any delivery without documentation will not be accepted.

B. Equipment that will need to be shipped directly to the Birch Grove Primary School via any courier must be approved and scheduled by the Technology Coordinator ten to fourteen business days prior to shipping packages to: The Birch Grove Primary School, Tolland, Connecticut.

C. Store and handle equipment in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage.

D. Sequence deliveries to avoid delays, but minimize on-site storage to avoid possible damage and theft.

1.06 WORK RESTRICTIONS

A. Notify Project Manager or Owner not less than 5 business days in advance of proposed interruptions.

B. Do not proceed with interruptions without Project Manager's or Owner's written permission.

1.07 COORDINATION

A. Pre-installation Conference: Conduct conference at project site to comply with requirements in Division 1 Section "Project Coordination."

1. The installation of all equipment must be coordinated prior to installation with the construction and the project schedule. Included in the conference shall be:

a. Owner
b. Owner's Rep
c. Project Manager
d. Construction Manager
e. Other trades
f. Architect
g. Engineer
h. Technology Designer

1.08 WARRANTIES

A. Provide a warranty for all equipment, including subsystems and components. The warranty shall state that the equipment and services are free of faulty workmanship and defects, for a period of a minimum of one (1) year from the date of complete installation and proven functional operation. Within the warranty period, any part or system found to be defective will be repaired or replaced at no cost to the Owner.

B. Equipment supplied by the vendor/systems contractor under this bid must contain only new factory approved devices that will not void the equipment warranty.

1.09 UNIT PRICING

A. Bidders shall provide unit pricing for all components of the system being bid, as applicable.

1.10 BIDDER QUALIFICATIONS

A. The Contractor must customarily furnish the size, scope and nature of this SECTION and must be an authorized manufacturer's representative, certified, experienced and qualified to provide, install, program, troubleshoot, train, warrant and service all the systems in this SECTION in their entirety.

B. The Contractor (Firm and Employees) shall be experienced in the operations they are engaged to perform.

C. Bidders must provide documentation that they themselves are factory-authorized representatives of all systems specified.

D. Qualification Statement: Submit the following.

1. Up-to-date licenses, certifications, and training certificates for the equipment to be installed.

2. A valid certificate or correspondence from each manufacturer, indicating that the Contractor is an authorized installer and System Integrator for the system (or systems).

3. A valid certificate of completion of installation and service training of a present employee of the Contractor from each applicable manufacturer.

4. Demonstrate at least three (3) years' experience in the fabrication, programming, assembly, and installation of technology equipment of similar magnitude and quality as specified for the subject job. Submit documentation to this effect with the bid response. Be an authorized sales and service center for all listed components and offerings in this specification.

5. References: Furnish no less than three (3) references for installations of similar size (dollar amount & quantity of spaces receiving integrated technology) and scope, performed throughout the State of Connecticut area within the past three (3) years.

a. For each project listed, provide the following information:

1) Name of project.

2) Address.

3) Scope of project.

4) Contact person, title, telephone number.

5) Name of contact and telephone numbers of General Contractor, Owner's Representative, Architect, and Electrical Engineer.

6) List all the systems provided for the project.

7) List manufacturer's name and telephone number.

8) List each system model number provided on the project.

E. Provide a full-time on-site Project Manager to supervise the project.

F. Each Foreman and Installer working on this project shall be trained a minimum of eight (8) hours by the Manufacturer whose equipment is being provided on this project. The training shall consist, at a minimum, of proper installation techniques of the specific equipment in order to have a complete operating system that meets or exceeds the requirements specified herein. Each Foreman and Installer working on this

project shall have from the manufacturer, documentation indicating that they have been adequately trained prior to the start of the project. Only Foremen and Installers who have been properly trained and documented by the manufacturer whose equipment is being provided on this project shall be allowed to install same.

G. Maintain at the site an updated copy of the Manufacturer Trained Installers list, including a copy of their training documentation from the manufacturer. This documentation shall be made available to the Architect upon request.

H. Product Demonstration: The Contractor may be required to provide product demonstrations and interviews with the owner and his representatives, or may be required to provide side-by-side demonstrations with other vendors. These demonstrations may be required before a contract is issued. Offerors should be prepared to demonstrate each feature called for in this specification.

1.11 SEISMIC REQUIREMENTS

A. All equipment and work shall meet the restraint requirements for a Seismic Zone - 2 location, including installation and connections of material and equipment to the building structure.

B. Manufacturer Seismic Qualification Certification: Submit certification that all components will withstand seismic forces and will have supports and Seismic Restraints, Include the following:

1. Basis for Certification: Base certification on the maximum number of components capable of being mounted in each component type. Identify components on which certification is based. Indicate whether withstand certification is based on actual test of assembled components or on calculation.

    a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity of each component and of each assembled type and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices upon which the certification is based and their installation requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The equipment specified is for the purpose of establishing a design standard. Substitutions of equal quality products will be considered but are subject to approval by the Owner, Engineer, Architect, and the Town of Tolland Information Technology technical staff. **Approval must be granted before submitting a bid for a substitution.**

2.2 NETWORK, EDGE SWITCHES SYSTEM:

A. The design and components listed are a technology system based on the existing Town of Tolland IT for Schools design standard, HPE Aruba 5400 Series .

B. The network switching shall provide the equipment, cables, and connectors needed for the Network Contractor to complete the installation, terminations, and configurations for a fully functional based switching infrastructure.

C. Furnish, receive, deliver, and install all required equipment on site as agreed upon by the Owner and in accordance with the construction schedule. **Drop shipments will not be allowed**.

(See "The Item Description sheets")
TE.1 – NETWORK, EDGE SWITCHES SYSTEM
(See "TE" Technology Equipment drawings for deployment locations)

2.3 WIRELESS ACESS POINTS:

A. The design and components listed are a technology system based on the existing Town of Tolland IT for Schools design standard.

B. Bid Price

1. Bidders shall provide bid pricing for the LAN system Wireless Access Points in quantities as shown on the Room Inventory List.

2. Vendor to install 42 WAPs relocated from the old school and 35 new to equal 77.

3. Vendor to provide and install Oberon 1016-C 18" Hi-Bar Lock Boxes w. Translucent Doors for protection of the Gymnasium WAPs.

4. Furnish, deliver, and install all required equipment as agreed upon by the Owner following the construction schedule. **Drop shipments will not be allowed**.

C. Wireless Access Points shall be HPE Aruba AP-303 Indoor Wireless Access Point #JZ321A with MPTL connections to the network.

(See "The Item Description sheets")
TE.2 - WIRELESS ACCESS POINTS
(See "TE" Technology Equipment drawings for deployment locations)

2.4 TELEPHONES:

A. The design and components listed are a telephone system based on the existing Town of Tolland IT for Schools design standard, Avaya IP 9608G, or the most current model.

B. Sixty (60) existing telephones will be relocated by Tolland IT. Sixteen (16) new telephones are needed along with 10 Wall Mount Brackets for installation by Tolland IT.

C. Bid Price

1. Bidders shall provide bid pricing for the Telephones in quantities as shown on the Room Inventory List.

2. Furnish, deliver, and install all required equipment as agreed upon by the Owner following the construction schedule. **Drop shipments will not be allowed**.

(See "The Item Description sheets")
TE.3 - TELEPHONES
(See "TE" Technology Equipment drawings for deployment locations)

2.5 CHARGING CABINETS

A. Charging Cabinets shall be provided for existing Chromebooks and future Computers. Charging Cabinets shall accommodate devices up to 17".

B. Basis of design shall be the LocknCharge Carrier 10 Charging Cabinet for 10 Devices with 2 Baskets and Rack for Devices up to 17" in the specialty areas and the Revolution 32 Charging Cabinet for Devices up to 17 for the standard Classrooms.

C. Delivery and installation shall be included in the cost. **Drop shipments will not be allowed**.

(See "The Item Description sheets")
TE.6 – CHARGING CABINETS
(See "TE" Technology Equipment drawings for deployment locations)

2.6 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS:

A. The design and components listed are a technology system based on the existing Town of Tolland, IT for School's design standard,the 70" Promethean ActivPanel Connect. The new Displays to include the OPS-M Windows Module.

B. Thirty-nine (39) existing Promethean Displays and fifteen (15) new Displays shall be installed for a total of fifty-four (54). Vendor shall provide all AV cabling including HDMI Extender to Teacher Station, Wall Plates for connection of Teacher Computer, and Patch Cords required. Specifics on the HDMI Extender System used as the basis of design is included with the Item Description Sheet.

C. Furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance to the construction schedule. **Drop shipments will not be allowed**.

(See "The Item Description Sheets and Bill Of Materials after Part 3 - Execution")
TE.10 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS
(See "TE" Technology Equipment drawings for deployment locations)

2.7 AUDIO VISUAL SYSTEMS:

A. Sound Systems shall be installed in the Music Room, Gymnasium, and Cafeteria.; and in the Media Center. A combine/divide configuration will be provided in the Gymnasium and Cafeteria spaces to allow the Cafeteria to be used as overflow space for large assemblies.

B. A Rear Screen Projector shall be provided in the Music Room to display the image on the Gymnasium side to avoid installing an overhead Projector in the Gym.

C. Audio Equipment Cabinets with mixers, recorder/players, amplifiers, controllers, and switchers will be provided along with microphones and speakers, according to the specifications for each room.

D. Assitive Listening Devices shall be installed in the Gym and in the Cafeteria to meet ADA requirements for Public Spaces. Included in each system will be an RF Transmitter, Antenna, Rack Mounting Kit, Programmable Receivers, Neck Loop Lanyards for T-Coil hearing aids, Ear Speakers, Headphones, a 12-Unit Charging Tray, an ADA compliant Signage Kit, and Disinfecting Wipes. Listen Technologies shall be the basis of design.

E. Bidders shall provide bid pricing for the Classroom and Specialty Room Sound Systems in quantities as shown on the Technology drawings.

F. Furnish and deliver all required equipment to the site agreed upon by the Owner and construction schedule. **Drop shipments will not be allowed**.

(See "The Item Description Sheets and Bill Of Materials after Part 3 - Execution")
TE.11 – AUDIO VISUAL SYSTEMS
(See "TE" Technology Equipment drawings for deployment locations)

2.8 CLASSROOM AND CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEM

A. One Portable Assistive Listening System shall be provided, including 1 Transmitter, 2 Receivers, 1 Conference Microphone, 2 Ear Surround Speakers, 2 Neckloops for T-Switch Hearing Aids, 2-Battery Packs, ADA Wall Plaque, 1 Carrying Case, 1 Tabletop Tripod for the Transmitter, and 1 Microphone Extension.

B. Furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance to the construction schedule. **Drop shipments will not be allowed**.

(See "The Item Description Sheets and Bill Of Materials after Part 3 - Execution")
TE.12 CLASSROOM AND CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEM
(See "TE" Technology Equipment drawings for deployment locations)

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. All installation work shall be in accordance with, but not limited to, this specification and drawings. Work practices shall be performed in accordance with applicable standards, requirements, and recommendations of Federal and Local authorities having jurisdiction.
2. All discrepancies discovered and any discrepancies which are apparent at the date of submission of bids, shall be immediately corrected without additional charge to the Owner.
3. All equipment to be rack mounted shall be supplied with the appropriate rack mount kits.
4. All rack mounted equipment that does not require user interface shall have a cover plate or vent panel to block access to the controls.
5. All equipment shall be firmly secured in place unless requirements of portability dictate otherwise. Unless granted specific permission by the Owner, install and secure all boxes, equipment, etc., plumb and square.
6. Fastenings, mounting brackets and supports shall be adequate to support their loads with a safety factor of at least five (5). A safety chain or cable will be tied to all equipment suspended from above according to seismic regulations.
7. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
8. Rated Stairs: No penetrations are permitted into stairs except for items serving that stair.
9. Each vendor will have a secure room provided by the owner that will be locked to store equipment that is delivered to the site. The exact location will be determined for the vendor in the future. Once material and/or equipment is delivered on site the Owner's Builders Risk policy takes over.
10. Coordinate the exact location of all the equipment with this specification section and install all equipment as directed by the Owner. The Technology drawings are for reference only and provide information on locations of data closets, switches, wireless access points, etc.

B. Network Switches

1. Vendor shall furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance to the construction schedule.
2. The Town of Tolland, IT technical staff will coordinate the installation and configuration.

C. Wireless Access Points

1. Vendor shall furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance to the construction schedule.
2. The Town of Tolland IT technical staff will coordinate the installation and configuration.

D. Telephones

1. Vendor shall furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance to the construction schedule.

2. The Town of Tolland IT technical staff will coordinate the installation and configuration.

E. Charging Cabinets

1. Vendor shall furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance with the construction schedule.

2. The Town of Tolland IT technical staff will coordinate the installation and configuration.

F. Classroom and Conference Room Interactive Displays

1. Vendor shall furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance with the construction schedule.

2. The Town of Tolland IT technical staff will coordinate the installation and configuration.

G. Audio Visual Systems

1. Vendor shall furnish, receive and deliver all required equipment to the site as agreed upon by the Owner and in accordance with the construction schedule.

2. The Town of Tolland IT Technical staff will coordinate the installation and configuration.

H. Training – All Systems

1. Vendor shall provide a detailed review of all hardware, software, and network configurations to the Owner technical staff to include "as built" network schematics, functional descriptions, and all available manufacturers' manuals.
2. The Contractor shall be required to provide training on all Technology systems in the following manner.
3. As a minimum, administrator training for 1 hour on each system will be provided to five (5) school employees for:

   a. A brief overview of the head end system and installation process.
   b. A demonstration of end user equipment and features.

4. General basic training to users for 1 hour on each system will be provided for all members of the school staff.

   a. A brief overview of the general system and installation process, if applicable.
   b. A demonstration of end user equipment and features.

5. Review Bid Packages for specific requirements for initial set-up and training.

3.2 SYSTEM ACCEPTANCE

A. System acceptance shall be determined by the Owner and The Town of Tolland, IT and or its designated representatives. The Town of Tolland, IT shall not accept the installed systems until:

1. All contracted for hardware is received, installed, configured and made functional.

2. All contracted for systems software is installed, configured and made functional.
3. All documentation required by the specification has been delivered to the Owner.
4. All outstanding “punch list” items have been corrected by the Contractor.
5. All training is complete.

3.3 TESTING

A. Technology Systems: The contractor shall verify the functionality of each installed system. Verify that all connectors are properly installed and where appropriate, screwed down. All cable shall be neatly dressed and tied back with spiral wrap. All cable shall be tagged with permanent markers indicating the function of each cable. System testing shall be coordinated with the Owner's representative.

3.4 DOCUMENTATION

A. When applicable, contractor shall provide (2) copies of all manuals and two (2) sets of as-built documents, in hard copy and/or electronic format. As-built documentation shall include location and types of all hardware provided in accordance to the latest architectural and technology drawings, wiring diagrams for installations and interconnection of each device.

B. Document the serial number, make, and model and owner room number locations of all new Technology equipment. Supply the Town of Tolland, IT with paper and electronic copy. Coordinate with owner for owner room number list.

END OF SECTION
**

SECTION 27 4116 – AUDIO VISUAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The specifications section "General Conditions" or other correspondence provided by the owner with this document and related details, form a part of this specification by this reference thereto and shall have the same force and effect as if printed herewith in full.

B. Refer to Section 27 0500 COMMON WORK RESULTS FOR DIVISION 27 and DIVISION 28 for additional PART 1 - requirements. See Appendix A.

1. Many of the PART 1 - requirements are common to most of the individual DIVISION 27 and DIVISION 27 Sections in these Contract Documents.

    a. Refer to Section 27 0500 for the additional common PART 1 - requirements included in this project.

2. Provide the PART 1 - requirements detailed in Section 270500 for this specific specification section. The DIVISION 27 and DIVISION 28 requirements that are specifically indicated as being provide by other specification sections or other trades shall be provided by others as specifically detailed in the contract documents. Provide all the requirements from the PART 1 - Section, including but not limited to:

    a. RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES, review this section and provide as specified.
    b. SUBMITTALS review this section and provide as specified.

C. "Professional grade" – Equipment that is intended for commercial, not residential, use and is rated for continuous duty.

1. "User-friendly controls" – Controls that are designed and laid out for ease of use in a logical, easily recognizable, format that utilizes industry standard symbols wherever applicable.
2. "Labels" – All labels on audio-visual equipment and racks shall be self-adhering black laminate with white engraved letters as outlined in Section 3.04.

D. Below is a listing of specification standards, tests, or recommended installation methods and procedures or applicable installation or safety codes.

1. National Electrical Code (NEC)
2. National Electrical Manufacturer's Association (NEMA)
3. Underwriters Laboratories (UL)
4. Electronics Industries Association (E.I.A.)

5. American National Standards Institute (ANSI)
6. Audiovisual System Engineering, by Davis and Davis Second Edition.
7. Handbook for Sound Engineering Third Edition by Glen Ballou
8. Video Engineering by Arch Luther, Andrew Inglis
9. Basic Television and Video Systems Sixth Edition, by Bernard Grob, Charles Herndon
10. BICSI/INFOCOMM AV Design Reference Manual

1.2 SCOPE OF SPECIFICATION

A. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work of this Section affected to Unit Prices.

B. This section covers the procurement, construction, installation, and training for the Audio-Visual Systems. The objective is to provide fully professional Sound Systems, completely installed on premises and acceptance tested for use.

C. The intent of this section is to specify the required equipment, methods, and scope of services required to provide a premium professionally installed, performance tested Audio system. This section in conjunction with the attached project details defines the technical, functional, and performance requirements for the specified Sound Systems. Provide the following in accordance with Specifications and Drawings:

1. Submittals delivered in a timely manner as described hereinafter.
2. Verification of dimensions and other conditions at project site. Review conduit system as shown in electrical section of building construction documents and, where applicable, as built conditions. Notify Consultant, Architect, GC, and EC within four weeks after award of contract of any deficiencies or inadequacies in conduit system design.
3. Riser Diagrams or Systems Flow Drawings of all AV Systems with specified products shown (If applicable).
4. Power distribution within equipment racks including power connection to electrical outlets as described in electrical section of building construction documents.
5. Initial testing and adjustments, demonstration of system for approval, participation in acceptance tests, final adjustments as required.
6. Record Documents, "As-Built" drawings and Owner's Manual.
7. Training of operating personnel.
8. Notify appropriate parties of conflicts in a timely manner.
9. Work cooperatively with other trades to resolve conflicts.
10. Provision in specified equipment for connection of Fire alarm interface override dry contact by Public Address Contractor to shunt the sound systems.

D. This Specification establishes the requirements necessary to achieve the intended performance and function of the Audio System(s) described herein. Therefore, all materials and labor that are specified are necessary to meet these requirements. It includes materials and labor required to provide a complete and operable system(s) as specified herein and shown with the Audio-Visual Systems drawings.

E. **In all cases, supply the specified equipment and any required accessories, cables or connections in order to provide a fully complete and functional system**. **Provide user cables for all HDMI input plates: 6' length for table connections and 15' for wall connections unless otherwise specified**.

F. All programming is to be completed by a certified, factory trained programmer, or third-party professional programming company. All programs completed for this project are to be considered property of the owner and the AV vendor shall provide copies of all uncompiled/ editable code and DSP configurations to the owner without extra licensing fees. All touch panel layouts shall be pre-approved by the owner's representative before programming is to commence onsite. Any programming completed without prior sign-off by the owner's representative may require modification before final approval without extra charges.

G. This Specification establishes the requirements necessary to achieve the intended performance and function of the Audio System(s) described herein. Therefore, all materials and labor that are specified are necessary to meet these requirements. It includes materials and labor required to provide a complete and operable system(s) as specified herein and shown with the Local Audio Systems drawings.

1. Music Room

    a. This system provides a high-performance playback and recording system housed in an AV Rack including Microphones, a Recorder, a Mixer, and Speakers. Area. A Rear Screen Projector and Projection Screen shall be provided in the Music Room which serves as the Stage and will show the image on the Gymnasium side to avoid installing an overhead Projector in the Gym.

2. Gymnasium

    a. This System is "Multi-faceted" and will be controlled by a Remote DSP Touch Screen,
    b. -**Program 1** operates the Gym System Only (overhead floor speakers only) thru 2 Mic Inputs on the East and West Walls. This mode uses the Automatic Mic Mixer and is controlled by the DSP Unit employing the feedback controller.
    c. -**Program 2** is for Lectern Mode using the Remote Touch Screen to select it. Again, using the Automatic Mic Mixer from those specific inputs it activates the "Point Source" Speaker as the main speaker and delays the signal going to each gym floor speakers. The feedback controller is also activated.
    d. -**Program 3** is for stage presentations where the Wi-Fi "iPad" Mixer is used and controlled via the iPad. It works much like Program 2 but can be manually controlled.
    e. -**Program 4** is for musical presentations, again using the Wi-Fi "iPad" Mixer. In addition, 4 overhead mics are also added into the system and via the DSP routed thru the local effect processor.
    f. The wireless microphones can be used in either the manual modes or automatic modes.
    g. An Assitive Listening System will be provided for the Hearing Impaired to meet ADA requirements. Included will be an RF Transmitter, Antenna, Rack

Mounting Kit, Programmable Receivers, Neck Loop Lanyards for T-Coil hearing aids, Ear Speakers, Headphones, a 12-Unit Charging Tray, an ADA compliant Signage Kit, and Disinfecting Wipes. Listen Technologies shall be the basis of design.

h. There shall be a high brightness, high resolution video projector, mounted in the Music Room and projecting onto a rear-projection screen (also mounted in the Music Room). This shall be controlled by a button panel which will control: projector power, input selection, volume control (of program sources at the projector) and the electric screen. There shall be two HDMI input locations in the Gym (house left and house right) which shall connect to the projector. The audio from these inputs shall be connected to the main sound system via the audio out connection on the projector and via an unbalanced to balanced device. This program audio shall connect to the DSP for routing.

3. Cafeteria

a. This system provides microphones, ceiling speakers, local announcements, local inputs, playback of recorded material, and system muting.

b. There will be a combo button and volume control panel to control level and airwall position. The sources shall be connected to an automixer that shall be set for optimal performance without feedback. Cafeteria sound will route through the main DSP for routing and control. All Cafeteria support equipment shall be installed in the main audio rack in the Music Room.

c. An Assitive Listening System will be provided for the Hearing Impaired to meet ADA requirements. Included will be an RF Transmitter, Antenna, Rack Mounting Kit, Programmable Receivers, Neck Loop Lanyards for T-Coil hearing aids, Ear Speakers, Headphones, a 12-Unit Charging Tray, an ADA compliant Signage Kit, and Disinfecting Wipes. Listen Technologies shall be the basis of design.

4. Media Center

a. This system provides microphones, ceiling speakers, local announcements, local inputs, playback of recorded material, and system muting.

H. The Contractor will provide all materials and all necessary labor to complete said Sound Systems in compliance with this specification. Where a conflict exists with other specifications concerning such materials and labor, this specification takes precedence unless otherwise addressed in writing by the owner or owner's representative.

I. It is understood and agreed by the project contractor that the systems described herein shall be completed in every detail necessary to supply a complete, working system(s) implemented in a professional manor.

1. This text as well as the provided drawings are only necessary to define the design intent and anticipated performance requirements.
2. Equipment not discreetly mentioned or outlined in these documents shall be provided without claim for additional payment.

J. Drawings included with this document shall be considered part of this specification. The Contractor will provide complete and operating system(s) including all labor and materials for all assemblies and sub-assemblies either specified or implied within this project document.

1. Equipment function and features are to be provided by the Contractor. Where a specific item is listed by manufacturer's name and product number it identifies a minimum requirement for performance parameters and functionally defined by the product. This is not only limited to the device specified but also by the manufacturer's warranties.
2. If a Contractor intends to provide goods other than those specified, such as "an equivalent" device it must clearly be documented within the bid response. Proposed "equivalent" items must include a written certification from the manufacturer of the replaced item stating the equivalency of each item in regard to features, function, performance, and future system capabilities.
3. A contractor wishing to substitute items with an equivalent product must be willing to demonstrate the equivalency of said item to the owner and owner's representative at the contractor's expense. This proof of equivalency, in addition to the manufacturer's letter may include the following.

    a. "On-Site" side by side demonstration of both the specified unit and the proposed equivalent item.
    b. Independent laboratory test report. This is to include spreadsheet comparison of all critical distortion, frequency response, dynamic range, and power requirements. All tests based upon current AES standards.
    c. Equipment costs for proposed substitution items shall be listed showing the owner or owner's representative a cost savings incurred with the use of said proposed item.
    d. Contactor costs incurred, travel expenses, and other related costs shall be incurred by the contractor.
    e. Any professional services, service fees of engineers, consultants, or architects because of time being expended during this review, charged to the owner, shall be reimbursed to the owner by the contractor and/or his sub-contractor.

K. Special Insurance

1. Provide insurance fully covering all equipment against loss and damage during shipment, storage, installation, testing, adjustment, and demonstration.

1.3 SUBSTITUTIONS

A. General: The Contractor has the burden of proving, at the Contractor's own cost and expense and to the satisfaction of the Architect, that the proposed product is similar and equal to the named product.

B. Basis:

1. Requests for acceptance of proposed equivalents made following the award of bid will be considered by the Architect only in the following cases:

a. The named products cannot be obtained by the Contractor because of strikes, lockouts, bankruptcies or discontinuance of manufacturer and the Contractor makes a written request to the Architect for consideration of the proposed equivalent.
b. The proposed equivalent, in the opinion of the Architect, is equal or superior to the named product and its use is to the advantage of the Owner.

2. A formal request must be made for the substitution documenting fully the above reason. Include complete data on the proposed substitution substantiating compliance with the Contract Documents including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by Addenda, with data relating to Contract time schedule, design and artistic effect where applicable, and its relationship to separate contracts. Accompany the request by accurate installed cost data on the proposed substitution in comparison with the product specified.

C. Consideration:

1. A request for substitution is a representation by the Contractor that:

a. The Contractor has personally investigated the proposed substitution and determined that it is equal or superior in all respects to that specified.
b. The Contractor will provide the same warranty for the substitution that would be for that specified.
c. The cost data presented is complete and includes all related costs under this Contract but excludes costs under separate contracts and excludes Architect's re-design costs, and that the Contractor waives all claims for additional costs related to the substitution which subsequently become apparent.
d. Indicate if there will be any cost impact on work by other trades.
e. The Contractor will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

2. An accepted substitution will be documented by a Change Order modifying the Specifications. The Contract Price will be changed only if the substitution results in cost savings to the Owner.

1.4 REFERENCES

A. AES (Audio Engineering Society)

B. ASTM (American Society of Tests and Measurements)

C. IEEE (Institute of Electrical and Electronic Measurements)

D. NAB (National Association of Broadcasters)

E. Building Industry Consulting Services International (BICSI) BICSI/INFOCOMM AV Design Reference Manual

F. Electronic Industries Association/Telecommunications Industry Association (EIA/TIA) -568B, "Commercial Building Telecommunications Wiring Standard"

G. EIA/TIA-569A, "Commercial Building Standard for Telecommunications Pathways and Spaces"

H. EIA/TIA-606A, "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings"

I. EIA/TIA-607, "Commercial Building Grounding/Bonding Requirements"

J. National Electrical Code (NEC), 2008 - National Fire Protection Agency (NFPA) 70

K. Institute of Electrical and Electronic Engineers (IEEE) 802.3 Carrier Sense Multiple Access with Collision Detection (Ethernet 100BASE-T)

L. Federal Communications Commission (FCC), Title 47, Code of Federal Regulations, Part 68.

M. National Institution for Communications Engineering Technology (NICET) J. International Communications Industry Association (ICIA).

1.5 DEFINITIONS

A. ADA: Americans with Disabilities Act

B. AV: Audiovisual

C. Bid: Herein, used interchangeably with "proposal"

D. CATV: Central or Master Antenna Television (broadband)

E. DSP: Digital Signal Processor

F. IR: Infrared

G. NIC: material and work which is Not In Contract and for which the Installer is not responsible except as otherwise detailed herein.

H. OFE: "Owner Furnished Equipment" which will be provided by The Owner. Be responsible for installing and integrating this equipment as detailed herein.

I. OFCI: "Owner Furnished Contractor Installed" Equipment which will be provided by The Owner. Be responsible for installing and integrating this equipment as detailed herein.

J. The term "shall" be mandatory.

K. The term "will" be informative.

L. The term "should" be advisory.

M. Term “provide” means furnish and install.

N. “Indicated”, “shown”, or “noted” – As indicated on drawings or specifications.

O. “Comparable”, “Equivalent”, or “Similar” – Of base bid manufacturer, comparable in materials, size, color, design, and efficiency of specified product, conforming to base bid manufacturers.

P. “Reviewed”, “satisfactory”, “accepted”, “approved”, “directed” – As reviewed, satisfactory, accepted, approved, or directed by the Owner.

Q. Bidder: Qualified firm intending to tender a bid on the systems described herein.

R. Construction Manager (CM) or General Contractor (GC): The representative responsible for general building construction and onsite coordination between sub-contractors

1.6 BID PROPOSALS

A. Itemized Bid Response

1. Each piece of equipment shall be individually priced and submitted with Bid Proposals. Provide itemized bid response to include equipment description, manufacturer, model number, unit price, and quantity on a per room basis. All equipment prices shall reflect required modifications and accessories as needed for a complete and functioning system.
2. Non-equipment charges shall be outlined separately as a single line item on a per room basis. A sum of the audio system total cost shall be provided with the bid proposal.

B. Contractor Qualification

1. Demonstrate at least three (3) years’ experience in the fabrication, programming, assembly, and installation of audiovisual presentation and remote-control systems of similar magnitude and quality as specified for the subject job. Submit documentation to this effect with the bid response. Be an authorized sales and service center for all listed components and offerings in this specification.
2. References: Furnish no less than three (3) references for installations of similar size (dollar amount & quantity of spaces receiving integrated technology) and scope, performed throughout the Providence, Rhode Island area within the past three (3) years. At a minimum, reference information will include the reference company or institute name, contact person’s name and title, telephone number, address, and detailed project description, project manager’s name, and contact information of the organization that is responsible for day-to-day operation of the audiovisual installation.

C. Alternate Proposals

1. Any proposed alternate equipment choices should be requested in writing by the contractor prior to the proposal submission for approval. Each item on the alternate equipment list must be accompanied by catalog cut sheets and technical specifications.

D. Non-Equipment Charges, including but not be limited to:

1. Engineering: Including all required design drawings, run sheets, instruction manuals, console layout, step-by-step user guide, etc.
2. Pre-Installation: Work performed on the Installer's premises including all fabrication, modification, assembly, rack wiring, etc.
3. Installation: Including all on-site installation and wiring, shop drawing, coordination and supervision, testing, checkout, Owner training, etc., performed on the Owner's premises.
4. General and Administrative: Including all shipping, insurance, and guarantees.

E. Owner Furnished Equipment (OFE, OFCI)

1. Identify any Owner Furnished Equipment assumed in the Bid Proposal to be installed and integrated under this contract. Identify all assumed Owner Furnished equipment within each room/space type that will be required to complete the Audio-Visual Systems installation.

F. State of the Art Development

1. Supply only the manufacturer's latest developed product. In cases where product development surpasses the criteria of the specification, inform the Architect and make the newer product available to the project at no additional cost. In no case shall discontinued or obsolete equipment be acceptable. The same requirement applies to software programs developed/updated during the warranty period.
2. Should a manufacturer discontinue a specified product, provide the manufacturer's recommended replacement at no additional cost to the owner. Should the manufacturer have no direct replacement product, Audio contractor shall propose a product of equal or greater specification from an alternate manufacturer at no additional cost to the owner.
3. Should a product recall by a specified manufacturer require temporary or permanent replacement of a product specified under this section, notify the Architect at the earliest possible time and arrange to replace the product in question as quickly as possible.

    a. Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the jobsite.
    b. Equipment defect or intended recall shall not relieve the Audio Contractor from any contractual obligations regarding delivery schedule of product.
    c. Under no circumstances shall arrangement for alternate product require the Owner to accept superseded equipment except on a temporary basis.

G. Service Contract

1. The successful Bidder shall submit the cost for a one-year service contract, renewable for up to three years, which shall commence with the completion of the one-year warranty period, if requested. These contracts shall be a fixed cost and can be accepted at the option of the Owner.
2. The service contract shall include all of the services provided during the warranty period, including complete replacement or repair of defective equipment.

1.7 QUALITY ASSURANCE

A. Coordination

1. Coordinate this Section with work of other Project Manual sections and associated trades.
2. Specific references, herein, requiring coordination of certain work shall not obviate responsibility for other required coordination.
3. Coordinate access to the site and all facets of the installation with the GC. Attend coordination meetings as needed.

B. Standards and Codes

1. Comply with

   a. Local, state, and federal codes
   b. Applicable National Electrical Code
   c. American National Standards Institute
   d. Underwriters' Laboratories, Inc. standards.

2. All equipment, material, accessories, and loose items provided by Contractor shall be new and shall conform to applicable requirements of the above-mentioned agencies.
3. If required by local authorities, provide certificates and labels indicating compliance with above-mentioned codes and standards where applicable.

C. Point of Contact

1. Designate to the Owner in writing, the responsible person who shall ensure timely and consistent communication with the Owner on progress of the contract. The designated representative shall have full knowledge of all engineering and production procedures and shall report status of the installation and upcoming work plans to the Owner's Project Manager and Consultant on a weekly basis.
2. Project manager shall have successfully managed not less than two (2) projects of similar size and scope (as defined in previous sections). Bid submission shall detail the percentage of time that the project manager and other key personnel will be involved with the project.

1.8 SYSTEM DESCRIPTION

A. Design Intent

1. Provide a complete and functioning audio system inclusive of all hardware, software and training to meet or exceed the performance features outlined in this document.

B. Design Standards

1. The Owner's goal is to have available a cohesive and fully functional system. Therefore, part of the development efforts for successfully implementing the Audio-Visual Systems should include:

a. Install the system in a manner that complies with BICSI and ICIA cable routing standards. Route all audio, video (if applicable), and control cabling elements in a subtle, unobtrusive manner to maintain the architectural and visual integrity of the building.
b. Except where plenum cable is used above finished ceilings, it is required that all cablings be routed inside the comprehensive system of conduit. Floor and wall boxes shall serve as the primary interface points to the Audio system.
c. Provide and install cover plates, connectors, and associated cabling to link all floor and wall boxes to all affiliated local and remote Audio components. No Wiremold or surface-mounted raceway will be permitted. The Audio contractor shall coordinate faceplate materials, colors, and finishes with the faceplates used by other trades on the project and the architect to match aesthetics.
d. Provide and install security covers on any electronics with front panel controls that should not need to be adjusted after initial set-up. All components permanently mounted to rack rail systems shall be installed with industry accepted security screws.
e. All ceiling mounted Audio equipment shall be secured to building structure.
f. Steel cable security systems and padlocks to secure structure shall be provided for all surface mount loudspeakers, document cameras, flat panel displays, and projectors. All padlocks provided for security shall be keyed to a single master key.
g. Provide intellectual property release and install an editable version of all master source code for all digital signal processing, remote control, or microprocessor-based systems included on this project to an owner furnished personal computer. Also provide a hardcopy on portable media.
h. Provide necessary audio, video, RGBHV, HDMI, DVI, USB, and control signal repeaters, extenders, and amplifiers for any run greater than 30 feet and as needed to maintain required signal levels for receipt at destination device. All audio lines shall be balanced at the source, prior to any cable pull longer than 20 feet. There are no exceptions.
i. For each input/output point of interface to the system, provide a suitable length patch cord for owner use for every signal type present. Provide umbilical style cable management for any mobile solutions.

2. Performance Standards: Unless restricted by the published specifications of a particular piece of equipment, or unless otherwise required, the following minimum performance standards shall be met by each system:

a. Analog Audio:

1) S/N (including crosstalk and hum): 75 dB minimum.
2) Total Harmonic Distortion: 0.5% maximum from 30 Hz to 15,000Hz.
3) Frequency Response: Flat within +1.0 dB, 30 Hz to15, 000Hz.

b. Performance Test Signal Paths: The signal paths for the above Performance Standards shall be as follows:

1) Audio: From all source inputs (for microphones, audiotape units, digital video units, etc.) through all audio processing, audio distribution amplifiers (ADA), mixers, switchers, codec, etc., to all electrical signal destinations.

c. Remote Control Standards: As a minimum, the remote-control system for each space shall be programmed to include the following:

1) Owner Logo on first page.
2) Automatic System Shutdown.
3) AM/ PM Clock Settings.
4) 50 % audio level default.
5) Separate Program and Microphone Audio Level Control with mute function.
6) Volume/ Mute control for program and speech audio reinforcement on every screen.
7) Panel layout to include user screens, as well as password protected technician pages.
8) Raise and lower projection screen when projection is powered on/ off respectively.
9) Assign room computer as default system source upon power up.
10) Full function control of all source components, display units, processing devices and switching electronics.
11) Follow-up programming and modifications as requested by the Owner shall be provided 6 months after system acceptance. Provide and install updated editable source code to the Owner following these updates.
12) In the event the remote-control system programming becomes compromised during the warranty period, provide the necessary effort to make the system fully functional once again.

1.9 PERFORMANCE REQUIREMENTS

A. Examine all Project Specifications and Drawings for requirements that affect work of this Section, whether such work is specifically mentioned in this Section.

B. Delegated Design: Design rigging, including comprehensive engineering analysis by a qualified professional engineer, licensed in the state where the project is located, using performance requirements and design criteria indicated.

C. Structural Performance: Rigging shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Design Loads: Weight of equipment, e.g., Auditorium Speakers, etc.

D. Seismic Performance: Speakers system and Sound system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Minimum Standards: Comply with the following:

1. Tension Load Path Components and Systems: Design factor of eight (8).
2. Cable Bending Ratio: Minimum of 29 times the rope diameter.
3. Steel: 1/5 of stress yield.
4. Maximum Fleet Angle: Two (2) degrees for grooved drums and blocks

F. The Sound System must provide global muting function through dry contact closure for fire alarm and P/A System

1.10 SUBMITTALS

A. Submit all related Submittal information at one time.

1. SUBMIT ALL ITEMS IN A SPECIFICATION SECTION AT THE SAME TIME. An incomplete submittal will be held until a complete submittal is provided or may be rejected without further review and returned to the applicable parties. Include a copy of the Specification Paragraphs pertaining to the items submitted.
2. Submittal data is to be submitted in a three-ring binder, a continuous spiral binder, or plastic binding that allows the booklet to lie flat while open. Each booklet shall contain the below in the following order:

a. Cover Sheet.

1) Include name of supplying contractor and project name.

b. The Submittal Bill of Materials Index/Equipment List column headings shall identify the following minimum information. Submittals must be submitted using the following "headings" in the order indicated from left-to-right on the Bill of Materials Index/Equipment List:

1) All Bill of Material items shall be listed in the Bill of Material Index/Equipment List, in the same order as they appear in the specification.
2) "Specification Section #", reference specification section number/location that identifies each individual item, for every item specified and submitted.
3) Example of Specification Section number/location: 2.13, B., 7., c., 4), e).
4) "Description" of each item.
5) Manufacturer's "Name" for each item.
6) Manufacturer's "Model #" for each item.
7) "Quantity" of each item being provided.
8) Submittal Page Number(s) of specification sheet(s) for each item.

c. Any submittal that does not include a submittal Bill of Materials, and provides a minimum of the information requested herein, shall be rejected without further review and returned to the applicable parties.

d. Submittal shall include complete Specifications and all applicable addendums, including type of materials, electrical characteristics, capacities, performance, and power requirements, to determine compliance with Contract Documents. All data submitted, including wiring diagrams, shall be complete for all equipment, and shall apply only to this specific project. All extraneous material shall be deleted or marked out. Items to be supplied shall be specifically indicated, using a method that will be visible after photocopying.

e. Maintain at the job site the latest equipment submittal showing the action taken by the Architect. Make this submittal available to Architect.

f. Regardless of any information included in the submittal submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the review. Review by the Architect does not relieve responsibility for submittal errors or from meeting the requirements of the Contract Documents.

g. It is intended that Submittal data be complete and accurate at the first submission. If the Submittal is returned marked "Resubmit" only one additional submission will be permitted.

h. List a minimum of four completed project references like the scope of this project that include DSP devices of like quality. Include project name, location, and contact names of references (NO EXCEPTIONS).

i. Provide a statement from the major manufactures showing the sound contractor is an authorized representative of that product. This is to ensure products are current, recall notices are acknowledged, and correct programming/installation methods are employed as recommended by the manufacture (NO EXCEPTIONS).

j. Include a list of testing equipment owned by the Audio Contractor. At a minimum it shall include an Impedance Bridge (must be a metered bridge, not an LED meter), a Real Time Analyzer with full display and printer interface, Speaker Phase Checker, dB SPL Meter with selectable scales, and FFT-spectrum analyzers. At the option of the audio consultant the Audio Contactor maybe required to supply projective speaker coverage data using the EASE® System Design Program (NO EXCEPTIONS).

k. A minimum of one contractor meeting will be required with the owner or owner's representative to review the scope of project. The intent of this is to review submittals, proposed construction, proposed installation, and to coordinate sound system(s) installation with other trades.

3. Product Data: Specification Sheets shall be submitted on all items, including cable types. Submit a catalog sheet per product of equipment listed in the Detailed Bill of Materials, in the exact order as the Detailed Bill of Materials. Each catalog sheet shall describe mechanical, electrical, and functional equipment specifications. The catalog sheet must also include an image of the product. Photocopy duplications of the manufacturer's original equipment catalog sheets will be allowed if they provide adequate clarity of both the printed word and graphics/pictures. If more than one product is shown on the catalog sheet the intended product must be denoted by either an arrow or highlight. Catalog data sheets or other published materials showing appearances, electrical ratings characteristics

and connection requirements, performance characteristics, dimensions, weights, installation methods, and space requirements of equipment and its accessories, as listed below and required by the individual paragraphs:

a. Identification Methods
b. Grounding and Bonding
c. Electrical Connections for Equipment
d. Supports and Supplementary Steel
e. Electrical Identification
f. Test Report Formats
g. Test Equipment

4. Authorized Distributor Certificate.

a. Recently dated (within one year from submittal date) support letter from manufacturer stating that the supplying contractor is an Authorized Distributor of the product being supplied.

B. Shop Drawings

1. Submit shop drawings that indicate physical size and arrangement, (plans and elevations) construction details, provisions for conduits, access requirements for installation and maintenance, finishes, and materials used in fabrication. Supplement shop drawings with wiring diagrams and information as described under Product Data. Provide shop drawings as required by the individual paragraphs. Prior to fabrication submit contractor generated drawings for approval for all supplied systems. These drawings shall include, but are not limited to, the following:

a. Title Sheet & Symbols Legend.
b. All panels, plates, and designation strips, including details relating to terminology, engraving, finish and color.
c. All equipment racks, cabinets, consoles, tables, carts, support bases, and shelves.
d. Schematic drawings (Audio & Control Signal Flow if applicable), system functional block drawings, including those for audio and video subsystems. Resubmission of contract drawings is unacceptable.
e. All unusual equipment modifications.
f. Front mechanical drawings of each equipment rack.
g. Equipment location drawings.
h. Cable labeling plan.
i. Floor Plans, RCPs and Elevations: Show planned location for all elements and cable routing. Drawings should be at project standard scale and clearly legible.
j. DSP Programming shall be submitted showing all the optional settings and modes of operation, NO EXCEPTIONS (if Applicable).

C. Form

1. Submit all materials for review as described above, specifically referenced to the Specification paragraph number (where applicable).

a. Submit all drawings on sheets of one size, preferably the project standard size.
b. Where materials are presented on sheets 11" x 17" or smaller, organize into three-ring binder which include:

1) Dividers or tabs between logical sections
2) Project name and binder title labels on face and edge of binders

c. On submittal drawings, maintain 3/32" minimum lettering height. Submittals with text less than 1/16" in height may be rejected.

2. Partial Submittals may be rejected. If submitted individually and each in its entirety, the following Submittals shall not be considered partial:

a. Personnel
b. Milestones
c. Conduit Verification Statement and Notifications
d. Rigging and Mounting Drawings
e. As-Built Documentation

3. Product Data and Shop drawings must be submitted together to be reviewed.

D. User Interface

1. To develop a user interface which is both functional and useable, provide working "Beta" copies of system software for review and comment by the owner, architect and the Audio consultant as per the below listed schedule:

a. This is anticipated to be an interactive process, requiring at least three submittals prior to first beneficial use. At a minimum, the software development process will have the following milestones:

1) Initial concept Submittal for Review
2) First Beta Review
3) Second Beta Review
4) Final Implementation and On-Site Training: Prior to Final Acceptance
5) Follow-up programming review and updates; Timing (within sixty-days from final acceptance)

E. Weekly Reporting

1. Commencing with project award, provide weekly status reporting of milestone task status, anticipated completion date, and related memo notes for the following tasks:

a. Submittals
b. Infrastructure verification
c. Pre-wire status
d. Equipment Procurement
e. Shop fabrication

f. Remote control system design
g. Installation and Terminations
h. Field testing and pre-acceptance testing
i. Owner training
j. First owner use
k. Open Coordination Items and Questions
l. Final acceptance demonstrations

2. Provide, in writing, within two weeks after award of Contract, the names, mailing address, phone numbers with extensions, email addresses and paging service numbers (if available) of the following project personnel:

a. Project Manager
b. Lead Systems Engineer
c. Field Foreman
d. Remote Control System Programmer (If Applicable)

F. Conduit Verification

1. Within four weeks after award of Contract, submit statement confirming that Contractor has reviewed the conduit system as designed in building construction documents and, where applicable, as built.
2. Notify Consultant, General Contractor, Architect or Electrical Contractor of deficiencies or inadequacies, if any, in conduit system design or installation. If none, so indicate.
3. Absent conduit verification by Contractor and after installation of conduit as designed, Contractor shall assume costs of equipment, materials, labor and engineering, including services of owner's representative(s) in designing and/or verifying revised wiring approach(es) as relate to providing a fully functional system using conduit as designed or as revised at the discretion of the owner.

G. Rigging and Mounting Drawings

1. Submit full size drawings outlining mounting and installation details of all Audio equipment requiring integration with cabinetry or architectural elements.
2. Details stamped and signed by an appropriately licensed engineer, of all equipment mounting methods and materials provided by the Scope of Work, wherein failure of method or materials used for mounting or hanging permanently installed equipment could result in serious personal injury.

a. Details provided by or requiring approval by licensed engineer may include method of attachment to building structure or attachment and/or suspension points; method of attachment to supported equipment; all suspension materials; a materials list including specifications of all suspension materials; calculations used to determine loads and strengths of suspension materials, other as deemed necessary by the engineer.

3. In the absence of submitted approved, stamped, and signed mounting and hanging details, the Owner reserves the right to acquire such engineering approval at the expense of the

Contractor. Owner will notify Contractor of such intent. Contractor shall remedy within two weeks or Owner may proceed without Contractor approval and without relieving Contractor from any other obligations set forth by Contract.

H. Color Selection

1. Color options for all items as applicable coordinate with Architect.
2. Wall plate finishes should be coordinated with the Architect.

I. Samples

1. Color and finish samples of any furniture or lecterns coordinate with Architect (if applicable).

1.11 CLOSEOUT SUBMITTALS

A. At the completion of the installation, but before Final Acceptance, provide for review and approval the following, in compliance with Division 1 Section Closeout Procedures.

1. Operation and Maintenance Manuals:

a. Equipment manufacturer's operation and service manuals for each make and model of equipment.
b. System Operation Manual. Produce a manual specifically for the subsystems detailed herein. The manual shall describe all procedures necessary to activate each system to provide for the functional requirements, except as specifically excluded by the Owner. This section shall provide a simple "How-to" user guide for the procedures needed to operate the system. This document shall contain a section on operating the systems equipment in the event of control system failure. Control system touch panel layouts shall be accompanied by narrative text describing "step-by-step" function engagement.

2. Warranty

a. Provide list and dates of activation of equipment warranties.
b. Provide original manufacturers' certificates.

3. As-built Drawings

a. Include contractor generated (mark-up of contract documents is not acceptable) digital record diagrams for all systems including, but not limited to:

1) Schematic wiring diagrams with cable markings.
2) Internal wiring diagrams of the equipment rack cabinets.
3) Custom equipment modifications.
4) Final test results and nominal settings for all adjustable controls.

4. Software Passwords (if Applicable)

a. Software Passwords Schedule (i.e., a spreadsheet listing the manufacturer, model number and location in the Facility, of each piece of audio/video equipment, the software for which is password-protected).
b. Provide to Owner's Representative as a secure document separate from
c. Operating and Maintenance Manuals and As-Built Drawings.

5. Editable Control System Code

a. Provide the final control system code in an editable format.

6. Laminated Instruction Cards

a. Provide 8 ½ x 11 Instruction cards, approved by the Owner. Laminate step-by-step instructions outlining system operations for each room that has an Audio system. Provide editable file of card to Owner.

1.12 DELIVERY, STORAGE, HANDLING AND STAGING

A. Supply, transport, deliver, unload, move to the installation location, unpack, place, assemble, secure, connect, and install all equipment needed to complete the installation. Be responsible for transportation, parking, delivery, and on-site storage of the system's equipment. Be responsible for all transportation of personnel to and from the site.

B. Reconfirm before delivery that hallways, stairways, passages, doorways, rooms, entries, elevators and foyers are of sufficient size to accommodate the passage and installation of the equipment and systems. Off-site pre-staging of goods is encouraged.

C. The Owner's acknowledgment of delivery of goods and any payment made on account of such delivery shall not constitute acceptance (partial or otherwise) and shall not diminish obligations as specified.

D. The actual dates of delivery shall be under the absolute control of the Owner. The dates and times for delivery/installation are critical to the successful completion of the project. Deliveries shall normally be accepted only Monday through Friday 8:00 a.m. to 4:00 p.m. In the event it becomes necessary for goods to be installed outside these hours comply with the instructions of the Owner. Deliveries attempted outside these hours without prior consent of the Owner may be turned away. Comply with all instructions of the Owner and the Contractor concerning time of arrival at the site; which entrance shall be utilized for delivery; routes to be taken to reach the installation location; and other matters relating to the orderly and timely installation of the system.

E. Installation shall commence immediately upon delivery of materials to the jobsite, except as directed by Construction Manager. Time required from delivery date to completion of project shall be in accordance with the approved schedules.

1.13 SYSTEM TRAINING

A. Training: Provide training in the operation and maintenance of the system for personnel designated by the Owner. Record owner training sessions on DVD or other agreed upon media and make training videos available to the owner at no charge. The training shall be organized as follows:

1. One (1) hour training class for system technical operation and maintenance. This class shall cover the following topics:

   a. Review of signal flow diagrams.
   b. Review of all equipment functions, relevant to the function in this system.
   c. Review of initial equipment settings.
   d. Demonstration of all functional connections from a user perspective.
   e. Review & demonstration of replacement procedures for consumables (e.g., lamps).
   f. Review of manufacturers recommended routine maintenance procedures.

2. One (1) hour training class for system engineering concerns. This class shall cover the following topics:

   a. Review of signal flow diagrams.
   b. Review of all equipment functions, relevant to the installation.
   c. Review of initial equipment settings.
   d. Review of manufacturer's recommended routine maintenance procedures.
   e. Review & demonstration of replacement procedures for consumables (e.g., lamps).
   f. Review & demonstration of control system software replacement/upgrade procedures.

3. Two (2) hour training classes addressing Audio system operations. The classes will demonstrate and describe the following:

   a. System set-up and operations.
   b. Control system operation.
   c. How to attach microphones, record Audio signals, and control the sound system.
   d. Video System operation & capabilities.
   e. Audio monitoring and ADA system operations.
   f. Cable antenna television system (CATV).
   g. Training may take place at any time (chosen by the Owner) after the systems are operational, up to a year following system acceptance.
   h. Close out submittals shall be provided prior to any training classes.
   i. Coordinate detailed specifics of the training session(s) time, date & location with the Owner.

1.14 WARRANTY

A. The system warranty shall be for twelve (12) months from the date of final acceptance. Provide all equipment, material, and labor required to uphold a full system warranty at no charge to the Owner. All manufacturers' equipment warranties shall be activated in the Owner's name and shall commence on the date of final acceptance. In the case of modified equipment, the manufacturer's warranty is normally voided. In such cases, provide the Owner with a warranty equivalent to that of the original manufacturer.

B. There shall be no cost to the Owner for maintenance performed during the warranty period beyond the fixed cost of the contract.

C. Service calls performed under warranty will include:

1. Checking and repairing microphones and microphone cables.
2. Conducting subjective and objective tests of the audio, video, and control systems of the installed audiovisual systems.
3. Repairing and/or adjusting any malfunctioning components located by the technician during this testing.
4. Addition of control system programming updates and modifications, including providing an updated editable copy of the source code to the Owner.

D. Provide a service telephone number, staffed by a qualified technician familiar with the equipment installed. Staff this number during normal business hours.

E. Respond with an on-site technician within 24-hours of a service call (including Saturdays and Sundays) for all equipment and system failures.

F. Replace or repair, at no cost to the owner, any failed equipment hardware or software installations required to provide full system operations.

G. During the warranty period, advise the Owner in writing each time any routine software and firmware updates become available, giving the Owner the opportunity to upgrade the software/hardware should they so desire at no additional cost. Provide any necessary system modifications after installation of these updates to maintain a fully functioning system.

H. Provide updates to firmware during service period. Provide any necessary system modifications after installation of these updates to maintain a fully functioning system.

1.15 SEISMIC REQUIREMENTS

A. Equipment and work shall meet the restraint requirements for a Seismic Zone - 2 location, including installation and connections of material and equipment to the building structure.

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufactured Products: The components required for a complete sound system are defined by the following list. Quantities are only provided as a convenience. If a quantity differs between the drawing and this text, the greater quantity of items prevails. Items not listed, i.e., connectors, terminal strips, power supplies, etc. are the contractor's responsibility to complete a whole functional system.

1. All items provided by contractor shall be current models and "brand new" in manufacture.
2. Demonstration models, tested equipment, or previously used items will not be accepted.
3. Any item that is obsolete shall be identified to owner or owner's representative.
4. Owner or owner's representative reserves the right to accept or decline any proposed equipment substitute.

B. Custom Manufactured Items: All custom fabricated items are to be submitted in CAD format with submittal package and subject to the approval of the owner or owner's representative. Contractor is responsible for incurring costs if samples of fabricated panels are requested. Custom made panels are to be new in origin and made to order for this specific project.

2.2 PRODUCTS

A. See Bill of Materials included as part of the Audio-Visual System Flow Diagrams/drawings

B. Bill of Materials for products and installation services to be included.

C. The components required for a complete sound system are defined by the following list. Quantities are only provided as a convenience. If a quantity differs between the drawing and this text, the greater quantity of items prevails. Items not listed, i.e. connectors, terminal strips, equipment cabinet screws (MiddleAtlantic HTX type for all cabinets), power supplies, etc. are the contractor's responsibility to complete a whole functional system.

D. 1d04 Music Room - Equipment Bill of Materials

Item#	Qty.	Mfg.	Model	Description
1	2	Shure	SM58	Vocal Microphones
2	2	Shure	SM57	Instrument Microphones
3	4	Shure	MX202B/C	Recording Microphones
4	8	ProCo	ME-25	25' Mic Cable
5	1	OnStage	MB7006	Microphone Storage Box
6	4	OnStage	MS9701B	Microphone Stands with Booms
7	2	OnStage	SB9600	Tripod Studio Mic Boom

8	1	Rapco	iRack	Input Panel
9	1	XLR Mic Input, Mini and RCA Mono Line	Audio Plate	
10	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507
11	1	Shure	UA221	Antenna Splitter (PAIR)
12	2	Shure	UA864	Remote antenna
13	2	Shure	UABIAST-US	BIAS power injector
14	1	Soundcraft	Signature 12	12 Channel Mixer
15	1	Soundcraft	5065070	Mixer Rack Mount
16	1	Tascam	CD-200BT	CD/iPod Dock Player
17	1	Denon	DN300RMKII	USB/Solid State Recorder
18	1	dbx	DR PA2	Sound processor
19	1	Crown	CDi2000	Power Amplifier
20	1	Atlas	AA-PPRC	Paging priority controller
21	1	Middle Atlantic	RLM-15-1CA	Remote controlled power module
22	1	Gator	GRC-10X12	Rolling rack w/tilt up console rack
23	1	Middle Atlantic	PDR-915R-SP	Power Strip
24	1	Middle Atlantic	D4	Equipment Draw
25	2	JBL	Control 29AV	L1 Monitor Speakers
26	1	RDL	ST-UBA2	Unbalanced to balanced convertor with power supply
27	1	Extron	DTP T HWP 4K 231 D	HDMI transmitter
28	1	Extron	DTP HDMI 4K 230 Rx	HDMI receiver
29	1	Extron	XTP DTP 24/1000	Shielded CAT6, bulk
30	2	Extron	XTPDTP 24 PLUG	RJ-45 connector
31	1	Liberty	22-1P EZ	Shielded 22-2 bulk
32	1	Liberty	14-2C	14-2 speaker cable bulk
33	1	Liberty	RG58-CMR	Antenna cable, bulk
34	4	Liberty	112116	BNC crimp connector for Antenna

35	4	Neutrik	NC3FXX	XLR connector
36	1	C2G	50612	15’ HDMI cable
37	1	C2G	56783	6’ HDMI patch cable

E. 1d07 Gymnasium - Equipment Bill of Materials

Item#	Qty.	Mfg.	Model	Description
1	2	Shure	PG58XLR	Vocal Microphones
2	2	Shure	SM58	Vocal Microphones
3	2	Shure	SM57	Instrument Microphones
4	8	ProCo	ME-25	25’ Mic Cable
5	1	OnStage	MB7006	Microphone Storage Box
6	4	OnStage	MS9701B	Microphone Stands with Booms
7	4	Shure	MX202WP/C	Choral Microphones-Ceiling Installed
8	1		Audio Plate	XLR Mic Input, Mini and RCA Mono Line Input
9	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507 (w/2 Antennas)
10	1	Shure	UA221	Antenna Combiner (PAIR)
11	2	Shure	UA864	Remote antenna
12	2	Shure	UABIAST-US	BIAS power injector
13	2	Rapco	MS2	Mic Splitters 1X2
14	2	Custom	Custom	Mic plate with 4 XLRs, 2 for automixer, 2 for house system
			One stage right, one stage left, each a 2 gang NEMA Cover	
15	2	ProCo	WP1013	Dual Mic Input Plates on stage steps
16	2	ProCo	WP1004	Mic Inputs, Gym East & West Walls
17	1	Shure	SCM800	Auto-Mixer
18	1	Allen and Heath	Qu-16C	16Ch, digital mixer with iPad app
19	1	BSS	BLU100	DSP Unit
20	1	BSS	EC8BV	8 button plus vol ctl plate
21	1	BSS	EC4BV	4 button plus vol ctl plate
22	1	TP-Link	TL-SG1016PE	PoE Switch
23	1	TP-Link	OMADA AC1750	Wi-Fi Access point
24	2	Shure	DFR22	Feedback Controller

25	1	Crown	CDi2000	Power Amplifier
26	1	Crown	CDi4000	Power Amplifier
27	1	Listen Technologies	LT-800-072-01	Stationary RF Transmitter (72 MHz)
28	1	Listen	LA-122	Universal Antenna Kit (72 MHz and 216 MHz)
29	1	Listen	LA-326	Universal Rack Mounting Kit
30	12	Listen	LR-5200-072	Programable Receiver
31	4	Listen	LA-401	Universal Ear Speaker
32	9	Listen	LA-165	Headphones
33	9	Listen	LA-166	Neckloop
34	1	Listen	LA-381	Charging station for 12 units
35	1	Listen	LA-304	Assistive Listening Notification Signage Kit
36	1	Listen	LA-901	Disinfecting wipes
37	1	Middle Atlantic	ERK-4425-AV	Equipment Cabinet w/ locking doors, power, fan-top and lacing bars
38	1	Middle Atlantic	MPR-SEQ-1CA	Power Sequencer
39	1	Middle Atlantic	S-DEC	Power Switch
40	1	Middle Atlantic	DECP-1X1	Power Panel
41	4	Middle Atlantic	RLM-20-1CA	Power Module
42	1	Middle Atlantic	D4	Drawer
43	1	Custom	Rack panel	Custom for control panels
44	2	Rapco	AV1A	Direct Box
45	2	QSC	E115	**L5**, 15” 2-WAY PROGRAM SPKR
46	2	QSC	E115 YOKE	Bracket for L5 Speaker
	8	JBL	AC299	**L4** Gym Ceiling Speakers
47	8	JBL	MTU266-99	Bracket for L4 Ceiling Speaker
48	1	Da-Lite	37621LC	Rear Projection Screen - Tensioned Contour Electrol, Wide (16:10) Size: 87” X 139”, Black Case, Surface: HD Progressive ReView 0.9 (f/k/a Dual Vision)
49	1	Da-Lite	Screen Rigging	Screen Rigging Hardware
50	1	Da-Lite	98837	Locking Switch Plate Cover
51	1	Epson Pro	L1505UHNL	Projector, WUXGA/4KE 8000 Lumens
52	1	Epson Pro	ELPLW05	Lens for above

53	1	Chief	Mount	Ceiling mount, pipe and building attachment hardware
54	1	RDL	ST-UBA2	Unbalanced to balanced convertor with power supply
55	1	Extron	MLC Plus 100	Control panel
56	2	EXTRON	DTP T HWP 4K 231 D	HDMI transmitter
57	2	EXTRON	DTP HDMI 4K 230 Rx	HDMI receiver
58	2	C2G	50634	35’ HDMI cable
59	2			Single Gang AV Wall Plate with HDMI and USB ports
60	1	EXTRON	XTP DTP 24/1000	Shielded CAT6, bulk
61	4	EXTRON	XTPDTP 24 PLUG	RJ-45 connector
62	1	Liberty	24-4P-L5-EN	CAT5e data cable
63	6	Liberty	100 003B	EZ-45 connectors
64	1	Liberty	22-1P EZ	Shielded 22-2 bulk
65	1	Liberty	14-2C	14-2 speaker cable bulk
66	1	Liberty	RG58-CMR	Antenna cable, bulk
67	4	Liberty	112116	BNC crimp connector for antenna
68	4	Neutrik	NC3FXX	XLR connector
69	4	C2G	56783	6’ HDMI patch cable

F. 1d08 Cafeteria - Equipment Bill of Materials

Item#	Qty.	Mfg.	Model	Description
1	1	Shure	PG58XLR	Vocal Microphone
2	2	ProCo	WP1013	Dual Input Plates
3	1	ProCo	ME-25	25’ XLR Cable
4	1	OnStage	MS9700B	Microphone Stand
5	1	Custom	Audio Plate	XLR Mic Input, Mini and RCA Mono Line Input
6	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507 (w/2 Antennas)
7	1	Shure	UA221	Antenna Combiner (PAIR)
8	2	Shure	UA864	Remote antenna
9	2	Shure	UABIAST-US	BIAS power injector
10	1	Shure	SCM800	Mixer
11	1	Axiom	BT1	Blue Tooth Receiver
12	1	Axiom (Attero)	AXP20	Audio extender Rx

13	1	BSS	EC4BV	4-Button plus volume control plate
14	1	Listen Technologies	LT-800-072-01	Stationary RF Transmitter (72 MHz)
15	1	Listen	LA-122	Universal Antenna Kit (72 MHz and 216 MHz)
16	1	Listen	LA-326	Universal Rack Mounting Kit
17	8	Listen	LR-5200-072	Programmable Receiver
18	4	Listen	LA-401	Universal Ear Speaker
19	7	Listen	LA-165	Headphones
20	6	Listen	LA-166	Neckloop
21	1	Listen	LA-381	Charging station for 12 units
22	1	Listen	LA-304	Assistive Listening Notification Signage Kit
23	1	Listen	LA-901	Disinfecting wipes
24	1	Atlas	AA-PPRC	Paging priority controller
25	1	Crown	CDi2000	Power Amplifier
26	1	Middle Atlantic	D2	Equipment Drawer
27	5	Community	DP6-B	**L3** Speakers
28	5	Community	D6 Pro	L6 Two-Way Ceiling speakers
29	1	EXTRON	XTP DTP 24/1000	Shielded CAT6, bulk
30	2	EXTRON	XTPDTP 24 PLUG	RJ-45 connector, shielded
31	1	Liberty	24-4P-L5-EN	CAT5e data cable
32	2	Liberty	100 003B	EZ-45 connectors
33	1	Liberty	22-1P EZ	Shielded 22-2 bulk
34	1	Liberty	16-2C	16-2 speaker cable bulk
35	1	Liberty	RG58-CMR	Antenna cable, bulk
36	6	Liberty	112116	BNC crimp connector for antenna
37	0	Neutrik	NC3FXX	XLR connector
38	1	C2G	50612	15’ HDMI cable
39	1	C2G	56783	6’ HDMI patch cable

G. 1d27 Media Center - Equipment Bill of Materials

Item#	Qty.	Mfg.	Model	Description
1	2	Shure	PG58XLR	Vocal Microphones
2	2	ProCo	WP1013	Dual Input Plates
3	2	ProCo	ME-25	25’ Mic Cable
4	2	OnStage	MS9700B	Microphone Stands

5	1	Rapco	iRack	Input Panel
6	1	Shure	SCM800	Mixer
7	1	Custom	Audio Plate	XLR Mic Input, Mini and RCA Mono Line Input
8	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507 (w/2 Antennas)
9	1	Shure	UA221	Antenna Splitter (PAIR)
10	2	Shure	UA864	Remote antenna
11	2	Shure	UABIAST-US	BIAS power injector
12	1	Marantz	PMD-526C	Multi-format player
13	1	dbx	DR PA2	Sound processor
14	1	EXTRON	XPA 2001-70V	Power Amplifier W/70
15	1	Middle Atlantic	RLM-15-1CA	Remote controlled power module
16	1	Middle Atlantic	PTRK-14	Equipment Cabinet
17	1	Middle Atlantic	PDR-915R-SP	Power Strip
18	1	Middle Atlantic	D2	Equipment Drawer
19	6	Community	CP6-B	L2 Speakers
20	3	Community	D6 Pro	L6 Two-Way Ceiling Speakers
21	1	Atlas	AA-PPRC	Paging priority controller
22	1	Liberty	22-1P EZ	Shielded 22-2 bulk
23	1	Liberty	16-2C	16-2 Speaker Cable bulk
24	1	Liberty	RG58-CMR	Antenna cable, bulk
25	6	Liberty	112116	BNC crimp connector for Antenna

H. Cafeteria and Gymnasium Assistive Listening Systems

1. Assitive Listening Devices shall be installed in the Gym and in the Cafeteria to meet ADA requirements for Public Spaces. Included in each system will be an RF Transmitter, Antenna, Rack Mounting Kit, Programmable Receivers, Neck Loop Lanyards for T-Coil hearing aids, Ear Speakers, Headphones, a 12-Unit Charging Tray, an ADA compliant Signage Kit, and Disinfecting Wipes. Listen Technologies shall be the basis of design. Quantities are shown in Bill of Materials above.

I. Portable ListenIR Idsp System LS-88-01

1. Deliver the Portable ListenIR Idsp System LS-88-01 to the Main Office.
2. Furnish an Idsp portable IR assistive listening system for use by the hearing-impaired. The assistive listening system (ALS) shall be capable of broadcasting up to two (2) audio channels with the choice of four (4) mono carrier frequencies; 2.3, 2.8, 3.3 and 3.8 MHz. The system coverage area shall be up to 30,000 ft² (2787 m²) with single channel transmission. The system shall have a SNR of 60 dB or better and THD of less than 2%. The system shall have an audio frequency response of 63 Hz to 15 kHz, +/- 3db. The system shall include an omnidirectional table top microphone for audio pickup in the

room. The system shall be transported or stored in a portable carrying case when the system is not in use.

3. The system receivers shall be capable of receiving on one (1) of four (4) wide band channels (carriers), (2.3 MHz), (2.8 MHz), (3.3 MHz) and (3.8 MHz). The receivers shall be tuned to a single channel and users shall not be able to change the channel. The receivers shall have the option of being lanyard or belt clip worn and the lanyard shall incorporate an integrated neck loop for compatibility with T-coil hearing aids. The receivers shall be intelligent and provide customized audio to either earphones or the integrated neck loop based upon which is connected.
4. The receivers shall have two (2) 3.5 mm (TRRS) connectors to drive the integrated neck loop lanyard or up to two (2) mono or stereo earphones. The receivers shall incorporate a multi-functional display (OLED) that indicates battery status, inventory number, volume level and a customizable channel name. The receivers shall employ a unique iDSPTM noise reduction technology. The receivers shall be fully programmable via PC software. The receivers shall have a micro USB connector used for programming/setup, inventory control, charging and firmware upgrades. The receivers shall incorporate automatic battery charging circuitry and use a non-proprietary lithium ion battery. The receivers shall automatically turn on when removed from the charging device and automatically turn off when returned to the charging device.

    a. The LS-88 is specified and includes:

LA-277	Conference Microphone	1
LA-338	Table Top Tripod	1
LA-346	Carrying Case	1
LA-401	Universal Ear Speaker	2
LA-423	4-Port USB Charger	1
LA-430	Intelligent Ear Phone/Neck Loop Lanyard	2
LR-4200 IR	Intelligent DSP IR Receiver	2
LT-84-01	ListenIR Transmitter/Radiator Combo	1

2.3 ACCESSORIES

A. **Mute Local Sound System broadcast during Fire Alarm**. Provided between the local sound system and the fire alarm system, properly interface this cable to the Local Sound System (and coordinate with the Fire Alarm System Contractor the type of signaling required) and provide all hardware/programming required so when during a fire alarm the audio being broadcast by the local sound system will be muted. Once the fire alarm has ended, automatically return the local sound system to normal operations.

B. **Mute Local Sound System broadcast during Public Address Announcements**. Provided between the local sound system and the public address system, properly interface this cable to the Local Sound System (and coordinate with the Public Address System Contractor the type of signaling required) and provide all hardware/programming required so when during a public address announcement the audio being broadcast by the local sound system will be muted. Once the public address announcement has ended, automatically return the local sound system to normal operations.

2.4 BONDING & GROUNDING JUMPER CABLE

A. Provide bonding and grounding jumper cable.

1. Refer to Division 26, Section - Grounding and Bonding for Communication Systems.

2.5 LOCAL SOUND SYSTEMS CABLING

A. Provide and terminate all cabling per manufacturers' recommendations for a completely operational system as specified.

B. At all backbox locations, cables shall have a minimum 18" service loop coiled in backbox.

C. All cables shall be individually home-run.

D. Microphone Cable: Provide one pair #22 AWG-shielded, stranded for each microphone.

E. Speaker Cable: Provide one pair #18 AWG-stranded from each speaker to applicable amplifier.

1. All cables shall be listed and labeled for environmental air plenums where cable is indicated in plenum spaces and is not indicated to be in raceway. Comply with requirements in Division 16 Section "Communications Horizontal Cabling."

2.6 COMPONENT MOUNTING RACKS

A. Configuration: Comply with CEA-310-E. Factory-fabricated units designed for interchangeable mounting, forced or convection air cooling, wiring connection, and enclosure of standard 19-inch relay rack modules.

B. Mounting Provisions: Equipped for wall mounting.

C. Cabinet: Factory-finished steel with component mounting rails and prewired plug strips for component power connections. Full front and rear doors with continuous hinges, handles, and cylindrical keyed locks.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General

1. All installation work shall be in accordance with, but not limited to, this specification and drawings. Work practices shall be performed in accordance with applicable standards, requirements, and recommendations of Federal and Local authorities having jurisdiction.
2. All discrepancies discovered and any discrepancies which are apparent at the date of submission of bids, shall be immediately corrected without additional charge to the Owner.
3. Clearly label all user controls for intended use and nominal setting. These labels shall be engraved and filled, or equal. Note: “Dymo” labels are not acceptable.
4. All equipment to be rack mounted shall be supplied with the appropriate rack mount kits.
5. The rack enclosure shall have a single button on/off power distribution panel (Furman M-8x2 or equal) located in the rack unit.
6. All rack mounted equipment that does not require user interface shall have a cover plate or vent panel to block access to the controls.
7. All rack and instructor stations shall include “security type” screws to secure rack-mounted components.
8. In rooms containing wireless microphones or assisted listening system, provide an antenna distribution system inclusive of remote antennas as needed to support transparent coverage throughout the space(s).
9. All rooms with separate audio reinforcement systems require control interfacing to the Fire Alarm system. Contact Closure cabling shall be provided by the Fire Alarm Installer from the Fire Alarm panel to each relevant Audio equipment rack location. Connect provided Contact Closure cabling to the Remote-Control Bus input on the relevant Audio DSP unit. Program each audio system to mute in the event of an alarm.
10. All equipment shall be firmly secured in place unless requirements of portability dictate otherwise. Unless granted specific permission by the Owner, install, and secure all boxes, equipment, etc., plumb and square.
11. Fastenings, mounting brackets and supports shall be adequate to support their loads with a safety factor of at least five (5). A safety chain or cable will be tied to all equipment suspended from above.
12. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
13. All wiring practices within the systems shall follow all applicable local and state codes. Sound system equipment wiring practices shall be in strict conformance with “Sound System Engineering” 4th Edition publish 2013 by Focal Press, Don Davis, Eugene Patronis and Pat Brown.
14. Installation to include all standard safety practices. Fastenings, cabling, and supports for all fixed equipment must include a minimum safety standard factor of three or greater.
15. Provide adequate ventilation for all active electronic equipment.
16. All lines installed in conduits shall be splice free. Cabling shall be free from installation damage.

17. All connector wiring shall be by rosin core solder joints. No push on type connectors shall be accepted.
18. All cables to be numbered and identified in "As Built Documents". Provide permanent cable identification.
19. Project shall be adequately always staffed. Coordination with other trades and cooperation is mandatory.
20. All equipment shall be installed without dents, scratches, free of marks and blemishes.

3.2 AUDIOVISUAL CABLE INSTALLATION

A. Cables shall be installed in conduit. Cables of different levels shall be in separate conduits and adhere to the following schedule of placement:

	Mic	**Line**	**Speaker**	**AC Power**
Mic	Same	6" apart	12" apart	12" apart
Line	6" apart	Same	12" apart	6" apart
Speaker	12" apart	12" apart	Same	Adjacent

B. All cables, regardless of length, shall be marked with wraparound cable markers at both ends. There shall be no unmarked cables at any place in the system. Marking codes used on cables shall correspond to codes shown on "as-built" drawings and/or run sheets. The labeling and numbering system will be coordinated with the Owner.

C. All wired microphones shall include at a minimum a 30ft. patch cable with heavy-duty jacket and XLR connectors (if applicable).

D. Loudspeakers operating at 8 ohms shall be installed with 12AWG cable as a minimum size/diameter.

E. Wall plate and floor box input/output panels shall be installed with audio/ video line drivers on runs exceeding 35ft (if applicable).

F. All cablings shall be neatly strapped, dressed, and adequately supported. Any exposed cabling shall be neatly enclosed in a protective covering.

G. Terminal blocks, boards, strips, or connectors shall be furnished for all cables, which interface, with racks, cabinets, consoles, or equipment modules.

H. All audiovisual signal lines shall be balanced at Audio I/O plates. Provide ninety (90) degree connector adapters for all audio cabling at custom Audio I/O plates.

I. All cables shall be grouped according to the signals being carried. To reduce signal contamination, separate groups shall be formed for the following cables:

1. Power cables.
2. Data cables (when applicable).
3. Audio cables carrying low level signals.
4. Audio cables carrying line and high-level signals.

J. Supply cables as required to meet system performance standards. Any cabling installed in walls or ceilings shall be plenum rated. All cables shall be cut to the length dictated by the run plus the required service loop to permit future equipment movement and relocation.

K. For equipment mounted in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.

L. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer. Notify the construction manager if a field condition interferes with the proper installation of any cables or equipment.

M. All RJ-45 connectors used for audiovisual transport shall utilize rugged connectors.

N. Grounding Procedures: To minimize problems resulting from improper grounding and to achieve maximum signal-to-noise ratios, the following grounding procedures shall be adhered to:

1. General: Because of the great number of possible variations in grounding systems, follow good engineering practice, as specified herein, and to deviate from these practices only when necessary to minimize crosstalk and to maximize signal-to-noise ratios in the audio, video, and control systems. Inform the Consultant if there is a deviation from the standard grounding practices prior to performing the work.
2. System Ground: A single "system ground" shall be established for the system. All grounding conductors shall connect to this system ground. The system ground shall be provided in the equipment rack and shall consist of a copper bar of sufficient size to accommodate all secondary ground conductors.
3. A copper conductor, having a maximum of 0.1 Ohms total resistance, shall connect the system ground bar to the nearest grounded, metallic electrical conduit of at least 2 inches in diameter. Be responsible for determining if the metallic conduit is properly electrically bonded to the building ground system and shall show the grounding path of a document that is provided with the system documentation.
4. Secondary system grounding conductors shall be provided from all ungrounded equipment in each area, to the primary system grounding point for the area. Each of these grounding conductors shall have a maximum of 0.1 Ohms total resistance.
5. Under no conditions shall the AC neutral conductor, either in the power panel or in a receptacle outlet, be used for a system ground.

O. Audio Cable Shields: All balanced audio cable shields shall be grounded at one point only.

P. For ungrounded portable equipment, such as microphones, the shield shall be connected at both ends but grounded at only one end.

Q. Non-continuous cable supports.

1. Audiovisual cables shall be supported AFC with adjustable non-continuous cable supports.
2. Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of audiovisual cables.
3. Non-continuous cable supports shall have flared edges to prevent damage while installing cables.
4. Installation and configuration shall conform to the requirements of the current revision levels of ANSI/ EIA/TIA Standards 568 & 569, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
5. Do not exceed load ratings specified by manufacturer.
6. Follow manufacturer's recommendations for allowable fill capacity for each size non-continuous cable support.
7. Non-continuous cable supports shall be ERICO Cable Cat TM J-hook series or approved equal.

3.3 EQUIPMENT HOUSING

A. Locate operator useable equipment and patch panels at an appropriate operating height.

3.4 LABELING

A. Provide engraved label over each user-operated control that describes the function or purpose of the control. Adjust size of label to appropriate size for location.

B. Provide each terminal strip with a unique descriptor and numerical designator for each strip. Show strip information on the drawings.

C. Provide logical and legible cable and wiring labels permanently attached for easy identification to each cable on both ends.

D. Label on cables shall be adhesive style striping covered with clear, heat shrink tubing, sized appropriately for the cable.

E. Wiring designator shall be alphanumeric code, unique for each cable.

F. Each cable type shall be labeled starting with different destinations (i.e., mic series "Mxxx", speaker series "Sxxx", etc.).

G. Locate the cable designator at the origination and the destination of each circuit. Locate cable designator within 2" of connection point.

3.5 CONTRACTOR COMMISSIONING

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

1. All products are installed in a proper and safe manner per the manufacturers' instructions.
2. Insulation and shrink tubing are present where required.
3. Dust, debris, solder, splatter, etc. is removed.
4. Cable is dressed, routed, and labels and all connections are consistent with regard to polarity.
5. All labeling has been provided and installed.
6. All products are neat, clean, unmarred, and securely fastened.
7. All debris has been cleaned and removed from the site.
8. All electronic devices are properly grounded.

B. Perform the following test. Record all results in the final project manual.

1. Test each AC power outlet for proper connections for hot, neutral, and ground.
2. Measure and record the DC resistance for the technical ground in the equipment racks and console. Resistance should be 0.15 ohms or less.
3. Measure the impedance of each speaker line from the amplifier rack.

C. Speaker Verification Test:

1. Provide a low-level distinctive tone to each amplifier input.
2. Systematically turn on each amplifier, one by one, and verify that the correct speaker is being driven. Correct wiring as required for proper operation.

D. Constant Voltage Speaker test:

1. Provide a low-level distinctive tone to each amplifier input.
2. Systematically turn on each amplifier, one by one, and verify that the correct speaker is being driven. Correct wiring as required for proper operation.
3. Walk the areas covered by the speakers and check for even level volume coverage. Adjust any speakers that are not correct by changing tap values as required for even volume level.

E. Speaker Polarity:

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

F. System(s) Gain Adjustment:

1. Adjust each active device to have unity gain from the console output to the input of the amplifiers.
2. With all amplifiers turned off, connect a sine wave and pink noise to an input of the console. Using a RMS voltmeter, adjust the scale to an output between -10 and 0dBu. Once level has been established, it should remain unchanged throughout the testing.

G. Amplifier Level Adjustment:

1. Adjust the gain of each amplifier to provide consistent and appropriate levels throughout the seating areas/facilities.

2. With the console and other electronic devices feeding the amplifiers adjusted as described above, adjust the output of the console to be -10dB on the output VU meter.
3. Adjust the appropriate amplifiers to achieve 85dBA in the area covered by one of the speakers. Use a calibrated sound level meter to make the adjustments.
4. If the speaker is utilizing an active crossover, mute the individual bandpass sections to adjust each section independently.
5. Start with the speaker closest to the stage area or the booth location as appropriate. Once that speaker has been adjusted to the above criteria, repeat this procedure for each speaker cabinet.
6. Amplifiers should be set to provide an average of 85dBA plus or minus 1.5dB throughout each seating section.

H. Amplifier Level Adjustment 70-volt System:

1. Adjust the level of the 70-volt systems to achieve a volume level appropriate for their location and intended use.
2. After initial amplifier adjustment, walk all areas utilizing the 70-volt systems and check for volume uniformity. If any changes of 3dB or more occur, adjust that specific area or speaker as required for even coverage.

I. Input Verification Test:

1. Using a microphone, portable signal generator, or CD player, send signal from every microphone input to the console. Check every connection location in the facility.
2. Verify video signal presence at each component input with test equipment and verify the proper signal and uniform strength.
3. Verify that the receptacle under test appears at the correct position on the patch bay and is operating properly.
4. In a similar manner, check any other inputs or tie lines, as appropriate.

J. Impedance:

1. Measure absolute impedance value of each loudspeaker line at 250, 500, 1000, and 2000 Hz without the amplifier connected but with all speakers connected. Record the impedance levels versus frequency for each loudspeaker line.
2. Impedance must not be below the rated load impedance of respective amplifier and may be any value equal to or above that.
3. Check the resistance of the lines for loudspeaker, line level, and microphone receptacles with the receptacles opened and shorted. Document and repair any shorts or discontinuities found.

K. Polarity:

1. Verify the polarity of each device in the shop to obtain true polarity throughout the system.
2. Verify and document that polarity is kept throughout the system after wiring from inputs through output devices or receptacles.

L. Gain Structure:

1. Turn off amplifiers and set equalizers and filter controls to flat response. Do not bypass any equalizers or filters.
2. Adjust compressors and limiters to a 1:1 compression ratio and a +10 dBu limiting threshold. Do not bypass these processors.
3. Insert pink noise into the mixer or mixing console and adjust levels to obtain a 0 dBu reading for the mixer or mixing console output. Distribute this output to all systems and subsystems.
4. Adjust the output of line level electronics and signal processors to obtain a 0 dBu output at the output terminals. For equipment with input level controls, adjust the input controls so that input levels peak at -10 dB. For equipment not capable of providing 0 dBu output, adjust to achieve as close to 0 dBu as possible.
5. Turn amplifier gain controls to minimum and turn on the power amplifiers. Adjust the gain controls to achieve a +4 dBu output level for low impedance amplifiers and a +18 dBu output level for high impedance or constant voltage amplifiers.

M. Hum and Noise Level:

1. Without changing the gain, terminate microphone and line level inputs with proper shielded resistors of 150 and 600 ohms, respectively.
2. Measure and record overall hum and noise levels for each power amplifier output from each input and with all inputs simultaneously. Hum and noise shall be at least 50 dBA below rated power output levels with amplifier controls set for optimum signal-to-noise, using input from line level and microphone sources.

N. Electrical Distortion:

1. Load amplifier outputs with appropriate resistors matching the nominal impedance of the output terminals in place of the actual loudspeaker loads.
2. Adjust gain controls as for hum and noise level test.
3. Apply 250 Hz, 500 Hz, 1 kHz, and 2 kHz sine wave signal from an oscillator with less than 0.01% Total Harmonic Distortion to one input, such that a level of 0 dBu is obtained on the mixer.
4. Measure and record the electrical distortion at each power amplifier output. Distortion shall be less than 0.5%.

O. Parasitic Oscillation and Radio Frequency Pick-up:

1. Set up system for each specified mode of operation.
2. Using a 5 MHz bandwidth oscilloscope and loudspeaker monitoring.
3. Ensure that the system is free from spurious oscillation and RF pick-up with the absence of any input signal and with a 160 Hz signal at a 0 dBu level on the mixer or mixing console.
4. Repeat this test for each mode of operation of the lighting dimmers (incandescent, neon, and fluorescent).

P. Background Noise:

1. Using a calibrated ANSI S1.4-1983 (1997) Type 1 or IEC 60651-01-1994, precision sound level meter, determine the average ambient noise level in the room. Record the level derived. The average background noise shall be 60 dBA or below during performance of the following tests. If noise level exceeds this criterion, promptly notify the Consultant before proceeding further.

Q. Buzzes and Rattles:

1. Apply a 1 kHz sine wave signal such that a 0 dBu level is obtained on the mixer or mixing console.
2. Sweep loudspeaker systems from 50 Hz to 5 kHz at 6dB below full amplifier power. Listen for buzzes, rattles, vibrations, or resonance. Locate and correct problems.
3. If the cause is outside the system, promptly notify the Consultant, indicating the cause and recommended corrections.

R. Coverage:

1. Using pink noise as an input, adjust loudspeakers and output levels to provide ±6 dB coverage in the octave band centered at 1 kHz throughout the areas served by the system.
2. Measure and record results.

S. Equalization:

1. Equalize the sound systems in order to provide uniform seat-to-seat response, raise the threshold of feedback, suppress ring modes, and insure natural, pleasing sound in equal and adequate amplitude with maximum degree of intelligibility, and provide performance conforming to the requirements specified under “Acceptance Testing.”
2. Turn off systems except the speaker system under test.
3. Using pink noise as an input and with system equalizers set to bypass operation, determine the average frequency response of the loudspeaker system in the room using a 1/3 octave real time analyzer.
4. Record the frequency response derived.
5. Locate the analyzer microphone approximately 1 m above the floor at a point which approximates the average frequency response, within ±3 dB from 50 Hz to 16 kHz.
6. Record the frequency response at this location.
7. Using pink noise as an input and with system equalizers set to normal operation, set low and high pass filters at 63 Hz and 16 kHz, respectively.
8. Adjust the 1/3 octave filter settings to obtain the following response curves, minimizing the variation (±3 dB) between adjacent filter settings:

    a. Roll off -6 dB per octave below 125 Hz.
    b. Maintain ±3 dB, 125 Hz to 4 kHz.
    c. Roll off -3 dB per octave from 4 kHz to 12 kHz.
    d. Roll off sharply above 12 kHz.
    e. With any system microphone open, make minor adjustments to maximize gain before feedback. No more than 3 filter settings shall be adjusted.

f. Record the frequency response derived.

T. System Input and Output Levels:

1. Using pink noise source material and a calibrated ANSI S1.4-1983 (1997) Type 1 or IEC 60651-01-1994, precision sound level meter, perform the following:

   a. For microphone level inputs: locate a pink noise source at 300 mm from the corresponding system microphone. Adjust the pink noise source to provide a level of 75 dBA at the microphone and set mixer levels to achieve a 0 dBu level at the mixer output.
   b. For line level inputs: use system program source equipment, with pink noise playback media, as a direct input to the mixer or mixing console and set mixer levels to achieve a 0 dBu level at the mixer output. Repeat for each system input individually where mixer inputs vary in input sensitivity. Settings for equivalent sensitivity inputs may be duplicated.
   c. With any input set as specified above, adjust audio distribution amplifiers to provide levels of -10 dBu at each output.

2. Measure and record results.

U. Feedback Stability:

1. With required output levels set, measure, and record the available gain before feedback. Feedback stability margin shall be 6 dB, minimum.

V. Intelligibility:

1. Using a TEF analyzer, measure the percent articulation loss of consonants (% ALcons) for at least 4 various locations in the room in the 2000 Hz octave band.
2. % ALcons shall be less than 10 for each location.
3. Record results.

W. Notification:

1. Once all of the above is complete, the system(s) is (are) ready for inspection. Formally notify the Owner/Consultant at least seven (7) days prior to desired inspection date.
2. Final adjustments and equalization will be conducted at the time of inspection.

3.6 CONTRACTOR MEDIA TESTING AND COMMISSIONING

A. Audio Video Switching

1. The AV switching system shall support at least 6.75gbps of data transfer on each input and output to support 1080p 36-bit (deep) color video resolutions without compression.
2. The AV switching system shall support 8 channel audios.
3. The AV switching system shall support audio breakaway from video.
4. The AV switching system shall have less than 5us of latency from av input to av output.

5. The AV switching system shall support the HDMI specification of less than 1 in 1x10-9-bit errors at 1080p 36-bit (deep) color.
6. The AV switching system shall downmix multi-channel audio into 2-channel audio so that the same audio content may be routed to both multi-channel and 2-channel sinks.
7. The AV switching system shall be able to dither between standard and deep color video signals on each input and output.
8. The AV switching system shall support the following av signal inputs:

    a. HDMI 1.3a (high-definition multimedia interface)
    b. DVI 1.1 (digital visual interface)
    c. Display port multimode 1.1.
    d. Analog RGB
    e. YPBPR
    f. SPDIF
    g. Analog stereo audio

9. The AV switching system shall transcode the AV signals to a single signal type for distribution.

B. Audio Video Distribution

1. The AV distribution system shall use multimode fiber or shielded twisted pair for AV signal distribution.
2. The AV distribution system shall route AV signals from any input to any output with less than 1ms of latency.
3. The twisted pair structured cabling used to carry the AV signals shall be shielded.
4. The twisted pair structured cabling used to carry the AV signals shall be specified to 1.2ghz of bandwidth or greater.
5. The AV distribution system shall not require extra cabling to transmit the following control signals for AV sources and sinks:

    a. RS-232.
    b. Infrared.
    c. Ethernet.
    d. USB human interface device-class devices.
    e. Contact closure.

C. EDID Management

1. The AV switching system shall allow configuration of the EDID presented to sources on each AV input.
2. Each input on the AV switching system shall be configured independently.
3. The AV switching system shall by default present an EDID to each input that includes only the video timings and audio formats common all sinks connected to the outputs.
4. The AV switching system shall allow the user to enter each input’s EDID video timings individually.
5. The AV switching system shall allow the user to enable and disable support for the following items in each:

a. Deep color
b. 3D support

D. HDCP Management

1. The AV switching system shall support HDCP 1.1 or greater.
2. The AV switching system shall detect the number of keys supported by each source.
3. The AV switching system shall not send a source more keys than it supports.
4. The AV switching system shall cache the keys from each connected sink.
5. The AV switching system shall authenticate all cached keys with each source up to the source's key limit, so that authentication does not need to be re-started each time content is routed to a new output.

E. Signal Detection

1. The AV switching system shall report the following incoming signal information to an AV control system:

   a. Signals detect.
   b. Horizontal and vertical resolution.
   c. Signal refresh rate.
   d. Presence of HDCP.

2. The AV switching system shall report the following information to an AV control system:

   a. HDCP authentication status for each source and sink
   b. EDID preferred video timing for each sink
   c. Maximum number of keys supported by each source.

F. Troubleshooting

1. The AV switching system shall report the following information for troubleshooting:

   a. Maximum number of keys supported by each source.
   b. The number of keys sent to each source.
   c. EDID indicated video timings and audio formats supported for each sink.
   d. EDID presented to each source.

2. The AV switching system shall support off-site remote troubleshooting via Ethernet.

G. System Design

1. The contractor shall provide AV source equipment with support for enough keys so that it can be routed to all sinks simultaneously.
2. If a particular AV source cannot be found to support enough keys to route to all sinks simultaneously, the contractor shall:

   a. Notify the engineer.

b. Configure the AV switching equipment so that it shall not send an AV source more keys than it supports.

3. The contractor shall configure the EDID presented to each AV source to indicate only the video timings supported by all sinks used for viewing and distributing video.
4. The contractor shall configure the EDID presented to each AV source to indicate support for only the audio formats supported by all the sinks used for distributing audio.
5. The contractor shall verify the data rate supported by each shielded twisted pair cable used for AV distribution.
6. The contractor shall provide display equipment that does not over scan the video signal when full-pixel sources are routed.

H. Demonstration and Acceptance Testing

1. The demonstration and acceptance tests shall be done by an Extron DTP certified engineer.
2. The contractor shall provide a copy of the following information in electronic format to verify the AV switching equipment has been installed and configured correctly:
3. The number of HDCP keys supported by each source.

a. The video timing, HDCP use and audio format of each source when operating (not needed for walk-in equipment).
b. The video timings and supported audio formats for each connected sink.
c. The video timings and supported audio formats presented in the EDID to each source– the preferred video timing shall be indicated.
d. The length of cable used on all shielded twisted pair cable used for AV distribution.
e. The data rate supported by each shielded twisted pair cable used for AV distribution.

3.7 GENERAL VIDEO SYSTEMS

A. Video signals shall be scaled, or scan converted as necessary to provide the native resolution signal to display and video capture devices.

B. Whenever possible a common native resolution shall be determined for each space and shall be provided to every display in the system.

3.8 COMPUTER INTERFACES

A. Review all locations with the Owner prior to installation and provide according to Approval of the Owner. Low voltage power shall be provided at the interface.

B. Provide audio and video breakout cables for each computer interface provided as specified herein unless noted otherwise.

C. Provide manufacturer's adapter plates for pass-through connections as specified herein unless noted otherwise.

D. Adjust peaking, horizontal, and vertical position for system native resolution.

3.9 SIGNAL PROCESSING EQUIPMENT

A. Signal processing equipment shall be mounted in the equipment racks and/or control consoles, as specified herein unless noted otherwise.

B. Configure and adjust signal processing equipment to produce the native resolution of the primary display devices within each separate system for each potential source resolution, unless specified otherwise herein. RGBHV sources shall be tested from 640 x 480 at 60 Hz through 1600 x 1200 at 60 Hz. NTSC composite video and NTSC S-video shall also be tested.

3.10 VIDEO MONITORS/RECEIVERS AND ASSOCIATED EQUIPMENT:

A. Video monitors/receivers shall be selected to match the native resolution of the system, unless otherwise specified herein.

B. Configure monitors to provide full images at the monitor's native resolution. Verify color timing.

C. Review all locations with the Owner prior to installation and provide according to Approval of the Owner.

3.11 VIDEO SYSTEMS

A. General

1. Adjust, balance, and align equipment for optimum quality and to meet the manufacturer's published specifications.

B. Performance Standards

1. Unless restricted by the published specifications of a particular piece of equipment, or unless specified otherwise herein, the following performance standards shall be met by each system.

C. Video images shall be:

1. Free from banding where bands of the video image are at incorrect intensities.
2. Free from bending at the corners due to synchronization problems.
3. Free from outlining due to timing issues and component signals being out of convergence.
4. Free from ghosting or reflections due to improper termination and impedance mismatching.
5. Free from video roll due to ground loops and improper grounding.

6. Free from visible jitter due to an instable synchronization signal.
7. Free from double images due to improper scan rates.

D. Video, Signals

1. S/N (peak-to-rms) unweighted dc to 4.2 MHz: 55 dB minimum.
2. Crosstalk, unweighted dc to 4.2 MHz: 55 dB minimum.

E. Video Signal Strength

1. Composite video: 1V peak-to-peak, nominal.
2. S-video: 0.7V peak-to-peak, nominal.
3. Component video: 0.7V peak-to-peak, nominal.
4. Computer: RGB 0.7, peak-to-peak, nominal, H and V, 5V (TTL).
5. Receptacle voltage level for RF signal outlets: 6.0 dBmV, ±3.0 dB.
6. Line and field tilt: 2% maximum.
7. Differential gain: 3% maximum.
8. Differential phase: 2° maximum.

F. Video, Timing

1. System synchronization coincidence shall be within 50 nanoseconds.
2. NTSC color timing shall be within 2° at 3.58 MHz.
3. Computer (RGBHV) color timing shall be within 1 pixel at system resolution.
4. Video timing shall be achieved without readjustment of source phasing.
5. Delay units, active or passive, shall be provided, if necessary, to achieve proper timing.

G. Video Displays

1. Review all locations with the Owner/Consultant prior to installation and provide according to Approval of the Owner/Consultant.
2. For the following tests and adjustments, test signals provided by the signal generator shall be injected into the system from the primary presentation location and displays optimized from this location.

    a. Image Sizing:

        1) Using a crosshair or crosshatch pattern, adjust display device to show full image at system resolution.

    b. Black Level:

        1) Use a signal generator to provide a picture line up generating equipment (PLUGE) test pattern on the display to be adjusted.
        2) Adjust the brightness control upward until the “blacker-than-black” bar is visible on the screen.
        3) Decrease the brightness control slowly until this bar becomes fully extinguished. Continue until the test pattern background reaches the same point, i.e., no light output.

4) The remaining vertical bar should be dimly visible. Record the value of the onscreen display.

c. System Gain:

1) Use a signal generator to provide a PLUGE test pattern on the display to be adjusted.
2) Adjust the contrast control until the 100% white bar begins to bloom or distort in size or stops getting brighter.
3) Decrease the contrast control until the white bar is at the threshold of maximum brightness without any of these distortions.
4) Record the value of the onscreen display.
5) Perform Black Level and System Gain tests until there is no additional interaction between contrast and brightness control adjustments and record the final onscreen values for contrast and brightness.

d. Color Level or Gain:

1) Use a signal generator to provide a SMPTE color bars test pattern on the display to be adjusted.
2) Adjust the color level, individually if possible, until each channel's large bar blends with the small patch underneath.
3) Record the onscreen value for color level(s).

e. Color Phase:

1) Use a signal generator to provide a SMPTE color bars test pattern on the display to be adjusted.
2) While viewing the blue channel information only, adjust the tint control until the large internal bars blend with their patch below.
3) Perform Color Level and Color Phase tests until there is no additional color or tint control interaction and record the final onscreen values for color and tint.

H. Cabling

1. Upon completion of the installation of each area, the Contractor shall test all elements of the system. This testing shall include as a minimum:

a. Continuity of all circuits.
b. Operation of all circuits.
c. Phase checking of all circuits.
d. Operation of all equipment in all modes.

2. During and/or after installation, as appropriate, the Contractor shall test all cabling for continuity, phase, shielding, and unreasonable signal loss. The testing shall be conducted according to the submitted and approved test plan.

3.12 REPAIR/RESTORATION

A. Any damage to any installed work or product caused by the unpacking, transporting, assembly, connecting, or configuring of the product shall be repaired at no charge to the Owner.

3.13 FIELD QUALITY CONTROL

A. Once installed and the System Checkout is complete, the system shall be demonstrated as operational to the Owner.

1. If the Audio system fails to meet the requirements of this document or those stated by the technical documentation, then the Owner shall reject the installed system and the contractor shall be given notice (either oral or in writing) to correct the failure.
2. If unable to overcome repeated performance deficiencies within thirty (30) days, and if requested to do so by the Owner, remove the equipment and replace at no expense to the Owner.
3. No warranties shall begin until the Owner has authorized final acceptance in writing.
4. Right to Revoke Acceptance: If any equipment and/or goods which have been previously accepted, specifically or by the making of payment, are found to have defects, damage, deficiencies, or fail to conform to the specification, for any cause not attributable to the Owner, the Owner may revoke acceptance.

B. Conduct pre-acceptance tests.

1. Perform all system performance checks on the installed systems prior to final acceptance testing. The Owner / Audio Consultant may witness the pre-acceptance tests. The Owner / Architect may inspect and operate system components to evaluate installation progress and technical compliance prior to acceptance testing.

C. Contractor System Checkout

1. Perform system checkout before acceptance tests are scheduled. Furnish all required test equipment. Perform all work necessary to determine and/or modify performance of the system to meet the requirements of this specification.
2. During performance testing, all equipment shall be operated under standard conditions as recommended by the manufacture.
3. Test all audio and video systems for compliance with the Performance Standards using test procedures that follow later in this specification.
4. Maintain documentation of all performance tests for reference by Consultant during the System Acceptance Tests.
5. At the conclusion of the tests, return all equipment settings to previously calibrated positions.
6. Provide written records of all test results in spreadsheet form.
7. Check all control functions, from all controlling devices to all controlled devices, for proper operation.

8. Adjust, balance, and align all equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for all level controls and record these settings in the "System Operation and Maintenance Manual."
9. Provide testing results and settings for all equipment and systems to the Audio Consultant at least three (3) business days prior to System Acceptance Testing.
10. Provide the Audio Consultant with all test results, manuals, software, as-built documentation, etc. prior to acceptance testing.
11. Inform the Owner and Audio Consultant that the systems are ready for System Acceptance Testing. The system shall be considered ready for acceptance testing when the following conditions are met:

    a. Audio Contractor has pre-tested all systems such that all sub-systems, functions, software, and equipment are de-bugged and operational.
    b. Audio Contractor has supplied the Audio Consultant with the written test results and documentation as listed above for all rooms and systems.
    c. Audio Contractor has supplied the Audio Consultant with close out (manuals, training materials, and other as-built) documentation revised to reflect comments and/or revisions arising from the review cycles listed elsewhere within this document.

D. Final Acceptance Test

1. Testing will be performed with the Owner (or its designees) present to determine that the Audio system equipment satisfies the manufacturers' performance specifications and that the Audio system installed satisfactorily performs the functions required by this specification. Conduct formal pre-acceptance tests prior to the Owner's acceptance testing to ensure that the performance and functional specifications are satisfied by the installed system and the system is ready for the Owner's acceptance. The Audio contractor shall verify in the owner's presence that the installed audiovisual system satisfies the performance and functional requirements through formal acceptance testing. The Audio contractor shall be responsible for staging each room to be tested and shall have sufficient personnel on site to run multiple systems at once (not less than three (3) technicians).

E. Test Equipment

1. Assemble the following test equipment (or equivalent) on site:

    a. Video signal generator, Leader 410C.
    b. Combined waveform monitor/vectorscope, Leader 5872A.
    c. Audio and Video cable, terminations, adapters, etc.
    d. Audio Test CD.
    e. DVD/Blu-Ray.
    f. Programmable Audio Test Generator.

F. Audio Visual System Testing

1. Absolute Impedances

a. Set any speaker level controls at zero attenuation. Measure absolute impedance value of each speaker line at 250, 500, 1000, 2000, and 4000 Hz without the amplifier connected but with all speakers connected. Impedance must not be below the rated load impedance of respective amplifier and may be any value equal to or above that. Check resistance of lines to all speakers and microphone receptacles with receptacles open and short-circuited.

2. Hum and Noise Level

a. Test overall hum and noise, it should be at least 60 dB below rated power output of each amplifier with amplifier controls set for optimum signal to noise and full output and with inputs terminated with proper shielded resistor. (150 and 600 ohms).

3. Parasitic Oscillation and RF Pickup

a. Set up system for each specified mode of operation.
b. Use 5 MHZ band with oscilloscope and speaker monitoring.
c. Check to ensure that the system is free of spurious oscillation and RF pickup in the absence of any input signal and also with the system driven momentarily to full output at 160 Hz.

4. Buzzes, Rattles, Distortions

a. Apply high quality music signal to the system. Adjust the sound system for frequent peaks at its specified maximum sound pressure level.
b. Apply sinewave sweep from 50 to 5,000 Hz to 6 dB below full amplifier power.
c. In both cases, listen carefully for buzzes, rattles and objectionable distortion.
d. Correct all causes of such defects. If cause is not from system, promptly notify the architect indicating cause and suggested corrective procedures.

5. Equalize all Audio-Visual Systems for maximum gain before feedback in all room configurations.
6. Record all systems settings and include into Systems Operation manuals

G. Qualification Methods

1. Three methods will be used to qualify the Audio system for acceptance.

a. Inspection - A critical observation of qualifying factors, such as quality of workmanship, equipment placement, routing of cables, adequacy of technical documentation, etc., that do not lend themselves to demonstration or measurement.
b. Demonstration - A process of showing by reason or evidence that a given condition clearly satisfies the requirement.
c. Measurement - A process of determining the actual dimension, capacity, or amount of something, by measuring using calibrated standards.

2. Acceptance of the Work of this Section shall occur after completion of corrections and adjustments required by "Punch List" (as generated during Demonstration and Acceptance Testing of Completed Installation).
3. Owner reserves the right to use equipment, material and services provided as part of Work of this Section, prior to Acceptance, without incurring any obligation to Accept any equipment or completed systems until Punch List work is complete and systems comply with Contract Documents.

3.14 APPLICABLE FEDERAL SPECIFICATIONS

A. The list below forms only a part of this specification.

1. J-C-30A &Am-1 Cable and Wire, Electrical (Power, fixed installations)
2. W-C-3735B Circuit Breakers, Molded Case, Branch Circuit, and Service
3. W-C-586C Conduit outlet boxes, bodies, and entrance caps, electrical: cast metal
4. W-C-596E/Gen Connector, Electrical, Power, General Specifications
5. W-F-406B Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
6. W-F-408C Fittings for Conduit, Metal, Rigid, (Thick wall and EMT)
7. W-J-800D Junction Box: Extension, Junction Box; Cover, Junction Box (Steel, Cadmium, or Zinc Coated)
8. HH-I-553C Insulation Tape, Electrical (Rubber, Natural, or Synthetic)
9. HH-i-595C Insulation Tape, Electrical, Pressure Sensitive Adhesive, Plastic
10. WW-C-0054OC Conduit, Metal, Rigid: and Coupling, Elbow, Nipple, Electrical Conduit: Aluminum
11. WW-C-566C Conduit, Metal, Flexible
12. WW-C-581 E Conduit, Metal, Rigid, and Intermediate: and Coupling, Elbow, and Nipple Electrical Conduit: Steel Zinc Coated
13. C2-1990 National Electrical Safety Code
14. C97.1-1972 Low Voltage Cartridge Fuses 600v or less
15. Institute of Electrical and Electronic Engineers (IEEE)
16. 142-1982 Recommended Practice for Grounding of Industrial and Commercial Power Systems

3.15 GROUNDING

A. The Contractor shall follow all standard NEC and local codes for grounding practices on all of the audiovisual equipment and equipment racks.

B. All RGB video lines to external devices exceeding 100 feet or being powered from different power panels shall have suitable line drivers and isolation as specified herein.

C. It shall be the responsibility of the Contractor to follow good engineering practices. At no time shall there be a compromise in safety or any exception to the NEC and local codes.

D. Ground equipment, racks, and audio line shields to independent audio system ground ONLY as shown on drawings.

E. Ground all conduits ONLY to power system ground. Insulate all conduits and electrical boxes from this system including equipment racks, and audio system ground.

F. Ground case of power strips/channels in equipment racks to the racks and insulate from power system ground.

G. Provide a separate ground lead from each amplifier chassis and from each of the other items of equipment normally requiring grounding to the rack ground buss.

H. Insulate all conductors in conduit, including shields, from the conduit, back boxes, and from each other for the entire conduit length.

I. At each group of racks, provide a single labeled Isolated Ground bus bar terminal strip to land the individual labeled rack grounds.

J. At each rack, provide a lug bonded to the rack frame with a minimum #12 TW stranded wire to the Isolated Ground bus central to the rack group.

K. Equipment signal ground shall be to the Isolated Ground System via the green wire of the equipment power cord. Where equipment uses two (2) wire power cord, provide a green bond wire to rack IG bus bar, with gauge equal to the equipment main's power supply conductors.

L. Cable shields shall only be grounded by a single path to Isolated Ground.

M. Shields shall be tied to Isolated Ground at the driving or transmitting end of a run or circuit only, unless otherwise noted.

N. The resistance of the ground system from common ground point at racks to building ground point shall not exceed 0.1 ohm.

O. Provide isolated ground receptacles typical for all power receptacles for all equipment.

P. The Contractor shall ensure that ONLY the audio-visual equipment is connected to the AUDIOVISUAL dedicated Ground system.

3.16 SEISMIC SUPPORTS, SUPPLEMENTARY STEEL AND CHANNELS

A. Provide all supports, supplementary steel and channels required for the proper Seismic installation, mounting, and support of all work installed under this Section.

B. All supports, supplementary steel and channels shall be furnished, installed, and secured with all fittings, support rods, and appurtenances required for a complete support or mounting system.

C. Supplementary steel and channels shall be firmly connected to the building construction in a manner approved by the Owner prior to the installation of same. Submit to the Owner, the locations proposed for using supplementary steel and channels for the support of equipment, fixtures, and raceways. The submittal shall indicate the mounting methods, size, and details of

the supports, channels and steel. Submittal shall also indicate the weight that the supports, channels, and supplementary steel are to carry.

D. The type and size of the supporting channels and supplementary steel shall be of sufficient strength and size for seismic restraint and shall allow only a minimum deflection in conformance with the channel and supplementary steel manufacturer's requirements for loading.

E. All supplementary steel and channels shall be installed in a neat and workmanlike manner, parallel to the walls, floor, and ceiling construction. All turns shall be made with 90-degree and 45-degree fittings, as required to suit the construction and installation conditions.

F. All supplementary steel, channels, supports, and fittings, shall be Underwriters' Laboratories, Incorporated-approved, be galvanized steel, and be manufactured by Steel City, Unistrut, Power-Strut, T. J. Cope, Chalfant, or approved equal.

G. Provide supports to meet the required Seismic rating, as indicated under "Part One" of this Specification.

H. Provide beam clamps with set screws (C-clamp type).

I. Work under this Section shall be held in place by Seismic-rated methods.

J. Supporting from the roof decking will not be acceptable.

K. Provide expansion anchors on masonry units or brick work. Power-actuated supports will not be accepted.

L. Provide stainless steel or corrosion-resistant supports in corrosive areas, or in wet or damp areas.

M. Support work from the building structure, independent of suspended ceilings, roof deck, or other trades work. Where ductwork, pipes, pipe racks, type of building construction materials, or structural framing members provide obstruction or difficult support means, hanger rods shall be used in association with horizontal sections of steel support channels, in an approved manner.

N. All work shall be installed in a rigid and satisfactory manner, and shall be supported by bar hangers in frame construction, or shall be fastened directly with wood screws on wood, bolts with expansion shields on concrete, or brick toggle bolts on hollow masonry units, and machine screws or welded threaded studs on metal. Threaded studs of the proper type and holding capacity, driven-in by a power charge, and provided with lock washers and nuts, are acceptable for mounting of equipment on solid concrete walls or slabs.

O. Obtain written permission from the Owner to allow use of power-activated charges. Use only properly trained and licensed operators.

P. Do not use power charge-driven supports for any work that is to be hung from a horizontal surface without written permission from the Owner.

Q. Preset inserts of the proper type and holding capacity shall be used in overhead slab construction wherever possible.

R. Provide lateral supports for work to prevent excessive movement during a seismic event, using rods, braces, or galvanized or stainless-steel cables.

S. Pendants, supports, or hanging rods longer than 12 inches (300mm) shall be laterally braced.

T. Where installed in damp, wet areas, and areas requiring wash-down, all surface-mounted panels, boxes, junction boxes, conduits, etc., shall be supported by spacers to provide clearance between wall and equipment.

3.17 TRAINING

A. Training sees section 1.13.

B. Training sessions by either the manufacturer or an authorized manufacturer's representative shall be videotaped for all applicable features, functions, programming and operations for owner's future reference.

C. As a minimum, training sessions shall consist of the following:

1. General project information and review shall be by the General Foreman or Superintendent of the Trade.
2. Specific system training with a detailed description of how the system will operate to meet the performance requirements of the Audiovisual system shall be by a Factory-Trained Representative and shall include:

    a. Video and Audio-Visual Systems overview.
    b. Start up, shut down, and reset procedures.
    c. Hands on training on all system hardware and features.
    d. Basic troubleshooting techniques.

3. Provide a troubleshooting guide to identify the source of system problems.

D. During the instruction period the Operating and Maintenance Manual shall be used and explained.

E. The Operating and Maintenance Manual material shall be bound in 3-ring binders and indexed. On the edge of the binder provide a clear see-through plastic holder with a typed card indicating the Project name, the Owner's name, the installer's name and the Volume number (e.g., Vol. No. 1 of 2).

F. Provide name, address, and telephone number of the manufacturer's representative and Service Company for all items supplied, so that the source of replacement parts and service can be readily obtained.

1. Include copies of manufacturers and installer's warranties and maintenance contracts, and performance bonds properly executed and signed by an authorized representative.
2. Include copies of all test reports and certifications.

3.18 ACCEPTANCE DEMONSTRATION

A. Systems installed under this Section shall be demonstrated to the Owner and Owner. Demonstrations are in addition to necessary testing and training sessions. Notify all parties at least seven (7) days prior to the scheduled demonstration. Schedule demonstrations in cooperation with, and at times convenient to, all parties, and so as to not disturb ongoing activities.

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain audiovisual system equipment.
2. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.
3. Review equipment list and data in maintenance manuals. Systems shall be tested prior to the demonstrations and each system shall be fully operational and tested prior to arranging the Acceptance Demonstration. Final payments will be withheld until a satisfactory demonstration is provided for all systems indicated or requested.

B. If the demonstration is not complete, performing all functions, features and connections or interfaces with other systems, or if there is a failure during the demonstration, additional demonstrations shall be arranged. Provide and pay for all costs, labor, and expenses incurred for all attendees for each additional demonstration required for acceptance and demonstration of complete system operation.

C. Demonstrations shall be scheduled in ample time to complete all activities prior to final acceptance and Owner occupancy. Demonstrations shall take place at least 30 days prior to the scheduled project completion date and 30 days prior to owner's use and occupancy.

D. As a minimum, provide demonstrations for systems indicated under "Work Included" under Part One of the Specifications. Provide demonstrations of additional systems as requested by the Owner.

3.19 PROJECT OWNER COORDINATION

A. Prior to Substantial Completion of the project and in ample time to address and resolve any coordination issues, request and arrange meetings between the Owner, Owner's Vendors and Consultants, to discuss the Scope of Work for each system being provided, and the interface required for a fully functional and operational system upon project completion. Initial meetings shall be scheduled three months prior to the scheduled Substantial Completion date, or as soon as Submittals are submitted and reviewed for projects with shorter schedules.

B. At these meetings, the required interface shall be reviewed with the Owner, Requests for information required to complete programming or for coordination shall be presented, and system operation and philosophy shall be discussed.

C. Additional meetings shall be held as requested by any party so that all issues are resolved and with the goal and intent that all systems are fully operational and functional upon project Substantial Completion, and that the responsibility for all components required is clearly established.

3.20 CLEANING UP

A. Upon completion of all work and testing, thoroughly inspect all exposed portions of the installation and completely remove all exposed labels, markings, and foreign material.

B. The interior of all boxes and cabinets shall be left clean; exposed surfaces shall be cleaned and plated surfaces polished.

C. Repair damage to finished surfaces resulting from work under this Section.

D. Remove material and equipment from areas of work and storage areas.

E. All equipment shall be clean from dirt, dust, and fingerprints prior to final acceptance.

F. Touch up all damaged pre-finished equipment using materials and methods recommended by the Manufacturer.

3.21 PROJECT CLOSEOUT

A. Provide close-out submittals as required herein, including the following close out submittals.

1. Operation and Maintenance Manuals.
2. Record Drawings.
3. Warranties
4. Test Reports.
5. Extra Materials.

B. Obtain written receipts of acceptance close-out submittals submitted. Receipts shall specifically detail what is being delivered (description, quantity, and specification section) and shall be dated and signed by firm delivering materials, and by the Owner's Representative.

3.22 SCHEDULES

A. Equipment List

1. In part 2 of this specification is the equipment list for this space. Each of these items shall be priced using both the equipment make and model shown, or components with equivalent functionality and of newer make, which meet or exceed the performance characteristics that are outlined for each component in the list. If an item is listed as "Custom," this means that the Contractor may use any manufacturer's component appropriate for the function and quality required for that item. Submit a "build" quality shop drawing for approval, on any custom items.

END OF SECTION 274100

TE.1 NETWORK SWITCHES

TE1.01 Data Switch Chassis Total Qty: 8 IDF 1b14 – 2, MDF 1c06 – 6

Item:	Switch Chassis
Manufacturer:	HPE Aruba
Model No:	HP 5406R zl2 - Part # J9821A
Dimensions:	W 17.5.", D 17.75", H 6.9" – 4U

Product Description:
Layer 3 modular switch provides scalable aggregation with HPE Smart Rate multi-gigabit ports for high-speed 802.11ac devices, Dynamic Segmentation, Virtual Switching Framework (VSF) stacking technology, hitless failover, line rate 40GbE, robust QoS and security and **requires no software licensing.**

TE1.02 Expansion Module with 24 Ports Total Qty: 45 IDF 1b14 – 12, MDF 1c06 33

Item:	Expansion Module
Manufacturer:	HPE Aruba
Model No:	# J9987A
Dimensions:	W 10.3.", D 8.1", H 1.8" – 1U

TE1.03 Power Supply Total Qty: 16 IDF 1b14 – 4, MDF 1c06 - 12

Item:	Power Supply
Manufacturer:	HPE Aruba
Model No:	5400R 1100W PoE+ zl2 - Part #J9829A#ABA
Dimensions:	W 7.4.”, D 6.2”, H 5.1” – 3U

TE1.04 10 Gbit Transceiver Qty: 2 IDF 1b14 – 1, MDF 1c06 – 1

Item:	10 Gbit Transceiver
Manufacturer:	HPE Aruba
Model No:	# J9151E
Dimensions:	W 0.6”, D 2.2”, H 0.5”

SECURE ATTACHMENT OF FF&E AND TECHNOLOGY ITEMS:

To ensure proper attachment of fixtures, furnishings & equipment items, including technology items, where "items" are attached to the wall, ceiling overhead structure, floor and/or furniture component, contractor shall provide information adequate for architect to verify items are attached securely and per manufacturer's recommendations. Architect's review may be implemented during submittal process. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. to securely attach items to the existing structure as required to meet field conditions and meet applicable codes.

TE.2 WIRELESS ACCESS POINTS

TE2.01 Wireless Access Point Total Qty: 77 – 59 Ceiling Mounted

Item:	Wireless Access Point
Manufacturer:	HPE Aruba
Model No:	AP-303 Indoor Wireless Access Point #JZ321A
Dimensions:	W 5.9”, H 5.9” D 1.4”

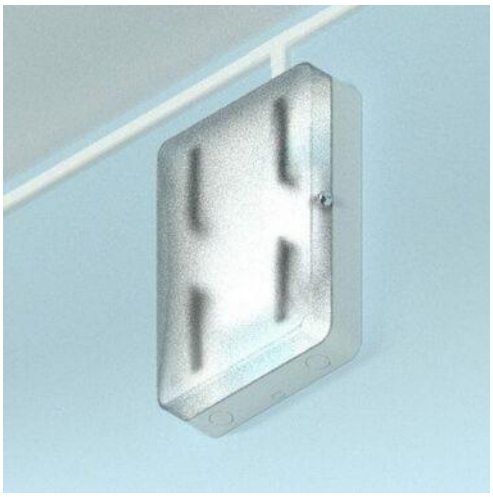
Product Description:
Indoor WAP with 802.11ac
2 Integrated Antennas
2.4 GHz / 5 GHz (Dual-Band)
1 x 10/100/1000 Mb/s PoE+ Ethernet Port

TE2.02 Wall Mount Kit for Wireless Access Point Total Qty: 12 + 6

Item:	Wall Mount Kit for Wireless Access Point
Manufacturer:	HPE Aruba
Model No:	JW047A
Notes:	Also needed for Gym (6)”

TE2.03 Protective Cover for Wireless Access Point **Total Qty: 6 -** Gymnasium 1d07

Item:	Translucent Cover for Wireless Access Point
Manufacturer:	Oberon
Model No:	1016-C
Dimensions:	12”W x 18”H x 5.15”D
Notes:	Wall Mount Kit also needed



SECURE ATTACHMENT OF FF&E AND TECHNOLOGY ITEMS:
To ensure proper attachment of fixtures, furnishings & equipment items, including technology items, where "items" are attached to the wall, ceiling overhead structure, floor and/or furniture component, contractor shall provide information adequate for architect to verify items are attached securely and per manufacturer's recommendations. Architect's review may be implemented during submittal process. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. to securely attach items to the existing structure as required to meet field conditions and meet applicable codes.

TE.3 TELEPHONES

TE3.01 8-Line IP Desk or Wall Phone Total Qty: 16

Item:	IP Telephone
Manufacturer:	Avaya
Model No:	J169 IP Phone (No Power Supply)

Product Description:
Color Display 3.5” Diagonal, 320 X 240 pixels
Integrated RJ9 headset port with Electronic Hook Switch
Built in volume boost in handset, mute key with mute alert.
4 context sensitive soft keys

TE3.02 Wall Bracket for IP Phone Total Qty: 10

Item:	Wall Bracket for 9608G
Manufacturer:	Avaya
Model No:	700383375

SECURE ATTACHMENT OF FF&E AND TECHNOLOGY ITEMS:
To ensure proper attachment of fixtures, furnishings & equipment items, including technology items, where "items" are attached to the wall, ceiling overhead structure, floor and/or furniture component, contractor shall provide information adequate for architect to verify items are attached securely and per manufacturer's recommendations. Architect's review may be implemented during submittal process. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. to securely attach items to the existing structure as required to meet field conditions and meet applicable codes.

TE.6 CHARGING CABINETS

TE6.01 CHARGING CABINETS FOR 32 DEVICES Total Qty: 30

The **LocknCharge Revolution 32 Charging Cabinet** is a small footprint solution that is designed to charge, store and secure up to 32 of almost any device type up to 17 inches including laptop, Chromebook or tablet. Its remote-controlled ECO Safe Charge Power Management System charges multiple laptops safely and efficiently. The Revolution 32 is ideal for classrooms that are tight on space but need to charge, store and secure a greater number of devices. This tall, slim station takes up half the footprint of a traditional Charging Cart, leaving more room for activities. Bricks and cables are hidden in two spacious compartments keeping them secure yet easy to access.

- Eco Timer to turn off availability of power after a set amount of time
- Removable racks to adapt to future needs
- High-quality steel construction for durability
- 31.7”W x 16.5”D x 55.7”H

SECURE ATTACHMENT OF FF&E AND TECHNOLOGY ITEMS:
To ensure proper attachment of fixtures, furnishings & equipment items, including technology items, where "items" are attached to the wall, ceiling overhead structure, floor and/or furniture component, contractor shall provide information adequate for architect to verify items are attached securely and per manufacturer's recommendations. Architect's review may be implemented during submittal process. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. to securely attach items to the existing structure as required to meet field conditions and meet applicable codes

TE.6 CHARGING CABINETS

TE6.03 CHARGING CABINETS FOR 10 DEVICES Total Qty: 16

LocknCharge Carrier 10 Charging Station

- 16.5”W x 13.4”D x 26.3”H
- Lock all and desk mountable
- Truly universal. Compatible with Chromebook, Macbook, Tablet, iPad and Laptop
- Charges any 10 devices simultaneously
- Secures up to 10 devices
- Includes Large Baskets by LocknCharge
- Also includes a Stainless Steel Device Rack for larger devices
- Lifetime warranty

SECURE ATTACHMENT OF FF&E AND TECHNOLOGY ITEMS

To ensure proper attachment of fixtures, furnishings & equipment items, including technology items, where "items" are attached to the wall, ceiling overhead structure, floor and/or furniture component, contractor shall provide information adequate for architect to verify items are attached securely and per manufacturer's recommendations. Architect's review may be implemented during submittal process. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. to securely attach items to the existing structure as required to meet field conditions and meet applicable codes

.

TE.10 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS

TE10.01 86" Promethean ActivPanel Total Qty: 54

Item:	70" ActivPanel Titanium
Manufacturer:	Promethean
Model No:	AP7-B70-NA-1
Dimensions:	65.7"W x 40.7"H x 3.7"D
Net Weight:	117 lbs.

Product Description:

- **Enhanced Interactivity**
  Teachers and students can collaborate with up to 20 simultaneous touch points and simultaneous pen, touch, and palm erase. 4 Battery-less Pens included with Rear Erasing Feature. 1 Block Eraser and Integrated Full-length Pen Tray.

- **Teaching Untethered**
  ActivPanel Titanium's controlled, multi-device mirroring lets teachers move freely and teach from anywhere in the classroom. Teachers can interact with shared screens directly from the ActivPanel, increasing student collaboration and participation.

- **Dual Proximity Sensors**
  The ActivPanel Titanium automatically warms up when someone enters the room. Teachers can quickly get started with just the touch of a button.

- **Wi-Fi® and Bluetooth®**
  Provides the flexibility required for diverse networking needs and offers more classroom mobility. Bluetooth allows for easy connection to STEAM-based hardware, such as robots and lab sensors.

• **Screen Type** TFT LCD (Direct LED Backlight), **Aspect Ratio** 16:9, **Display Colors** 1.07 Billion, **Resolution** 4K UHD (3840 X 2160 @ 60Hz), **Response Time** 8 ms, **Panel Refresh Rate** 60 Hz, **LED Lifespan** 50,000 hours, **Contrast Ratio** 4000:1, **Ambient Light Sensor** included.
• **Room Filling Sound** Students who hear better, learn better. The ActivPanel Titanium's bass enhanced front-facing facing speakers fill the classroom with full range audio and superior fidelity. **2 x 20 Watts.**
• **Advanced Computing Power** The ActivPanel Titanium features the speed, security, and reliability of the Android 8 operating system onboard, with **4 GB of RAM, 64 GB of storage**, and **Gigabit LAN**. GPU (Graphics Processing Unit) ARM Mali-G51 MP4. Remote over-the-air Updates and Panel Management software included.
• **Glass Hardness** 9H (pencil), 7 (Mohs). **Glass Type** Heat-tempered, Anti-Glare
• **Interactivity Features include; Angled Center Console** with Power, Volume Control, Menu, Freeze, No Touch, and Source Selection buttons, **Touch Resolution** 32768 x 32768 pixels, **Response Time** ≤ 5 ms, **Touch Accuracy** 1mm, **Tracking Rate** 6 m/s, **Scan Rate** 200 Hz.

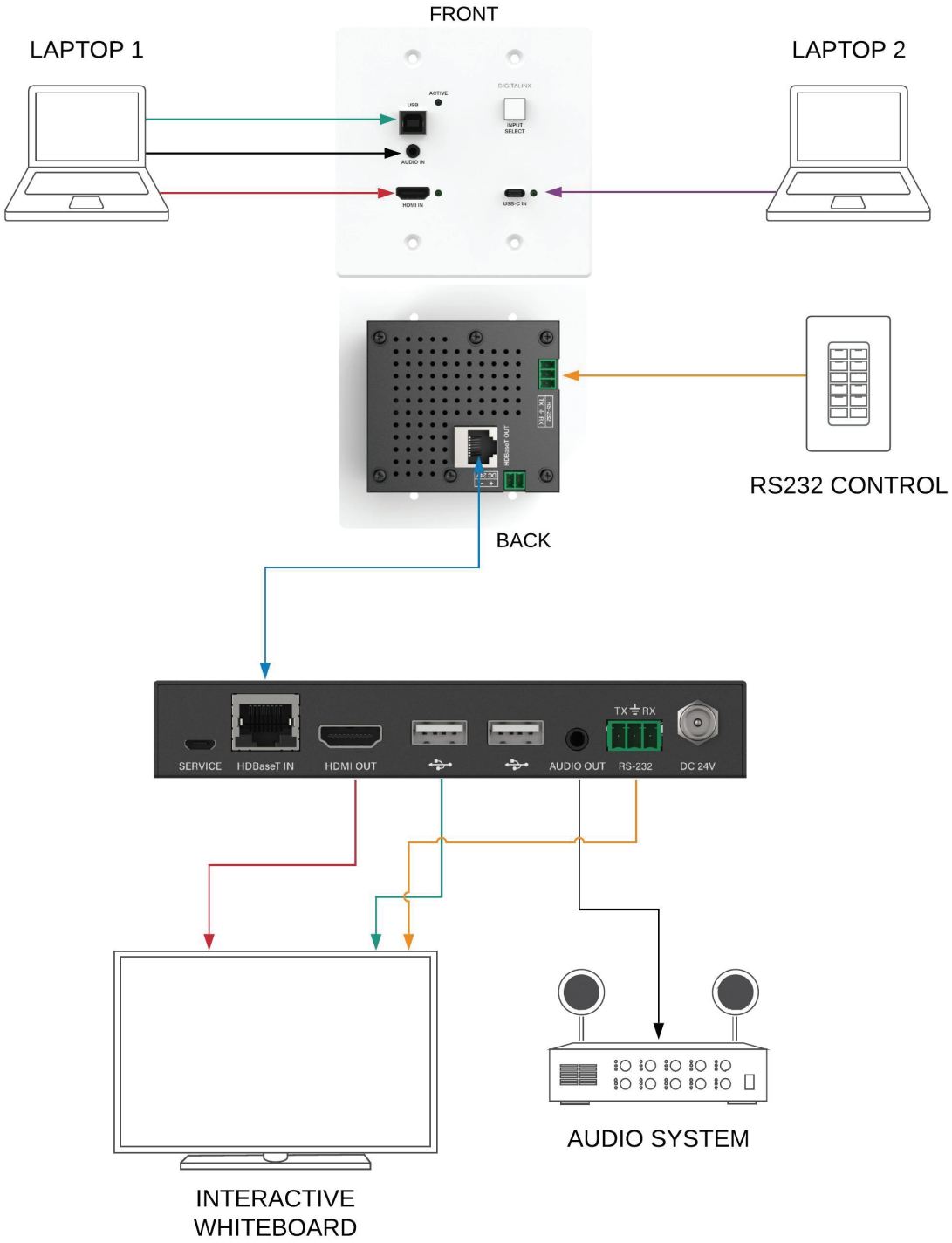
• **OPS-M Windows Module**
• The Windows Module includes the Intel® Core™ i5 Processor, 8 GB of RAM, and a Solid-State Drive offering faster access with greater reliability • Slides into the OPS slot providing a seamless integration without worrying about loose cables and power supply.

SECURE ATTACHMENT OF FF&E AND TECHNOLOGY ITEMS:

To ensure proper attachment of fixtures, furnishings & equipment items, including technology items, where "items" are attached to the wall, ceiling overhead structure, floor and/or furniture component, contractor shall provide information adequate for architect to verify items are attached securely and per manufacturer's recommendations. Architect's review may be implemented during submittal process. Contractor shall provide struts, hangers, fasteners, safety harnesses, channels, bolts, screws, rods, etc. To securely attach items to the existing structure as required to meet field conditions and meet applicable codes.

DIGITALINX
VALUE-ENGINEERED DIGITAL SOLUTIONS

DL-1H1A1UC-WPKT-W
A/V DIAGRAM

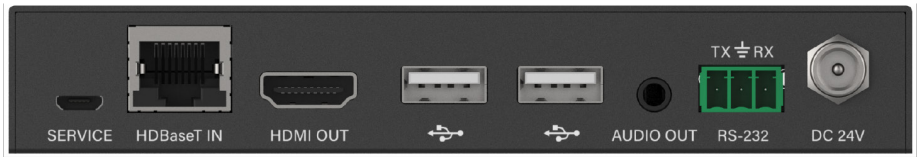


LIBERTY AV SOLUTIONS

DIGITALINX

VALUE-ENGINEERED DIGITAL SOLUTIONS

DL-1H1A1U1C-WPKT-W Install Guide



LIBERTY AV SOLUTIONS
A SUBSIDIARY OF WESCO DISTRIBUTION, INC.

Rev 200110

11675 Ridgeline Drive
Colorado Springs, CO
80921

Phone: 719-260-0061
Toll-Free: 800-530-8998
Fax: 719-260-0075

Product Overview

The Digitalinx DL-1H1A1UC-WPKT-W HDBaseT 2.0 extender set transmits HDMI or USB-C audio and video, analog audio, USB 2.0 High Speed data signals (up to 190Mbps) and RS232 over single category 6 twisted pair cable. The DL-1H1A1UC-WPKT-W can transmit 4K resolutions up to 4K@60Hz, 4:2:0 up to 40m / 120' and 1080P up to 70m / 230'. The 3.5 audio input/output on the system is completely separate and is not dependent on the HDMI or USB input source to be active, this way stereo audio can be transmitted through the system independently. The Digitalinx DL-1H1A1UC-WPKT-W is HDMI 1.4b and HDCP 2.2 compliant. The USB-C input supports ALT-DP mode and can support video, audio, data and power charging up to 40 watts. The DL-1H1A1UC-WPKT-W supports auto switching however an input select button is provided to switch between the HDMI and USB-C inputs manually.

The DL-1H1A1UC-WPKT-W HDBaseT receiver powers wall plate transmitter via HDBaseT so there is no need for an external power supply for the wall plate. However if using the USB-C input for a source device and power charging is required, both the receiver and the wall plate must be powered simultaneously.

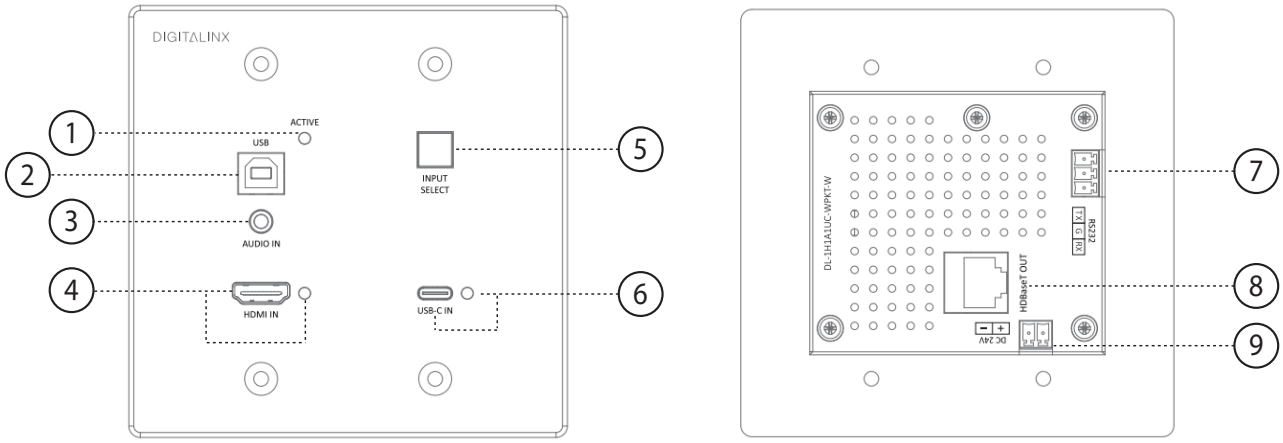
The DL-1H1A1U-WPKT-W is sold only as a set. The individual transmitter and receiver are not compatible with other HDBaseT devices due to proprietary PoE circuitry.

Package Contents

- DL-1H1A1UC-WPKT-W Wall plate extender set
- Quick Install Guide
- (2) 3 Pin phoenix connector
- (1) 2 Pin phoenix connector
- (1) DC24V 2A power supply
- (1) DC24V 1A power supply with US, UK, EU and AU power adapter plugs
- (2) Mounting ears with mounting screws

Transmitter / Receiver View

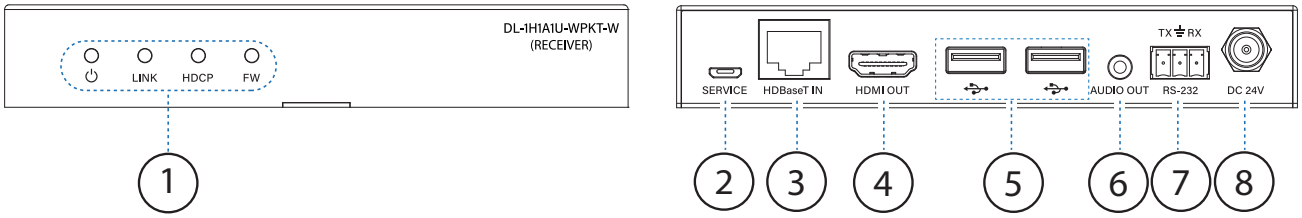
Transmitter



1. ACTIVE LED
   - When LED is solid green, the transmitter unit is active
2. USB - USB B host port
   - USB B host port is active when *HDMI IN* has been selected as the video input
3. AUDIO IN - 3.5 mm analog audio source input
4. HDMI IN - Video source input and LED
   - When LED is green, unit is receiving active HDMI signal
   - When LED is off, no active HDMI signal is present
5. INPUT SELECT
   - Press to toggle between *HDMI IN* and *USB-C IN* inputs
6. USB-C IN - USB Type C Input for video, data, power charging up to 40w and corresponding LED
   - When LED is green, unit is receiving active video signal
   - When LED is off, no active video signal is present
7. RS232 - Serial port for transmitting / receiving RS232 signals
8. HDBaseT OUT - HDBaseT output port
9. DC24V- Phoenix connector for connecting external 2A power supply

Note: The DL-1H1A1UC-WPKT-W-TX can receive power via HDBaseT from the receiver when connected together with a Category 6 F/UTP cable. If using the USB-C input for a source device and power charging to the connected source is required, the 2A wall plate power supply must be used to provide 40 watts of power to source.

Receiver



1. ACTIVITY LED'S

    - *When POWER LED is ON, unit is receiving power*
    - *When LINK LED is ON, the TX and RX is connected properly*
    - *When HDCP LED is ON, unit is receiving HDCP encrypted content*
    - *When FW LED is ON, unit is receiving power*

2. SERVICE- For firmware updates
3. HDBaseT IN - HDBaseT input port
4. HDMI OUT - HDMI output to connect to display technology
5. USB- USB A Client side ports

    - Client side hub, can be used for *USB B / HDMI IN* or *USB-C* when selected

6. AUDIO OUT - 3.5mm analog audio output port

    - Audio output is dedicated to the audio input on the wall plate, does not de-embed HDMI audio

7. RS232- Serial port for transmitting / receiving RS232 signals
8. DC24V - Locking connector for connecting external 1A power supply

Connectivity Instructions

1. Verify all components included with the extender set are present before installation.

2. If the extenders are going to be permanently mounted to a surface, attach the included mounting brackets with the supplied screws.

3. Turn off power and disconnect the audio/video equipment by following the manufacturer's instructions.

4. Connect Category 6 or greater twisted pair cable with RJ45 connectors between the transmitter (DL-1H1A1UC-WPKT-W-TX) and the receiver (DL-H1A1UC-WPKT-W-RX). TIA/EIA-568B straight-through wiring connections must be used with all HDBaseT extenders.

5. Connect an HDMI cable no longer than 5 meters / 15' and any desired control accessories between the display and the receiver (DL-H1A1UC-WPKT-W-RX).

6. Connect a USB-C cable no longer than 2 meters / 6' and any desired control accessories between the source and the transmitter (DL-1H1A1UC-WPKT-W-TX).

7. Connect an HDMI cable no longer than 5 meters / 15' and any desired control accessories between the source and the transmitter (DL-1H1A1UC-WPKT-W-TX).

8. Connect a computer USB port to the transmitter (DL-1H1A1UC-WPKT-W-TX) USB host port.

9. Connect USB peripherals such as white-boards and USB cameras to the USB client ports of the receiver (DL-1H1A1UC-WPKT-W-RX) USB ports. USB cable provided by Promethean

10. Connect the included 1A power supply to the DL-1H1A1UC-WPKT-W receiver and lock the power supply to the power connector by twisting the locking collar clockwise.

11. *OPTIONAL*- If using the USB-C power charging option, connect the included 2A power supply to the DL-1H1A1UC-WPKT-W wall plate

12. Power on attached audio/video devices. Use the INPUT SELECT button to choose which AV input to switch to

Cabling Requirements

HDBaseT Cabling

To ensure proper performance of the DL-1H1A1UC-WPKT-W, it is recommended that you use solid core, shielded Category 6 F/UTP cabling at a minimum. Category 5e F/UTP may perform well but may not support power over HDBaseT reliably.

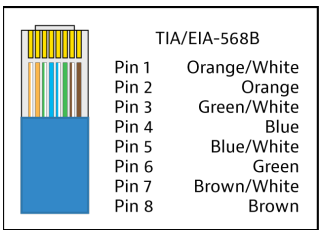
When using shielded category cabling *ALWAYS*...

....use shielded connectors
....properly ground the category cable

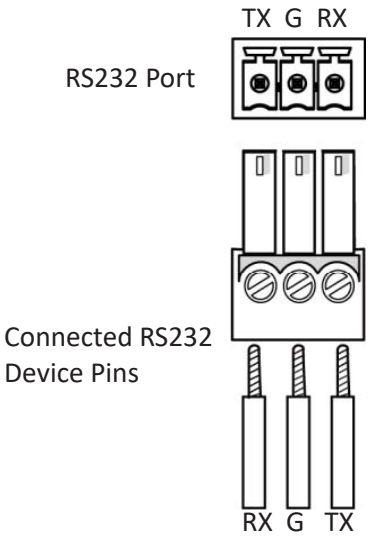
For optimized HDBaseT performance use the following Liberty Wire and Cable branded cabling;

Category 6 plenum; **24-4P-P-L6SH**
Category 6A plenum; **24-4P-P-L6ASH**

Category 6 NON-plenum; **24-4P-L6SH**
Category 6A NON-plenum; **24-4P-L6ASH**



Twisted Pair Wiring
Use TIA/EIA-568B wiring for Category 6 connection between send and receive units.



RS232 Wiring
Connect the controller or device RX signal to TX on the DL-1H1A1UC-WPKT-W extender. Connect the controller or device TX signal to Rx on the DL-1H1A1UC-WPKT-W extender.

Technical Specifications

VIDEO	
Video Inputs (TX)	(1) HDMI, (1) USB-C
Video Input Connector (TX)	(1) HDMI type A, (1) USB Type C
Input Video Signal	HDMI for HDMI input, ALT-DP Mode for USB-C
Video Output (TX)	(1) HDBaseT
Video Output Connector (TX)	(1) RJ45
Video Output (RX)	(1) HDMI
Video Output Connector (RX)	(1) HDMI type A
Output Video Signal	HDMI
Input Resolutions Supported	Up to 3840 x 2160 @ 60Hz, 4:2:0, 8bit color depth
Standards	Compliant with HDMI 1.4b & HDCP2.2
USB	
Supported USB Standard	USB 2.0 High Speed
USB Data Transfer Bandwidth	190Mbps
USB Port Type	(1) USB Type B, (1) USB Type C (TX) (2) USB Type A (RX)
AUDIO	
Supported output formats (HDMI)	LPCM, Dolby Digital/Plus/EX, Dolby True HD, DTS, DTS-EX,DTS-96/24, DTS High Res, DTS-HD Master Audio, DSD
Supported output formats (Analog)	PCM 2.0
Audio Input / Output	Stereo analog
Audio Input / Output Connector	(1) 3.5mm TRS audio jack
Audio Output Impedance	70 Ohms
Frequency Response	20Hz~20K Hz
CONTROL	
Control Port / Connector	(1) RS232 (TX) / 3 phoenix connector (1) RS232 (RX) / 3 phoenix connector
OTHER	
System Bandwidth	10.2Gbps
Operating Temperature	-10C ~ +40C
Storage Temperature	-20C ~ +60C
Humidity	20% ~ 90%
Power Supply	Input:100V~240V AC; Output: 24V DC 2A (TX) Input:100V~240V AC; Output: 24V DC 1A (RX)
Power Consumption	10 watts
Dimension (W*H*D)	TX:116mm * 114mm * 39mm / 4.6” * 4.5” * 1.5” RX:140mm * 23mm * 75mm / 5.5” * .9” * 2.9”
Weight	TX:300g / .7 lbs RX:200g / .44 lbs
Warranty	5 years
Certification	CE, FCC, RoHS

Thank you for your purchase.

For Technical Support please call our toll free number at 800-530-8998 or email us at supportli-bav@libav.com

www.libav.com

Digitalinx is a brand of:

LIBERTY AV SOLUTIONS

11675 Ridgeline Drive
Colorado Springs, Colorado
80921 USA
Phone: 719-260-0061
Fax: 719-260-0075
Toll-Free: 800-530-8998

TE.11 AUDIO VISUAL SYSTEMS

TE11.01 MUSIC ROOM AUDIO VISUAL SYSTEM

Shure SM58 Vocal Microphones

Shure SM57 Instrument Microphones

Shure SM58 Vocal Microphones

Shure Combo Wireless Kit w. 2 Antennas

Soundcraft 12 Channel Mixer

Tascam CD-200iL CD/iPod Dock Player

Denon DN-300R MKII Solid-State SD/USB Audio Recorder

Crown Audio CDi 2000 | 800W Dual Channel Power Amplifier

Gator Space GRC PU Pop-up Console Rack 12X10

JBL Control 29AV1 8 Inch Indoor Outdoor Passive Monitor Speaker

Extron DTP T HWP 4K 231 D HDMI Transmitter

Extron DTP T HWP 4K 230 Rx Receiver

E11.02 GYMNASIUM AUDIO VISUAL SYSTEM

Shure BLX24/PG58 Wireless Handheld Microphone System

Shure SM58 Vocal Microphones

Shure SM57 Instrument Microphones

Shure SM800 Audio Mixer

Allen and Heath Qu-16C Digital Mixer /

TPL-Link TL_SG1016PE PoE Switch-

Crown Audio CDi 2000 800-Watt per Channel, 2-Channel Power Amplifier with On-board DSP, 70 V Output, HiQnet USB Compatible

Middle Atlantic WRK-40SA-27 40 RU, 27" D WRK-SA Series Rack

JBL AM7215/95 Hgh Power 2-Way Loudspeaker with 1 x 15" LF & Rotatable Horn

JBL AC299 Two-Way Full-Range Loudspeaker with 1 x 12" LF
Ceiling Speakers

Da-LIte 37621LC RearProjection Screen Ratio: (16:10) Size: 87" X 139"

Epson Pro L1505UHNL Laser Projector with 4K Enhancement and Lens

TE11.03 CAFETERIA AUDIO VISUAL SYSTEM

Shure BLX24/PG58 Wireless Handheld Microphone System

Shure SM58 Vocal Microphones

Shure SCM800 8 Channel Microphone Mixer

Community DP6-B 6.5" Pendant Loudspeaker System, White or Black

Community D6-ProTwo Way 6.5" Ceiling Speaker System

TE11.04 MEDIA CENTER AUDIO VISUAL SYSTEM

Shure BLX24/PG58 Wireless Handheld Microphone System

Shure SM58 Vocal Microphones

Middle Atlantic PTRK-14 Mobile Equipment Cabinet

Extron XPA 2001-70V Power Amplifier W/70

Marantz PMD-526C Multi-format Player

Dbx DR PA Sound Processor

Commmunity CP-6-B L2 Full Range Speakers

Community D6-ProTwo Way 6.5" Ceiling Speaker System

TE.12 CLASSROOM AND CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEMS

TE12.01 CLASSROOM AUDIO SYSTEM W. TEACHER MICROPHONE Total Qty: 3

Item:	Redcat Access
Manufacturer:	Lightspeed
Model No:	RCA
Product Description:	
• All-in-one classroom audio system with a flat-panel speaker design and wireless teacher microphone t › deliver highly intelligible speech everywhere in the room.	
• Display 16" x 9" x 1.75 • Weight: 2.9 lbs. • Mounting: Table top or Wall Mount	

TE12.02 ASSISTIVE LISTENING SYSTEM Total Qty: 1

Item:	Listen IR IDSP System
Manufacturer:	Listen Technologies
Model No:	LS-88
Product Description:	
One (1) LT-84-01 ListenIR Transmitter/Radiator Combo Two (2) LR-4200 IR Intelligent DSP IR Receiver Two (2) LA-430 Intelligent Ear Phone/Neck Loop Lanyard Two (2) LA-401 Universal Ear Speaker One (1) LA-277 Conference Microphone One (1) LA-338 Table Top Tripod One (1) LA-346 Carrying Case One (1) LA-423 4-Port USB Charger	

DEPARTMENT OF ADMINISTRATIVE SERVICES

March 22, 2021

Dr. Walter Willett
Superintendent of Schools
Tolland Public Schools
51 Tolland Green
Tolland, CT 06084

Subject: Request for Sole Source Purchases of Interactive Display Panels, Network Switches, Wireless Access Points, & Telephones
Birch Grove Elementary School, Tolland, CT
State Project No. 142-0083 N

The OSCG&R Sole Source Review Committee has reviewed your request to specify items as sole source and has made its determination as follows:

1. Interactive Display: The specification the *"70" Promethean ActivPanel Titanium"* **interactive display panels as manufactured by Promethean Global, Seattle, WA** with associated equipment, software, and warranties, to match and be compatible with the existing *"Promethean ActivPanel Titatium"* interactive display panels currently in use in school meets the requirements for sole source specification and is approved. Therefore, you may proceed with the sole source specification for purchase only of the *"70" Promethean ActivPanel Titanium"* **interactive display panels** interactive display panels, as described in your request letter of March 6, 2020 (attached) and specification Section 27 2000, Technology Equipment – Bid with its attached data sheets (attached). The installation is not part of this sole source approval.

2. Network Switches and Wireless Access Points: The specification of *"HPE Aruba"* network switches and wireless access points as manufactured by Aruba, a Hewlett Packard Enterprise Company, including the associated equipment, to match and be compatible with the existing network switches and wireless access points and to maintain the existing maintenance and warranties meets the requirements for sole source approval and is approved. Therefore, you may proceed with sole source specification of the "HPE Aruba 5400 Series Network Edge Switches" and "HPE Aruba AP-303 Indoor Wireless Access Point #JZ321A with MPTL connections to the network" as escribed in your request letter of February 8, 2021 Updated March 11, 2021 (attached), the JCJ narrative letter of February 28, 2021 (attached) and specification Section 27 2000, Technology Equipment – Bid with its attached data sheets (attached). The installation is not part of this sole source approval.

3. Telephones: The specification of an *"Avaya telephone System"* including telephone handsets, wall mount brackets, perpetual licenses, and software activation wrapped into Tolland's existing IPOSS & Essentials Maintenance Plan currently in place, meets the requirements for sole source approval and is approved. Therefore, you may proceed with sole source specification of the *"Avaya Telephone System* as described in your request letter of February 8, 2021 Updated March 11, 2021 (attached), the JCJ narrative letter of February 28, 2021 (attached) and specification Section 27 2000, Technology Equipment – Bid with its attached data sheets (attached). Approval is for manufacturer only, installation for the above items shall be provided through bid by multi[le dealer/installers.

If you have any questions, please contact Mr. Kermit Thompson at our office at (860) 713-6484.

Sincerely,

Konstantinos Diamantis
Director, Office of School Construction Grants & Review

Encl: Your Sole Source Request Letter, dated November 30, 2020
Specification Section 27 41 00 Audio Visual Systems

CC: Robert Celmer, OSCG&R
Michelle Dixon, OSCG&R
Plan Review/Grant File
Peter Sztaba Facilities Director, Tolland Public Schools
Fawn Pellegrini, JCJ Architecture
Bruce Kellogg, JCJ Architecture

BID LIST SUMMARY - BID ITEMS

BID PACKAGE #1 - NETWORK SWITCHES & WIRELESS ACCESS POINTS

TE.1 NETWORK SWITCHES

					TE.1 NETWORK EDGE SWITCHES SYSTEM TOTAL:	$ -

TE.2 WIRELESS ACCESS POINTS

					TE.2 WIRELESS ACCESS POINTS TOTAL:	**$ -**
					TOTAL BID PACKAGE #1	**$ -**

BID PACKAGE #2 - TELEPHONES

TE.3 TELEPHONES

					TE.3 TELEPHONES TOTAL:	**$ -**
					TOTAL BID PACKAGE #2	**$ -**

BID PACKAGE #3 - CHARGING CABINETS

TE.6 CHARGING CABINETS

					TE.6 CHARGING CARTS AND CABINETS TOTAL:	**$ -**
					TOTAL BID PACKAGE #3	**$ -**

BID PACKAGE #4 - CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS

TE.10 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS

					TE.10 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS TOTAL:	**$ -**
					TOTAL BID PACKAGE #4	**$ -**

BID PACKAGE #5 - AUDIO VISUAL SYSTEMS, CLASSROOM & CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEM

TE.11 AUDIO VISUAL SYSTEMS

TE11.01	Music Room Audio Visual System	1	$ -	$ -	
TE11.02	Gymnasium Audio Visual System	1	$ -	$ -	
TE11.03	Cafeteria Audio Visual System	1	$ -	$ -	
TE11.04	Media Center Audio Visual System	1	$ -	$ -	
			TE.11 AUDIO VISUAL SYSTEMS TOTAL:	**$ -**	

TE.12 CLASSROOM AND CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEMS

TE12.02	**Listen Technologies** Assistive Listening System with Conference Microphone, Table Top Tripod, Carrying Case, Charger, 2 Ear Speakers, 2 Neckloop Lanyards, 2 Receivers, 1 Transmitter, LS-88-01	1	$ -	$ -	
			TE.12 CLASSROOM & CONFERENCE. ROOM AUDIO AMPLIFICATION SYSTEMS TOTAL:	**$ -**	
			TOTAL BID PACKAGE #5	**$ -**	
			PROJECT TOTAL	**$ -**	

BID LIST #1

BID PACKAGE #1 - NETWORK SWITCHES & WIRELESS ACCESS POINTS

TE.1 NETWORK SWITCHES & WIRELESS ACCESS POINTS

TAG	Qty.	Mfg.	Item Description / Model Number	Unit Cost	Total Cost
1.01	3	HPE Aruba	Data Switch Chassis - HP 5406R zl2 - Part # J9821A	$ -	$ -
1.02	39	HPE Aruba	Expansion Module w. 24 Ports - Part # J9987A	$ -	$ -
1.03	6	HPE Aruba	Power Supply - 5400R 1100W PoE+ zl2 - Part #J9829A#ABA	$ -	$ -
1.04	2	HPE Aruba	10Gbit Transceiver- Part # J9151E	$ -	$ -
	Sole Source approval received for HPE Aruba Network Switches No substitutions will be accepted.				
	Installation to be done by Tolland IT				
				TE.1 NETWORK SWITCHES & WIRELESS ACCESS POINTS TOTAL:	**$ -**

TE.2 WIRELESS ACCESS POINTS

2.01	35	HPE Aruba	AP-303 Indoor Wireless Access Point #JZ321A	$ -	$ -
2.02	35	HPE Aruba	1-Year Central License for AP-303 #JY925AAE	$ -	$ -
2.03	35	HPE Aruba	1-Year Central Cloud Services License for AP-303 #JY928AAE	$ -	$ -
2.04	35	HPE Aruba	1- Year Extended Service plan with Replacement #H9VR8E	$ -	$ -
2.05	18	HPE Aruba	Wall Mount Kit	$ -	$ -
2.06	77	HPE Aruba	Installation -35 new and 42 Existing WAP's	$ -	$ -
2.07	6	HPE Aruba	Protective Cover for Gymnasium WAPs -1016-C 18" Hi-Bar Lock Box w.	$ -	$ -
2.08	1	HPE Aruba	Installation of Gymnasium Covers	$ -	$ -
2.09	2	HPE Aruba	Installation of Relocated Outdoor WAPs	$ -	$ -
	Sole Source approval received for HPE Wireless Access Points - No substitutions will be accepted.				
				TE.2 WIRELESS ACCESS POINTS TOTAL:	**$ -**

TOTAL BID PACKAGE #1 $ -

BID LIST #2

BID PACKAGE #2 - TELEPHONES

TE.3 TELEPHONES					
TAG	**Qty.**	**Mfg.**	**Model Number / Item Description**	**Unit Cost**	**Total Cost**
3.01	16	Avaya	J169 IP Phone Global No Power Supply	$ -	$ -
3.02	16	Avaya	IP Office R10+ Avaya IP Endpoint 1 Year License: Cu	$ -	$ -
3.03	10	Avaya	J139/J159/J169/J179/J189 Wall Mount Kit With 1 Foot Cat5e Cable	$ -	$ -
3.04	10	Avaya	IP Phone 9620/94xx/95xx Wall Mount	$ -	$ -
3.05	16	Avaya	Software Activation for Installation	$ -	$ -
	Sole Source approval received for Avaya Telephones - No substitutions will be accepted.				
	Installation to be done by Tolland IT				
				TE.3 TELEPHONES TOTAL:	**$ -**
				TOTAL BID PACKAGE #2	**$ -**

BID LIST #3

BID PACKAGE #3 - CHARGING CABINETS

TE.6 CHARGING CABINETS					
TAG	**Qty.**	**Mfg.**	**Item Description / Model Number**	**Unit Cost**	**Total Cost**
6.01	28	LocknCharge	Revolution 32 Charging Cabinet for Devices up to 17" , 31.7"W x 16.5"D x 55.7"H, with Installation	$ -	$ -
6.02	2	LocknCharge	Additional Revolution 32 Charging Cabinet for Devices up to 17" , 31.7"W x 16.5"D x 55.7"H, with Installation	$ -	$ -
6.03	5	LocknCharge	Carrier 10 Charging Cabinet for 10 Devices with 2 Baskets and Rack for Devices up to 17", with Installation	$ -	$ -
6.04	11	LocknCharge	Additional Carrier 10 Charging Cabinet for 10 Devices with 2 Baskets and Rack for Devices up to 17", with Installation	$ -	$ -
				TE.6 CHARGING CABINETS TOTAL:	**$ -**

TOTAL BID PACKAGE #3 $ -

BID LIST #4

BID PACKAGE #4 - CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS

TE.10 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS

TAG	Qty.	Mfg.	Item Description/Model Number	Unit Cost	Total Cost
10.01	15	Promethean	70" ActivPanel 7 Titanium Interactive Display	$ -	$ -
10.02	15	Promethean	OPS-M WIN Windows Module with License	$ -	$ -
10.03	47	Liberty/Digital inx	DL-1H1A1UC-WPKT-W Wall Plate Extender Kit with Transmitter, Receiver, Power Supplies, & Mounting Ears	$ -	$ -
10.04	1	Liberty	**PPC6ABS075GY** 75' Cat6A Plenum Rated Shielded HDBaseT Pre-Made Patch Cable - Grey	$ -	$ -
10.05	12	Liberty	**PPC6ABS050GY** 50' Cat6A Plenum Rated Shielded HDBaseT Pre-Made Patch Cable - Grey	$ -	$ -
10.06	34	Liberty	**PPC6ABS035GY** 35' Cat6A Plenum Rated Shielded HDBaseT Pre-Made Patch Cable - Grey	$ -	$ -
10.07	47	Liberty	**E2-HDSEM-M-02** 7’ HDMI Cable from Display to Receiver mountd on back of Display	$ -	$ -
10.08	47	Liberty	**U420-006-5A** 6' USB-C to USB-C Cable from Teacher's Computer to Transmitter	$ -	$ -
10.09	47	Liberty	**E2-HDSEM-M-02** 2m (6.6 ft.) HDMI Cable from Teacher's Computer to Transmitter	$ -	$ -
10.10	47	Liberty	**E-USBAB** 6' Cable for connection of Computer USB port to Transmitter	$ -	$ -
10.11	47	Liberty	**152G6S0007** 7' Cat 6A Shielded Patch Cable from Display to Transmitter mounted on back of Display	$ -	$ -
10.12	47	Liberty	**PC-G1960-E-P-C** Single Gang Grommeted AV Pass Through Wall Plate with 1 7/8" oval cut-out for HDBaseT patch cable for inside 4-Gang Wall Box behind Display	$ -	$ -
10.13	2	Liberty	**P221P-3.5TRSM-M-100** 100' Audio Cable to connect Local Sound System to Receiver behing Display in Music Room, Media Center	$ -	$ -
10.14	1		Installation with Prevailing Wage Rates	$ -	$ -
	Sole Source approval received for Promethean Displays - No substitutions will be accepted				

TE.10 CLASSROOM AND CONFERENCE ROOM INTERACTIVE DISPLAYS TOTAL: $ -

TOTAL BID PACKAGE #4 $ -

BID LIST #5

BID PACKAGE #5 - AUDIO VISUAL SYSTEMS, CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEM

TE.11 AUDIO VISUAL SYSTEMS

TAG	Qty.	Mfg.	Model #	Description	Unit Cost	Total Cost
TE11.01 Music Room Visual System						
1.01	2	Shure	SM58	Vocal Microphones	$ -	$ -
1.02	2	Shure	SM57	Instrument Microphones	$ -	$ -
1.03	4	Shure	MX202B/C	Recording Microphones	$ -	$ -
1.04	8	ProCo	ME-25	25' Mic Cable	$ -	$ -
1.05	1	OnStage	MB7006	Microphone Storage Box	$ -	$ -
1.06	4	OnStage	MS9701B	Microphone Stands with Booms	$ -	$ -
1.07	2	OnStage	SB9600	Tripod Studio Mic Boom	$ -	$ -
1.08	1	Rapco	iRack	Input Panel	$ -	$ -
1.09	1		Audio Plate	XLR Mic Input, Mini and RCA Mono Line	$ -	$ -
1.10	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507	$ -	$ -
1.11	1	Shure	UA221	Antenna Splitter (PAIR)	$ -	$ -
1.12	2	Shure	UA864	Remote antenna	$ -	$ -
1.13	2	Shure	UABIAST-US	BIAS power injector	$ -	$ -
1.14	1	Soundcraft	Signature 12	12 Channel Mixer	$ -	$ -
1.15	1	Soundcraft	5065070	Mixer Rack Mount	$ -	$ -
1.16	1	Tascam	CD-200BT	CD/iPod Dock Player	$ -	$ -
1.17	1	Denon	DN300RMKII	USB/Solid State Recorder	$ -	$ -
1.18	1	dbx	DR PA2	Sound processor	$ -	$ -
1.19	1	Crown	CDi2000	Power Amplifier	$ -	$ -
1.20	1	Atlas	AA-PPRC	Paging priority controller	$ -	$ -
1.21	1	Middle Atlantic	RLM-15-1CA	Remote controlled power module	$ -	$ -
1.22	1	Gator	GRC-10X12	Rolling rack w/tilt up console rack	$ -	$ -
1.23	1	Middle Atlantic	PDR-915R-SP	Power Strip	$ -	$ -
1.24	1	Middle Atlantic	D4	Equipment Draw	$ -	$ -
1.25	2	JBL	Control 29AV	L1 Monitor Speakers	$ -	$ -
1.26	1	RDL	ST-UBA2	Unbalanced to balanced convertor with power supply	$ -	$ -
1.27	1	Extron	DTP T HWP 4K 231 D	HDMI transmitter	$ -	$ -
1.28	1	Extron	DTP HDMI 4K 230 Rx	HDMI receiver	$ -	$ -
1.29	1	Extron	XTP DTP 24/1000	Shielded CAT6, bulk	$ -	$ -
1.30	2	Extron	XTPDTP 24 PLUG	RJ-45 connector	$ -	$ -
1.31	1	Liberty	22-1P EZ	Shielded 22-2 bulk	$ -	$ -
1.32	1	Liberty	14-2C	14-2 speaker cable bulk	$ -	$ -
1.33	1	Liberty	RG58-CMR	Antenna cable, bulk	$ -	$ -
1.34	4	Liberty	112116	BNC crimp connector for Antenna	$ -	$ -
1.35	4	Neutrik	NC3FXX	XLR connector	$ -	$ -
1.36	1	C2G	50612	15’ HDMI cable	$ -	$ -

1.37	1	C2G	56783	6' HDMI patch cable	$ -	$ -
1.38				**Music Room Total Product**	$ -	$ -
1.39				**Installation**	$ -	$ -
1.40				**Music Room Total Cost**	$ -	$ -
TE11.02 Gymnasium/Stage Audio Visual System						
Tag	**Qty.**	**Mfg.**	**Model**	**Description**		
2.01	2	Shure	PG58XLR	Vocal Microphones	$ -	$ -
2.02	2	Shure	SM58	Vocal Microphones	$ -	$ -
2.03	2	Shure	SM57	Instrument Microphones	$ -	$ -
2.04	8	ProCo	ME-25	25' Mic Cable	$ -	$ -
2.05	1	OnStage	MB7006	Microphone Storage Box	$ -	$ -
2.06	4	OnStage	MS9701B	Microphone Stands with Booms	$ -	$ -
2.07	4	Shure	MX202WP/C	Choral Microphones-Ceiling Installed	$ -	$ -
2.08	1		Audio Plate	XLR Mic Input, Mini and RCA Mono Line Input	$ -	$ -
2.09	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507 (w/2 Antennas)	$ -	$ -
2.10	1	Shure	UA221	Antenna Combiner (PAIR)	$ -	$ -
2.11	2	Shure	UA864	Remote antenna	$ -	$ -
2.12	2	Shure	UABIAST-US	BIAS power injector	$ -	$ -
2.13	2	Rapco	MS2	Mic Splitters 1X2	$ -	$ -
2.14	2	Custom	Custom	Mic plate with 4 XLRs, 2 for automixer, 2 for house system. One stage right, one stage left, each a 2 gang NEMA Cover	$ -	$ -
2.15	2	ProCo	WP1013	Dual Mic Input Plates on stage steps	$ -	$ -
2.16	2	ProCo	WP1004	Mic Inputs, Gym East & West Walls	$ -	$ -
2.17	1	Shure	SCM800	Auto-Mixer	$ -	$ -
2.18	1	Allen and Heath	Qu-16C	16Ch, digital mixer with iPad app	$ -	$ -
2.19	1	BSS	BLU100	DSP Unit	$ -	$ -
2.20	1	BSS	EC8BV	8 button plus vol ctl plate	$ -	$ -
2.21	1	BSS	EC4BV	4button plus vol ctl plate	$ -	$ -
2.22	1	TP-Link	TL-SG1016PE	PoE Switch	$ -	$ -
2.23	1	TP-Link	OMADA AC1750	Wi-Fi Access point	$ -	$ -
2.24	2	Shure	DFR22	Feedback Controller	$ -	$ -
2.25	1	Crown	CDi2000	Power Amplifier	$ -	$ -
2.26	1	Crown	CDi4000	Power Amplifier	$ -	$ -
2.27	1	Listen Technologies	LT-800-072-01	Stationary RF Transmitter (72 MHz)	$ -	$ -
2.28	1	Listen	LA-122	Universal Antenna Kit (72 MHz and 216 MHz)	$ -	$ -
2.29	1	Listen	LA-326	Universal Rack Mounting Kit	$ -	$ -
2.30	12	Listen	LR-5200-072	Programmaable Receiver	$ -	$ -
2.31	4	Listen	LA-401	Universal Ear Speaker	$ -	$ -
2.32	9	Listen	LA-165	Headphones	$ -	$ -
2.33	9	Listen	LA-166	Neckloop	$ -	$ -
2.34	1	Listen	LA-381	Charging station for 12 units	$ -	$ -
2.35	1	Listen	LA-304	Assistive Listeining Notification Signage Kit	$ -	$ -
2.36	1	Listen	LA-901	Disinfecting wipes	$ -	$ -
2.37	1	MidAtlantic	ERK-4425-AV	Equipment Cabinet w/ locking doors, power, fan-top and lacing bars	$ -	$ -

2.38	1	Middle Atlantic	MPR-SEQ-1CA	Power Sequencer	$ -	$ -
2.39	1	Middle Atlantic	S-DEC	Power Switch	$ -	$ -
2.40	1	Middle Atlantic	DECP-1X1	Power Panel	$ -	$ -
2.41	4	Middle Atlantic	RLM-20-1CA	Power Module	$ -	$ -
2.42	1	Middle Atlantic	D4	Drawer	$ -	$ -
2.43	1	Custom	Rack panel	Custom for control panels	$ -	$ -
2.44	2	Rapco	AV1A	Direct Box	$ -	$ -
2.45	2	QSC	E115	**L5**, 15" 2-WAY PROGRAM SPKR	$ -	$ -
2.46	2	QSC	E115 YOKE	Bracket for L5 Speaker	$ -	$ -
2.47	8	JBL	AC299	**L4** Gym Ceiling Speakers	$ -	$ -
2.48	8	JBL	MTU266-99	Bracket for L4 Ceiling Speaker	$ -	$ -
2.49	1	Da-Lite	37621LC	Rear Projection Screen - Tensioned Contour Electrol, Wide (16:10) Size: 87" X 139", Black Case, Surface: HD Progressive ReView 0.9 (f/k/a Dual Vision)	$ -	$ -
2.50	1	Da-Lite	Screen Rigging	Screen Rigging Hardware	$ -	$ -
2.51	1	Da-Lite	98837	Locking Switch Plate Cover	$ -	$ -
2.52	1	Epson Pro	L1505UHNL	Projector, WUXGA/4KE 8000 Lumens	$ -	$ -
2.53	1	Epson Pro	ELPLW05	Lens for above	$ -	$ -
2.54	1	Chief	Mount	Ceiling mount, pipe and building attachment hardware	$ -	$ -
2.55	1	RDL	ST-UBA2	Unbalanced to balanced convertor with power supply	$ -	$ -
2.56	1	Extron	MLC Plus 100	Control panel	$ -	$ -
2.57	2	EXTRON	DTP T HWP 4K 231 D	HDMI transmitter	$ -	$ -
2.58	2	EXTRON	DTP HDMI 4K 230 Rx	HDMI receiver	$ -	$ -
2.59	2	C2G	50634	35' HDMI cable	$ -	$ -
2.60	2			Single Gang AV Wall Plate with HDMI and USB ports	$ -	$ -
2.61	1	EXTRON	XTP DTP 24/1000	Shielded CAT6, bulk	$ -	$ -
2.62	4	EXTRON	XTPDTP 24 PLUG	RJ-45 connector	$ -	$ -
2.63	1	Liberty	24-4P-L5-EN	CAT5e data cable	$ -	$ -
2.64	6	Liberty	100 003B	EZ-45 connectors	$ -	$ -
2.65	1	Liberty	22-1P EZ	Shielded 22-2 bulk	$ -	$ -
2.66	1	Liberty	14-2C	14-2 speaker cable bulk	$ -	$ -
2.67	1	Liberty	RG58-CMR	Antenna cable, bulk	$ -	$ -
2.68	4	Liberty	112116	BNC crimp connector for antenna	$ -	$ -
2.69	4	Neutrik	NC3FXX	XLR connector	$ -	$ -
2.70	4	C2G	56783	6' HDMI patch cable	$ -	$ -
2.71				**Gymnasium/Stage Total Product**	$ -	$ -
2.72				**Installation**	$ -	$ -
2.73				**Gymnasium/Stage Total Cost**	$ -	$ -
TE11.03 Cafeteria Local Sound System						
Tag	**Qty.**	**Mfg.**	**Model**	**Description**		

3.01	1	Shure	PG58XLR	Vocal Microphone	$ -	$ -
3.02	2	ProCo	WP1013	Dual Input Plates	$ -	$ -
3.03	1	ProCo	ME-25	25' XLR Cable	$ -	$ -
3.04	1	OnStage	MS9700B	Microphone Stand	$ -	$ -
3.05	1	Custom	Audio Plate	XLR Mic Input, Mini and RCA Mono Line Input	$ -	$ -
3.06	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507 (w/2 Antennas)	$ -	$ -
3.07	1	Shure	UA221	Antenna Combiner (PAIR)	$ -	$ -
3.08	2	Shure	UA864	Remote antenna	$ -	$ -
3.09	2	Shure	UABIAST-US	BIAS power injector	$ -	$ -
3.10	1	Shure	SCM800	Mixer	$ -	$ -
3.11	1	Axiom	BT1	Blue Tooth Receiver	$ -	$ -
3.12	1	Axiom (Attero)	AXP20	Audio extender Rx	$ -	$ -
3.13	1	BSS	EC4BV	4-Button plus volume control plate	$ -	$ -
3.14	1	Listen Technologies	LT-800-072-01	Stationary RF Transmitter (72 MHz)	$ -	$ -
3.15	1	Listen	LA-122	Universal Antenna Kit (72 MHz and 216 MHz)	$ -	$ -
3.16	1	Listen	LA-326	Universal Rack Mounting Kit	$ -	$ -
3.17	8	Listen	LR-5200-072	Programmaable Receiver	$ -	$ -
3.18	4	Listen	LA-401	Universal Ear Speaker	$ -	$ -
3.19	7	Listen	LA-165	Headphones	$ -	$ -
3.20	6	Listen	LA-166	Neckloop	$ -	$ -
3.21	1	Listen	LA-381	Charging station for 12 units	$ -	$ -
3.22	1	Listen	LA-304	Assistive Listeining Notification Signage Kit	$ -	$ -
3.23	1	Listen	LA-901	Disinfecting wipes	$ -	$ -
3.24	1	Atlas	AA-PPRC	Paging priority controller	$ -	$ -
3.25	1	Crown	CDi2000	Power Amplifier	$ -	$ -
3.26	1	Middle Atlantic	D2	Equipment Drawer	$ -	$ -
3.27	5	Community	DP6-B	**L3** Speakers	$ -	$ -
3.28	5	Community	D6 Pro	L6 Two-Way Ceiling speakers	$ -	$ -
3.29	1	EXTRON	XTP DTP 24/1000	Shielded CAT6, bulk	$ -	$ -
3.30	2	EXTRON	XTPDTP 24 PLUG	RJ-45 connector, shielded	$ -	$ -
3.31	1	Liberty	24-4P-L5-EN	CAT5e data cable	$ -	$ -
3.32	2	Liberty	100 003B	EZ-45 connectors	$ -	$ -
3.33	1	Liberty	22-1P EZ	Shielded 22-2 bulk	$ -	$ -
3.34	1	Liberty	16-2C	16-2 speaker cable bulk	$ -	$ -
3.35	1	Liberty	RG58-CMR	Antenna cable, bulk	$ -	$ -
3.36	6	Liberty	112116	BNC crimp connector for antenna	$ -	$ -
3.37	0	Neutrik	NC3FXX	XLR connector	$ -	$ -
3.38	1	C2G	50612	15' HDMI cable	$ -	$ -
3.39	1	C2G	56783	6' HDMI patch cable	$ -	$ -
3.40				**Cafeteria Total Product**	$ -	$ -
3.41				**Installation**	$ -	$ -
3.42				**Cafeteria Total Cost**	$ -	$ -
TE11.04 Media Center Local Sound System						
Tag	**Qty.**	**Mfg.**	**Model**	**Description**		
4.01	2	Shure	PG58XLR	Vocal Microphones	$ -	$ -
4.02	2	ProCo	WP1013	Dual Input Plates	$ -	$ -
4.03	2	ProCo	ME-25	25' Mic Cable	$ -	$ -

4.04	2	OnStage	MS9700B	Microphone Stands	$ -	$ -
4.05	1	Rapco	iRack	Input Panel	$ -	$ -
4.06	1	Shure	SCM800	Mixer	$ -	$ -
4.07	1	Custom	Audio Plate	XLR Mic Input, Mini and RCA Mono Line Input	$ -	$ -
4.08	2	Shure	ULXS24/58	Combo Wireless Kit w/UA507 (w/2 Antennas)	$ -	$ -
4.09	1	Shure	UA221	Antenna Splitter (PAIR)	$ -	$ -
4.10	2	Shure	UA864	Remote antenna	$ -	$ -
4.11	2	Shure	UABIAST-US	BIAS power injector	$ -	$ -
4.12	1	Marantz	PMD-526C	Multi-format player	$ -	$ -
4.13	1	dbx	DR PA2	Sound processor	$ -	$ -
4.14	1	EXTRON	XPA 2001-70V	Power Amplifier W/70	$ -	$ -
4.15	1	Middle Atlantic	RLM-15-1CA	Remote controlled power module	$ -	$ -
4.16	1	Middle Atlantic	PTRK-14	Equipment Cabinet	$ -	$ -
4.17	1	Middle Atlantic	PDR-915R-SP	Power Strip	$ -	$ -
4.18	1	Middle Atlantic	D2	Equipment Drawer	$ -	$ -
4.19	6	Community	CP6-B	L2 Speakers	$ -	$ -
4.20	3	Community	D6 Pro	L6 Two-Way Ceiling Speakers	$ -	$ -
4.21	1	Atlas	AA-PPRC	Paging priority controller	$ -	$ -
4.22	1	Liberty	22-1P EZ	Shielded 22-2 bulk	$ -	$ -
4.23	1	Liberty	16-2C	16-2 Speaker Cable bulk	$ -	$ -
4.24	1	Liberty	RG58-CMR	Antenna cable, bulk	$ -	$ -
4.25	6	Liberty	112116	BNC crimp connector for Antenna	$ -	$ -
4.26				**Media Center Total Product**	$ -	$ -
4.27				**Installation**	$ -	$ -
4.28				**Media Center Total Cost**	$ -	$ -
				TE.11 AUDIO VISUAL SYSTEMS TOTAL:		$ -

TE.12 CLASSROOM AND CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEMS	
TE12.02 M	**Assistive Listening System for Conference Room**
A.	**Portable ListenIR iDSP System LS-88-01 - Deliver to the Birch Grove Office**
B.	Furnish an IR Assistive Listening System for use by the hearing-impaired. The Assistive Listening System (ALS) shall be capable of broadcasting up to two (2) audio channels with the choice of four (4) mono carrier frequencies; 2.3, 2.8, 3.3 and 3.8 MHz. The system coverage area shall be up to 30,000 ft² (2787 m²) with single channel trans-mission. The system shall have a SNR of 60 dB or better and THD of less than 2%. The system shall have an audio frequency response of 63 Hz to 15 kHz, +/- 3db. The system shall include an omnidirectional table top microphone for audio pickup in the room. The system shall be transported or stored in a portable carrying case when the system is not in use.
C.	The system receivers shall be capable of receiving on one (1) of four (4) wide band chan-nels (carriers), (2.3 MHz), (2.8 MHz), (3.3 MHz) and (3.8 MHz). The receivers shall be tuned to a single channel and users shall not be able to change the channel. The receivers shall have the option of being lanyard or belt clip worn and the lanyard shall incorporate an integrated neck loop for compatibility with T-coil hearing aids. The receivers shall be intelligent and provide customized audio to either earphones or the integrated neck loop based upon which is connected.

D.	The receivers shall have two (2) 3.5 mm (TRRS) connectors to drive the integrated neck loop lanyard or up to two (2) mono or stereo earphones. The receivers shall incorporate a multi-functional display (OLED) that indicates battery status, inventory number, volume level and a customizable channel name. The receivers shall employ a unique iDSPTM noise reduction technology. The receivers shall be fully programmable via PC software. The receivers shall have a micro USB connector used for programming/setup, inventory control, charging and firmware upgrades. The receivers shall incorporate automatic battery charging circuitry and use a non-proprietary lithium ion battery. The receivers shall automatically turn on when removed from the charging device and automatically turn off when returned to the charging device.					
E.	**The LS-88 is specified and includes:**					
12.01	1		LA-277	Conference Microphone	$ -	$ -
12.02	1		LA-338	Table Top Tripod	$ -	$ -
12.03	1		LA-346	Carrying Case	$ -	$ -
12.04	2		LA-401	Universal Ear Speaker	$ -	$ -
12.05	1		LA-423	4-Port USB Charger	$ -	$ -
12.06	2		LA-430	Intelligent Ear Phone/Neck Loop Lanyard	$ -	$ -
12.07	2		LR-4200 IR	Intelligent DSP IR Receiver	$ -	$ -
12.08	1		LT-84-01	ListenIR Transmitter/Radiator Combo	$ -	$ -
12.09				**Conference Room Assistive Listening Total Product**	$ -	$ -
12.10				**Installation**	$ -	$ -
12.11				**Conference Room Assistive Listening Total Cost**	$ -	$ -
				TE.12 CLASSROOM AND CONFERENCE ROOM AUDIO AMPLIFICATION SYSTEMS TOTAL:		$ -
				Installation shall include Prevailing Wage Rates. Grounding and Bonding of equipment shall be provided.		
				TOTAL BID PACKAGE #5		**$ -**

ROOM NO.		DWG. NO.	DATA CLOSETS - MDF 1c06, IDF 1b14	TE1.01 Data Switch Chassis	TE1.02 Expansion Module	TE1.03 Power Supply	TE1.04 10Gbit Transceiver	TE2.01 Wireless Access Point	TE2.02 WAP w. Wall Mount Kit	TE2.03 WAP w. Protective Cover	TE2.04 Outdoor Wireless Access Point	TE3.01 Desk or Wall Phone	TE3.02 Wall Bracket for Phone	TE4.01 Network Cables	TE5.01 Network UPS's	TE6.01 Charging Cabinet for 32 Devices	TE6.02 Additional Charging Cabinet for 32 Devices	TE6.03 Charging Cabinet for 10 Devices	TE6.04 Additional Charging Cabinet for 10 Devices	TE7.01 Laser Printer - Light Duty B & W	TE8.01 Desktop Computer for Labs & Teacher Stations	TE8.02 Desktop Computer for Staff Offices	TE9.01 Digital Signage	TE10.01 70" Interactive Display	TE11.01 Music Room Audio Visual System	TE11.02 Gymnasium Audio Visual System	TE11.03 Cafeteria Audio Visual System	TE11.04 Media Center Audio Visual System	TE12.01 Classroom Audio System w. Teacher Microphone	TE12.02 Assitive Listening System	
ROOM INVENTORY LIST																															
AREA A																															
1a00	MECHANICAL	T111	MDF						1			1	1																			
1a01	STAFF WORK	T111	MDF					1				1	1						1				1									
1a02	FIRE PUMP	T111	MDF																													
1a03	STAFF DINING	T111	MDF					1				1	1										1									
1a03a	MOTHER	T111	MDF																													
1a04	OT/PT	T111	MDF					1				2							1	1	4		1									
1a05	SCIENCE	T111	MDF					1			1	1					1			1	1		1									
1a06	SENSORY	T111	MDF									1							1	1	1		1									
1a07	ART	T111	MDF					1				2					1			1	1		1									
1a08	SPEECH	T111	MDF					1				2							1	1	1		1									
1a09	STORAGE	T111	MDF																													
1a10	MATH	T111	MDF					1				2							1	1	1		1									
1a12	MATH	T111	MDF					1				2							1	1	1		1									
1a17	2ND GRADE SPED	T111	IDF					1				1						1		1	1		1									
1a18	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a19	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a20	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a21	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a22	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a23	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a24	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a25	2ND GRADE	T111	IDF					1				1				1				1	1		1									
1a27	CORRIDOR	T111	IDF					1																								
1a28	CORRIDOR	T111	IDF						1														1	1								
	TOTAL - AREA A							**18**	**2**	**0**	**1**	**24**	**3**	**0**	**0**	**8**	**2**	**1**	**5**	**17**	**19**	**0**	**1**	**19**	**0**	**0**	**0**	**0**	**0**	**0**		
AREA B																															
1b00	ELEC	T111	IDF																													
1b03	1ST GRADE SPED	T111	IDF					1				1						1		1	1		1									
1b04	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b05	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b06	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b07	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b08	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b09	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b10	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b11	1ST GRADE	T112	IDF					1				1				1				1	1		1									
1b12	CORRIDOR	T112	IDF																													
1b14	IDF	T111	IDF	2	12	4	1																									
	TOTAL - AREA B			**2**	**12**	**4**	**1**	**9**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**8**	**0**	**1**	**0**	**9**	**9**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**		
AREA C																															
1c06	MDF	T112	MDF	6	33	12	1					1	1	1	1																	
1c07	GUIDANCE (BEARS)	T112	MDF					1				1							1	1	1		1									
1c08	QUIET	T112	MDF																													

ROOM NO.		DWG. NO.	DATA CLOSETS - MDF 1c06, IDF 1b14	TE1.01 Data Switch Chassis	TE1.02 Expansion Module	TE1.03 Power Supply	TE1.04 10Gbit Transceiver	TE2.01 Wireless Access Point	TE2.02 WAP w. Wall Mount Kit	TE2.03 WAP w. Protective Cover	TE2.04 Outdoor Wireless Access Point	TE3.01 Desk or Wall Phone	TE3.02 Wall Bracket for Phone	TE4.01 Network Cables	TE5.01 Network UPS's	TE6.01 Charging Cabinet for 32 Devices	TE6.02 Additional Charging Cabinet for 32 Devices	TE6.03 Charging Cabinet for 10 Devices	TE6.04 Additional Charging Cabinet for 10 Devices	TE7.01 Laser Printer - Light Duty B & W	TE8.01 Desktop Computer for Labs & Teacher Stations	TE8.02 Desktop Computer for Staff Offices	TE9.01 Digital Signage	TE10.01 70" Interactive Display	TE11.01 Music Room Audio Visual System	TE11.02 Gymnasium Audio Visual System	TE11.03 Cafeteria Audio Visual System	TE11.04 Media Center Audio Visual System	TE12.01 Classroom Audio System w. Teacher Microphone	TE12.02 Assitive Listening System	
1c09	READING	T112	MDF					1				2							1	1	1			1								
1c10	READING	T112	MDF					1				2							1	1	1			1								
1c11	KINDERGARTEN	T112	MDF					1				1				1				1	1			1								
1c12	KINDERGARTEN	T112	MDF					1				1				1				1	1			1								
1c13	KINDERGARTEN	T112	MDF					1				1				1				1	1			1			0		0			
1c14	KINDERGARTEN	T112	MDF					1				1				1				1	1			1								
1c15	KINDERGARTEN	T112	MDF					1				1				1				1	1			1								
1c16	KINDERGARTEN	T112	MDF					1				1				1				1	1			1								
1c17	KINDERGARTEN	T112	MDF					1				1				1				1	1			1								
1c18	KINDERGARTEN	T112	MDF					1				1				1				1	1			1								
1c19	CORRIDOR	T112	MDF																													
	TOTAL - AREA C			**6**	**33**	**12**	**1**	**11**	**0**	**0**	**0**	**14**	**1**	**1**	**1**	**8**	**0**	**0**	**3**	**11**	**11**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**		
AREA D																																
1d00	VESTIBULE	T113	MDF																													
1d01	RAMP	T113	MDF																													
1d02	MUSIC OFFICE	T113	MDF					1	1			2								1		2										
1d04	MUSIC	T113	MDF					2								1					1			1	1							
1d05	GYM STORAGE	T113	MDF																					1								
1d06	GYM OFFICE	T113	MDF						1			1								1		1										
1d07	GYMNASIUM	T113	MDF							3		1	1													1						
1d08	CAFE	T113	MDF							3		1	1										2				1					
1d09	KITCHEN / SERVERY	T113	MDF						1			1	1																			
1d12	STOREROOM	T113	MDF						1																							
1d13	DRY STORAGE	T113	MDF																													
1d14	OFFICE	T113	MDF									1								1		1										
1d18	CUSTODIAL WORKRM	T113	MDF					1				1										1										
1d19	RECEIVING	T113	MDF																													
1d21	ELECTRICAL	T113	MDF																													
1d22	EMER ELEC	T113	MDF																													
1d23	WORK RM	T113	MDF					1																								
1d26	COMPUTER ROOM	T113	MDF					1				1								1	25			1					1			
1d27	MEDIA CENTER	T113	MDF						5		1	1				1				1	3			1			1	2				
1d28	CORRIDOR	T113	MDF						1														1	1								
1d29	HALL	T113	MDF																													
	TOTAL - AREA D			**0**	**0**	**0**	**0**	**6**	**10**	**6**	**1**	**10**	**3**	**0**	**0**	**2**	**0**	**0**	**0**	**5**	**29**	**5**	**3**	**4**	**1**	**1**	**1**	**1**	**3**	**0**		
AREA E																																
1e00	WAITING	T114	MDF					1															1									
1e01	OFFICE	T114	MDF																			2									1	
1e02	MAIL / WORK	T114	MDF									1	1																			
1e03	ASST. PRINCIPAL	T114	MDF					1				1										1		1								
1e04	CONFERENCE	T114	MDF					1				1												1								
1e07	PASSAGE	T114	MDF					1																								
1e08	PSYCH	T114	MDF									1								1		1										
1e09	RECORDS	T114	MDF																													
1e10	PRINCIPAL	T114	MDF					1				1										1		1								

ROOM NO.		DWG. NO.	DATA CLOSETS - MDF 1c06, IDF 1b14	TE1.01 Data Switch Chassis	TE1.02 Expansion Module	TE1.03 Power Supply	TE1.04 10Gbit Transceiver	TE2.01 Wireless Access Point	TE2.02 WAP w. Wall Mount Kit	TE2.03 WAP w. Protective Cover	TE2.04 Outdoor Wireless Access Point	TE3.01 Desk or Wall Phone	TE3.02 Wall Bracket for Phone	TE4.01 Network Cables	TE5.01 Network UPS's	TE6.01 Charging Cabinet for 32 Devices	TE6.02 Additional Charging Cabinet for 32 Devices	TE6.03 Charging Cabinet for 10 Devices	TE6.04 Additional Charging Cabinet for 10 Devices	TE7.01 Laser Printer - Light Duty B & W	TE8.01 Desktop Computer for Labs & Teacher Stations	TE8.02 Desktop Computer for Staff Offices	TE9.01 Digital Signage	TE10.01 70" Interactive Display	TE11.01 Music Room Audio Visual System	TE11.02 Gymnasium Audio Visual System	TE11.03 Cafeteria Audio Visual System	TE11.04 Media Center Audio Visual System	TE12.01 Classroom Audio System w. Teacher Microphone	TE12.02 Assitive Listening System	
1e11	EC	T114	MDF																												
1e12	OFFICE	T114	MDF									1										1									
1e15	ABA	T114	MDF					1				1					1		1	1				1							
1e16	NURSE	T114	MDF					1				2									2										
1e17	KINDERGARTEN SPED	T114	MDF					1				1						1	1	1				1							
1e18	INTERVENTION	T114	MDF					1				2						1	1	1				1							
1e19	FRC K-5	T114	MDF					1				1	1				1		1	1				1							
1e20	SPEECH	T114	MDF					1				1	1					1	1	1				1							
1e23	FRC PRE-K	T114	MDF					1				1					1		1	1				1							
1e24	PRE-K	T114	MDF					1				1				1			1	1				1							
1e26	PRE-K	T114	MDF					1				1				1			1	1				1							
1e27	FRC ADMIN	T114	MDF					1				2									2										
1e29	CORRIDOR	T114	MDF																												
1e30	VESTIBULE	T114	MDF																												
	TOTAL - AREA E							**15**	**0**	**0**	**0**	**19**	**3**	**0**	**0**	**2**	**0**	**3**	**3**	**9**	**8**	**10**	**1**	**11**	**0**	**0**	**0**	**0**	**0**	**1**	
	PROJECT TOTAL			**8**	**45**	**16**	**2**	**59**	**12**	**6**	**2**	**76**	**10**	**1**	**1**	**28**	**2**	**5**	**11**	**51**	**76**	**15**	**5**	**54**	**1**	**1**	**1**	**1**	**3**	**1**	
	EXISTING			**5**	**6**	**10**	**0**	**42**			**2**	**60**												**39**							
	ORDER NEW			**3**	**39**	**6**	**2**	**17**	**12**	**6**	**0**	**16**	**10**	**1**	**1**	**28**	**2**	**5**	**11**	**51**	**76**	**15**	**5**	**15**	**1**	**1**	**1**	**1**	**3**	**1**	

AIA® Document A751™ – 2019

Invitation and Instructions to Vendors for Quotations for Furniture, Furnishings, and Equipment (FF&E)

INVITATION FOR QUOTATION

The Owner requests a Quotation for the following Project:
(Include a detailed description and location of the Project.)

The Owner:
(Name, legal status, and address)

The Architect:
(Name, legal status, and address)

Issuing Party and Contact Information
For questions or more information regarding this Invitation and Instructions to Vendors for Quotations, please contact:
(Indicate name of Issuing Party, name of contact for inquiries, and contact information.)

Quotations are due on or before:
(Indicate the time, day, month, and year)

Quotations shall be submitted as indicated below:
(Indicate how, such as by website, host site/platform, address for paper copy, or other method Prospective Vendors shall submit their Quotation.)

Please refer to the attached Instructions to Vendors for Quotations for information about (1) how to receive Quotation Documents, (2) procedures for submitting a Quotation, (3) consideration of Quotations, and (4) Proposed Contract Documents for the Project.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

INSTRUCTIONS TO VENDORS FOR QUOTATION

TABLE OF ARTICLES

ARTICLE 1 DEFINITIONS

§ 1.1 Quotation Documents include the Quotation Requirements and the Proposed Contract Documents. The Quotation Requirements consist of this Invitation and Instructions to Vendors for Quotations, any quotation forms and supplementary instructions identified therein, and Addenda. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Vendor and that Agreement's Exhibits, Drawings, Specifications, all Addenda, and all other documents enumerated in Article 7 of these Instructions.

§ 1.2 Definitions set forth in A151-2019, Standard Form of Agreement between Owner and Vendor for Furniture, Furnishings, and Equipment (FF&E), or in other Proposed Contract Documents, apply to the Quotation Documents.

§ 1.3 The term "furniture, furnishings, and equipment" is expressed as FF&E throughout this Invitation and Instructions to Vendors for Quotation.

§ 1.4 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Quotation Documents.

§ 1.5 A Quotation is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Quotation Documents. The Work means the all of the Vendor's performance obligations as set forth in the Proposed Contract Documents.

§ 1.6 The Base Quotation is the sum stated in the Quotation for which the Prospective Vendor offers to perform the Work described in the Quotation Documents, to which Work may be added or deleted by sums stated in Alternate Quotations.

§ 1.7 An Alternate Quotation (or Alternate) is an amount stated in the Quotation to be added to or deducted from, or that does not change, the Base Quotation if the corresponding change in the Work, as described in the Quotation Documents, is accepted.

§ 1.8 A Unit Price is an amount stated in the Quotation as a price per unit for FF&E, or a portion of the Work, as described in the Quotation Documents.

§ 1.9 The Prospective Vendor is the party who is invited to submit a quotation pursuant to this Invitation and Instructions to Vendors for Quotations.

ARTICLE 2 PROSPECTIVE VENDOR'S REPRESENTATIONS

§ 2.1 By submitting a Quotation, the Prospective Vendor represents that:

.1 the Prospective Vendor has read and understands the Quotation Documents;

.2 the Prospective Vendor understands how the Quotation Documents relate to other portions of the Project, if any, being quoted concurrently, or presently under contract;

.3 the Quotation complies with the Quotation Documents;
.4 the Prospective Vendor has visited the Project premises, if required in the Quotation Requirements, and correlated the Prospective Vendor's observations with requirements of the Quotation Documents;
.5 the Quotation is based upon the FF&E required by the Quotation Documents without exception; and
.6 the Prospective Vendor has read and understands the provisions for liquidated damages, if any, set forth in the Proposed Contract Documents.

ARTICLE 3 QUOTATION DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Prospective Vendors shall obtain complete Quotation Documents, as indicated below, from the Issuing Party designated in this Invitation and Instructions to Vendors for Quotation.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Prospective Vendors shall obtain Quotation Documents.)

§ 3.1.2 Quotation Documents will not be issued directly to sub-vendors or suppliers unless specifically offered in this Invitation and Instructions to Vendors for Quotations, or in supplementary instructions to Prospective Vendors.

§ 3.1.3 Prospective Vendors shall use complete Quotation Documents in preparing Quotations. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Quotation Documents.

§ 3.1.4 The Quotation Documents will be available for the sole purpose of obtaining Quotations on the Work. No license or grant of use is conferred by distribution of the Quotation Documents.

§ 3.2 Modification or Interpretation of Quotation Documents

§ 3.2.1 The Prospective Vendor shall carefully study the Quotation Documents, shall examine the Project premises if required by the Quotation Requirements, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered, and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Quotation Documents shall be submitted by the Prospective Vendor in writing and shall be received by the Architect at least seven days prior to the date for receipt of Quotations.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Prospective Vendors shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Quotation Documents shall be made by Addendum. Modifications and interpretations of the Quotation Documents made in any other manner shall not be binding, and Prospective Vendors shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 Substitutions to FF&E identified in the Quotation Documents shall be as follows:
(Check the appropriate box.)

[ ] The Prospective Vendor may propose substitutions subject to the process, limitations, and requirements in Section 3.3.2

[ ] The Prospective Vendor may not propose substitutions

If the Owner does not make a selection regarding substitutions, the Prospective Vendor may propose substitutions, subject to the process, limitations, and requirements in Section 3.3.2.

§ 3.3.2 Substitution Process

§ 3.3.2.1 The FF&E described in the Quotation Documents establish a standard of required function, dimension, appearance, performance, and quality to be met by any proposed substitution.

§ 3.3.2.2 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Quotations. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in section 3.2.2.

§ 3.3.2.3 Prospective Vendors shall submit substitution requests on a substitution request form if one is provided in the Quotation Documents.

§ 3.3.2.4 If a substitution request form is not provided, requests shall include (1) the name of the FF&E specified in the Quotation Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the FF&E proposed as the substitute and relevant product information; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth (1) changes in other materials or equipment, or any other portions of the Work; (2) changes in the work to be performed by others on the Project; and (3) the impact, if any, on a Sustainability Certification, that will result from incorporation of the proposed substitution.

§ 3.3.2.5 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.2.6 If the Architect approves a proposed substitution prior to receipt of Quotations, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Prospective Vendors shall not rely upon them.

§ 3.3.2.7 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Prospective Vendors known by the Issuing Party to have received complete Quotation Documents.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 3.4.2 Addenda will be available where Quotation Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Quotations, except an Addendum withdrawing the request for Quotations or one which includes postponement of the date for receipt of Quotations.

§ 3.4.4 Prior to submitting a Quotation, each Prospective Vendor shall ascertain that the Prospective Vendor has received all Addenda issued, and the Prospective Vendor shall acknowledge their receipt in the Quotation.

ARTICLE 4 QUOTATION PROCEDURES

§ 4.1 Preparation of Quotations

§ 4.1.1 Quotations shall be submitted on the forms included with or identified in the Quotation Documents.

§ 4.1.2 All blanks on the Quotation form shall be legibly executed. Paper Quotation forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the Quotation form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper Quotation forms must be initialed by the signer of the Quotation.

§ 4.1.5 All requested Alternates shall be included in the Quotation. If no change in the Base Quotation is required, enter "No Change" or as otherwise required by the Quotation form.

§ 4.1.6 The Prospective Vendor shall make no stipulations on the Quotation form, nor qualify the Quotation in any manner, except, where two or more Quotations for separately designated portions of the Work have been requested, the Prospective Vendor may state the Prospective Vendor's refusal to accept award of less than the combination of Quotations stipulated by the Prospective Vendor.

§ 4.1.7 Each copy of the Quotation shall state the legal name and legal status of the Prospective Vendor. As part of the documentation submitted with the Quotation, the Prospective Vendor shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Quotation shall be signed by the person or persons legally authorized to bind the Prospective Vendor to a contract. A Quotation by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Quotation submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Prospective Vendor.

§ 4.1.8 A Prospective Vendor shall incur all costs associated with the preparation of its Quotation.

§ 4.2 Submission of Quotations

§ 4.2.1 A Prospective Vendor shall submit its Quotation as indicated in the Invitation for Quotation.

§ 4.2.2 Paper copies of the Quotation and any other documents required to be submitted with the Quotation shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Quotations and shall be identified with the Project name, the Prospective Vendor's name and address, and, if applicable, the designated portion of the Work for which the Quotation is submitted. If the Quotation is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED QUOTATION ENCLOSED" on the face thereof.

§ 4.2.3 Quotations shall be submitted by the date and time and at the place indicated in the Invitation for Quotation. Quotations submitted after the date and time for receipt of Quotations, or at an incorrect place, will not be accepted.

§ 4.2.4 The Prospective Vendor shall assume full responsibility for timely delivery or submission of Quotations.

§ 4.2.5 A Quotation submitted by any method other than as provided in this section 4.2 will not be accepted.

§ 4.3 Modification or Withdrawal of Quotation

§ 4.3.1 Prior to the date and time designated for receipt of Quotations, a Prospective Vendor may withdraw and replace a Quotation, or withdraw its Quotation entirely, by notice to the party designated to receive the Quotations. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Quotations. The receiving party shall verify that replaced or withdrawn Quotations are removed from the other submitted Quotations and not considered. Notice of submission of a replacement Quotation or withdrawal of a Quotation shall be worded so as not to reveal the amount of the original Quotation.

§ 4.3.2 Withdrawn Quotations may be resubmitted up to the date and time designated for the receipt of Quotations in the same format as that established in Section 4.2, provided they fully conform with this Invitation and Instructions to Vendors for Quotations.

§ 4.3.3 After the date and time designated for receipt of Quotations, a Prospective Vendor who discovers that it made a clerical error in its Quotation shall notify the Architect of such error within two business days of the date and time designated for receipt of Quotations, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Quotation. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Quotation shall be withdrawn and not resubmitted.

ARTICLE 5 CONSIDERATION OF QUOTATIONS

§ 5.1 Opening of Quotations

If stipulated in this Invitation and Instructions to Vendors for Quotations, or when otherwise required by law, Quotations properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Quotations may be made available to Prospective Vendors.

§ 5.2 Rejection of Quotations

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Quotations.

§ 5.3 Acceptance of Quotation (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Prospective Vendor, provided the Quotation has been submitted in accordance with the requirements of the Quotation Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Quotation received and to accept the Quotation which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Quotation Documents, and to determine the lowest responsive and responsible Prospective Vendor on the basis of the sum of the Base Quotation and Alternates accepted.

ARTICLE 6 POST-QUOTATION INFORMATION

§ 6.1 Submittals

§ 6.1.1 After notification of selection for the award of the Contract, the Prospective Vendor shall, as soon as practicable or as stipulated in the Quotation Documents, submit in writing to the Owner through the Architect:

.1 a designation of the Work to be performed with the Prospective Vendor's own forces;

.2 names of persons or entities proposed for the principal portions of the Work.

§ 6.1.2 The Prospective Vendor will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Quotation Documents.

§ 6.1.3 Prior to the execution of the Contract, the Architect will notify the Prospective Vendor if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Prospective Vendor. If the Owner or Architect has reasonable objection to a proposed person or entity, the Prospective Vendor may, at the Prospective Vendor's option, withdraw the Quotation or submit an acceptable substitute person or entity. The Prospective Vendor may also submit any required adjustment in the Base Quotation or Alternate Quotation to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted Quotation price or disqualify the Prospective Vendor.

§ 6.1.4 Persons and entities proposed by the Prospective Vendor and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 7.1 Copies of the Proposed Contract Documents have been made available to the Prospective Vendor and consist of the following documents:

.1 AIA Document A151™–2019, StandardForm of Agreement Between Owner and Vendor for Furniture, Furnishings, and Equipment (FF&E), unless otherwise stated below.
(If an agreement other than A151-2019 is to be used, insert the complete AIA Document number, including year, and Document title.)

.2 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

.3 Drawings

Number	Title	Date

.4 Specifications

Section	Title	Date	Pages

.5 Addenda:

Number	Date	Pages

.6 Other documents listed below:
(List here any additional documents, such as a Sustainability Plan, that are intended to form part of the Proposed Contract Documents.)

Additions and Deletions Report for

AIA® Document A751™ – 2019

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 11:41:03 ET on 03/03/2020.

There are no differences.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 11:41:03 ET on 03/03/2020 under Order No. 3701447273 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A751™ – 2019, Invitation and Instructions to Vendors for Quotations for Furniture, Furnishings, and Equipment (FF&E) , as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

AIA® Document A151™ – 2019

Standard Form of Agreement between Owner and Vendor for Furniture, Furnishings, and Equipment (FF&E)

AGREEMENT made as of the day of in the year
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

and the Vendor:
(Name, legal status, address, and other information)

for the following Project:
(Name, location, and detailed description)

The Architect:
(Name, legal status, address, and other information)

The Owner and Vendor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TABLE OF ARTICLES

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Governing Law, including the Uniform Commercial Code

This Agreement is for the sale of goods, specifically furniture, furnishings, and equipment (FF&E), and shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rule and including the jurisdiction's Uniform Commercial Code (UCC) as adopted. If this Agreement conflicts with terms provided by the UCC, the Agreement shall prevail. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 14.7.

§ 1.2 The Contract Documents

The Contract Documents are enumerated in Article 15 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Vendor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. Performance by the Vendor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.3 The Contract

The Contract Documents form the Contract for the Work. The Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior proposals, offers, terms and conditions, negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Vendor. The primary purpose of the Contract is the sale of goods, and any services provided are incidental to such primary purpose.

§ 1.4 Modifications
A Modification is a written amendment to the Contract for changes in the Work signed by both parties or a written order for a minor change in the Work signed by the Architect. A minor change in the Work is a change that is consistent with the intent of the Contract Documents and does not involve an adjustment in the Contract Sum or an extension of the Contract Time.

§ 1.5 The Work
The Work means the Vendor's performance, including the sale of FF&E and any incidental fabrication, shipping, warehousing, delivery, installation, and other items or services required by the Contract Documents and provided, or to be provided, by the Vendor. The Work includes all labor, materials, temporary protection, storage, and equipment necessary to fulfill the Vendor's obligations, except as specifically indicated in the Contract Documents to be the responsibility of others. The Work may constitute the whole or a part of the Project.

§ 1.6 Instruments of Service
Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.7 Ownership and Use of Drawings, Specifications, and Other Instruments of Service
§ 1.7.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Vendor, sub-vendors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.7.2 The Vendor, sub-vendors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to the protocols established pursuant to Sections 1.8 and 1.9, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Vendor, sub-vendors, and suppliers may not use the Instruments of Service on other projects, or in connection with additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.8 Digital Data Use and Transmission
The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.9 Building Information Models Use and Reliance
Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its vendors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 1.10 Severability
The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.11 Notice

§ 1.11.1 Except as otherwise provided in Section 1.11.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering Notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 1.11.2 Notice of Claims shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.12 Assignment of Contract

Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Vendor, assign the Contract to a lender providing financing for the Project if the lender assumes the Owner's rights and obligations under the Contract Documents. The Vendor shall execute all consents reasonably required to facilitate such assignment.

ARTICLE 2 CONTRACT SUM AND PAYMENTS

§ 2.1 Contract Sum

§ 2.1.1 The Owner shall pay the Vendor the Contract Sum in current funds for the Vendor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 2.1.2 Alternates

§ 2.1.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 2.1.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 2.1.3 Unit prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 2.1.4 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item	Price

§ 2.1.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

§ 2.1.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

§ 2.2 Payments
§ 2.2.1 The Owner shall make payments to the Vendor in conformance with the following payment terms:
(Insert payment terms, such as payment due dates, deposit requirements, and prompt payment discounts, if any.)

§ 2.2.2 When payment is due pursuant to the payment terms of Section 2.2.1, the Vendor shall submit to the Owner an itemized invoice, supported by data substantiating the Vendor's right to payment.

§ 2.2.3 Except with the Owner's knowledge and consent, the Vendor shall not engage in any activity, or offer any employment, interest, or contribution to the Owner's employees or consultants, that would reasonably appear to compromise the Owner's employees' or consultants' judgment with respect to this Project.

ARTICLE 3 TIME
§ 3.1 Contract Time
§ 3.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for completion of the Work. The Contract Time shall be measured from the date of commencement. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 3.1.2 Time limits stated in the Contract Documents are of the essence of the Contract. By executing this Agreement, the Vendor confirms that the Contract Time is a reasonable period for performing the Work.

§ 3.1.3 If the Vendor is delayed at any time in the commencement or progress of the Work by (1) changes ordered in the Work; (2) labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Vendor's control; or (3) other causes that the Vendor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine, subject to the provisions of Article 14.

§ 3.1.4 If the Vendor fails to achieve completion of the Work as provided in this Article 3, liquidated damages, if any, shall be assessed as set forth in Section 2.1.5.

§ 3.2 Date of Commencement
The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.3 Completion
§ 3.3.1 Completion of the Work occurs upon acceptance of all FF&E in the Contract Documents in accordance with Article 8.

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Vendor shall achieve completion of the entire Work:
(Check the appropriate box and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.3 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to completion of the entire Work, the Vendor shall achieve completion of such portions by the following dates:

Portion of Work	Completion Date

ARTICLE 4 OWNER

§ 4.1 The Owner's Representative

The Owner shall identify a representative authorized to act on behalf of the Owner with respect to the Project. The Owner's representative shall not be changed without ten days' prior notice to the Vendor. The Owner identifies the following representative:
(Name, address, email address, and other information)

§ 4.2 Information and Services Required of the Owner

§ 4.2.1 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.2.2 Unless otherwise provided in the Contract Documents, the Owner shall provide

.1 areas of the Project premises that the Vendor may use to perform the Work;
.2 access to the Project premises for the Vendor at reasonable times;
.3 information regarding any restrictions on the use of, or access to, the Project premises;
.4 suitable space for receipt, inspection, acceptance, and staging of materials and FF&E;
.5 utilities and facilities on the Project premises and vertical transportation necessary for progress and execution of the Work; and
.6 a secured premises for storage of FF&E until acceptance.

§ 4.2.3 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall furnish any other information or services under the Owner's control and relevant to the Vendor's performance of the Work with reasonable promptness after receiving the Vendor's written request for such information or services.

ARTICLE 5 VENDOR

§ 5.1 The Vendor's Representative

The Vendor shall identify a representative authorized to act on behalf of the Vendor with respect to the Project. The Vendor's representative shall not be changed without ten days' prior notice to the Owner and Architect. The Vendor identifies the following representative:
(Name, address, email address, and other information)

§ 5.2 The Vendor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents by activities or duties of the Architect in the Architect's administration of the Contract.

§ 5.3 The Vendor shall coordinate its Work with the work provided by the Owner and the Owner's other vendors, consultants, and contractors. The Vendor may communicate with the Owner's other vendors, consultants, and contractors, for the purposes of completing the Work. The Vendor shall keep the Owner reasonably informed of any such communications. The Vendor shall be entitled to rely on the accuracy and completeness of work and information furnished by the Owner and the Owner's other vendors, consultants, and contractors. The Vendor shall provide prompt written notice to the Owner if the Vendor becomes aware of any error, omission, or inconsistency in such work or information.

§ 5.4 Review of Contract Documents and Inspection of Project Premises by Vendor

§ 5.4.1 Execution of the Contract by the Vendor is a representation that the Vendor has visited the Project premises, if required in the Contract Documents, and correlated personal observations with requirements of the Contract Documents.

§ 5.4.2 Before starting each portion of the Work, including placing orders for FF&E, the Vendor shall (1) carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 4.2; (2) visit and inspect the Project premises in order to gain an understanding of the conditions under which the Work is to be performed; (3) determine availability of facilities for access, delivery, transportation, and staging; (4) determine any restrictions imposed by the Owner and the Owner's separate vendors and contractors; and (5) correlate observations with the requirements of the Contract Documents. The Vendor shall promptly report to the Owner and Architect conditions observed that would impede the Vendor's performance of the Work. The Vendor's obligations to review the Contract Documents are for the purpose of facilitating delivery and installation by the Vendor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Vendor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Vendor as a request for information in such form as the Architect may require. It is recognized that the Vendor's review is made in the Vendor's capacity as a vendor and not as a licensed design professional, unless otherwise specifically provided for in the Contract Documents.

§ 5.4.3 The Vendor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Vendor shall promptly report to the Architect any nonconformity discovered by or made known to the Vendor as a request for information in such form as the Architect may require.

§ 5.4.4 If the Vendor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Vendor's notices or requests for information pursuant to Sections 5.4.2 or 5.4.3, the Vendor shall submit Claims as provided in Article 14. If the Vendor fails to perform the obligations of Sections 5.4.2 or 5.4.3, the Vendor shall pay such costs and damages to the Owner, subject to Section 14.12, as would have been avoided if the Vendor had performed such obligations. If the Vendor performs those obligations, the Vendor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies, or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 5.5 Supervision

§ 5.5.1 The Vendor shall supervise and direct the Work using the Vendor's best skill and attention. The Vendor shall be solely responsible for and have control over the means, methods, techniques, sequences, and procedures of fabrication, shipment, delivery, and installation, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

§ 5.5.2 The Vendor shall be responsible to the Owner for acts and omissions of the Vendor's employees, sub-vendors, and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Vendor or any of its sub-vendors.

§ 5.5.3 The Vendor shall be responsible for inspection of portions of the Work already performed to determine that such portions are in proper condition for subsequent Work.

§ 5.6 Labor and Materials

§ 5.6.1 Unless otherwise provided in the Contract Documents, the Vendor shall provide and pay for labor, materials, tools, installation equipment and machinery, delivery, and other facilities and services necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 5.6.2 The Vendor shall enforce strict discipline and good order among the Vendor's employees and other persons carrying out the Work. The Vendor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

§ 5.6.3 The Vendor shall make no substitution or change in the Contract Documents unless done in accordance with a Modification, and after providing the Architect notice and a reasonable opportunity to evaluate the proposed substitution or change and consult with the Owner.

§ 5.7 Taxes

The Vendor shall pay sales, consumer, use, and other similar taxes that are legally enacted when quotes are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 5.8 Permits, Fees, Notices, and Compliance with Laws

§ 5.8.1 Unless otherwise provided in the Contract Documents, the Vendor shall secure and pay for permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 5.8.2 The Vendor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. If the Vendor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Vendor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 5.9 Allowances

The Vendor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select items under allowances with reasonable promptness. Allowance amounts shall include the costs to the Vendor of items delivered at the Project premises and all required taxes, less applicable trade discounts. Vendor's costs for unloading and handling at the Project premises, labor, installation, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowance. Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Modification. The amount of the Modification shall reflect the difference between actual costs and the allowances under Section 2.1.4.

§ 5.10 Vendor's Schedules

§ 5.10.1 The Vendor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a progress schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the progress of the Work and Project, shall be related to the entire Project, and shall provide for expeditious and practicable execution of the Work.

§ 5.10.2 The Vendor shall perform the Work in general accordance with the most recent schedule submitted to the Owner and Architect.

§ 5.10.3 The Vendor's progress schedule shall indicate dates for commencement and completion of phases of the Work within the Contract Time, including dates for order placement, fabrication, shipping, delivery, and installation. The schedule shall indicate other critical dates, such as deadlines for approval of submittals of colors, finishes, and materials.

The Vendor shall obtain and submit for the Owner's and the Architect's information written confirmation from sub-vendors of dates of fabrication and delivery.

§ 5.10.4 The Vendor shall cooperate with the Owner and Architect in coordinating the Vendor's progress schedule with those of contractors and separate vendors and with the requirements of the Owner and Architect. The Vendor shall cooperate in determining mutually acceptable dates and times for delivery, installation, and inspection of the Work, and use of services and facilities provided to the Vendor, all to be confirmed in writing within a reasonable time in advance of such dates and times.

§ 5.11 Submittals

§ 5.11.1 The Vendor shall review for compliance with the Contract Documents and submit to the Architect shop drawings, product data, samples, and similar submittals required by the Contract Documents in coordination with the Vendor's progress schedule and in such sequence as to allow the Architect reasonable time for review. By submitting shop drawings, product data, samples, and similar submittals, the Vendor represents to the Owner and Architect that the Vendor has (1) reviewed and approved them; (2) determined and verified materials, field measurements, and field installation criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Work shall be in accordance with approved submittals. Shop drawings, product data, samples and similar submittals are not Contract Documents.

§ 5.11.2 The Vendor shall provide the Owner with available manufacturer's warranty documents, product data, and material safety data sheets.

§ 5.12 Cleaning Up

The Vendor shall keep the Project premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Vendor shall remove waste materials, rubbish, the Vendor's tools, construction equipment, machinery, and surplus material from and about the Project.

§ 5.13 Access to Work

The Vendor shall provide the Owner and Architect with reasonable access to the Work in preparation and progress wherever located.

§ 5.14 Indemnification

§ 5.14.1 To the fullest extent permitted by law, the Vendor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Vendor, a sub-vendor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 5.14.1.

§ 5.14.2 In claims against any person or entity indemnified under Section 5.14.1 by an employee of the Vendor, a sub-vendor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 5.14.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Vendor or sub-vendor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

§ 5.14.3 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Vendor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any sub-vendor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Vendor. If approved by the applicable court, when required, the Vendor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

ARTICLE 6 TITLE AND RISK OF LOSS

§ 6.1 Title to all FF&E shall be transferred to the Owner upon acceptance in accordance with Article 8.

§ 6.2 The risk of loss with respect to all FF&E provided by the Vendor shall remain with the Vendor, and the Owner has no obligation to insure such FF&E, until acceptance in accordance with Article 8.

ARTICLE 7 DELIVERY AND INSTALLATION

§ 7.1 The Vendor shall deliver FF&E in accordance with the Vendor's progress schedule, or at a time agreed upon by the Owner and Architect, and in accordance with Article 5.

§ 7.2 Delivery and installation of all FF&E shall be made at the Project premises unless otherwise specified in the Contract Documents.

§ 7.3 The Vendor shall coordinate with the Owner regarding the logistics of the Vendor's delivery and installation obligations at the Project premises.

ARTICLE 8 ACCEPTANCE

§ 8.1 The Owner and Architect may conduct a preliminary inspection of FF&E within seven days after its delivery to the Project premises for the purpose of verifying the delivery and quantities. Preliminary inspections shall not constitute acceptance of, taking charge over, or taking control of, such FF&E. The Architect shall report to the Vendor any defects, damage, deficiencies, or nonconformity observed during the preliminary inspection.

§ 8.2 When the Vendor considers the Work, or a portion thereof which the Owner agrees to accept separately, to be complete, the Vendor shall notify the Owner and Architect. The Vendor shall allow the Owner and Architect a reasonable amount of time to inspect the FF&E to determine, based on conformance with the Contract Documents, if it is accepted or rejected in whole or in part. Based on the Architect's recommendation to the Owner and the Owner's own inspection, if any, the Owner shall accept or reject the FF&E, in whole or in part.

§ 8.3 If the Owner rejects any of the FF&E, the Owner, or the Architect acting on behalf of the Owner, shall notify the Vendor within seven days of the date of inspection, specifying the basis for such rejection. Upon rejection, the Vendor shall provide a remedy and evidence of arrangements to accomplish such remedy. The Owner shall allow the Vendor a reasonable amount of time to remedy the rejected FF&E. When the Vendor considers the remedied FF&E to be complete, the parties shall follow the procedures set forth in Section 8.2. If the Owner rejects any of the FF&E for a second time, the Owner shall promptly notify the Vendor and the Vendor shall promptly remove the rejected FF&E from the Project premises and refund payments made for such rejected goods to the Owner. If the Vendor disagrees with an Owner's rejection, the Vendor may make a claim.

§ 8.4 FF&E not inspected in accordance with Section 8.2 or rejected in accordance with Section 8.3 shall be deemed accepted.

§ 8.5 The Owner's acceptance under this Article 8 cannot be revoked; however, the provisions of this Article 8 do not preclude recovery of damages as provided by law. The Owner's acceptance, or failure to discover a Vendor's breach after acceptance, shall not bar the Owner from making claims in accordance with Article 14 or from remedies and damages due to the Vendor's breach of this Agreement, including the Vendor's breach of warranties in Article 9.

ARTICLE 9 WARRANTIES

§ 9.1 The Vendor warrants to the Owner that the FF&E furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Vendor further warrants that the FF&E will conform to the requirements of the Contract Documents. FF&E not conforming to these requirements may be considered defective. The Vendor's warranty excludes remedy for damage or defect caused by abuse, alterations to the FF&E not executed by the Vendor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage.

§ 9.2 The Vendor assigns to the Owner all FF&E manufacturers' warranties and guarantees upon acceptance in accordance with Article 8.

§ 9.3 The Vendor hereby provides to the Owner all warranties relating to the FF&E implied by law, including the warranty of merchantability and warranty of fitness for a particular purpose.

§ 9.4 The Vendor acknowledges that no exclusion of, or limitation on, warranties contained in any proposal, product literature, or other submittal shall affect the warranties provided in this Article 9.

ARTICLE 10 ARCHITECT

§ 10.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during the Vendor's performance, and until completion, of the Work. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 10.2 Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Vendor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with sub-vendors and suppliers shall be through the Vendor. Communications by and with separate vendors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 10.3 The Architect will assist the Owner in coordinating schedules for fabrication, delivery, and installation of the Work, but will not be responsible for failure of the Vendor or a sub-vendor to meet schedules for completion or to perform their respective duties and responsibilities in conformance with applicable schedules.

§ 10.4 The Architect will visit the Project premises at intervals appropriate to the stage of the Work, or as otherwise agreed with the Owner, to become generally familiar with, and to keep the Owner informed about, the progress and quality of the portion of the Work completed, and to determine, in general, if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. The Architect will not have control over, charge of, or responsibility for, the means, methods, techniques, sequences, or procedures of fabrication, shipment, delivery, storage, or installation, or for the safety precautions and programs in connection with the Work, as these are solely the Vendor's rights and responsibilities under the Contract Documents.

§ 10.5 The Architect may order minor changes in the Work. The Architect's order for minor changes shall be in writing. If the Vendor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Vendor shall notify the Architect and shall not proceed to implement the change in the Work. If the Vendor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Vendor waives any adjustment to the Contract Sum or extension of the Contract Time.

§ 10.6 The Architect will conduct inspections of FF&E and provide recommendations as set forth in Article 8. Pursuant to Article 8, the Architect is only responsible for identifying defects, deficiencies, or nonconformities that the Architect actually observes, or reasonably should observe, during its inspections. The Architect is not required to make exhaustive or continuous inspections to fulfill its responsibilities in Article 8 and has no responsibility to discover latent defects.

§ 10.7 The Architect will review and approve or take other appropriate action upon the Vendor's submittals such as shop drawings, product data, and samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

ARTICLE 11 RELATED ACTIVITIES OF OWNER OR OF SEPARATE VENDORS

§ 11.1 The Owner shall coordinate the activities of the Owner's own forces and of each separate vendor or contractor, if any, with the Work.

§ 11.2 If the Work depends for proper execution or results upon activities by the Owner or a separate vendor or contractor, the Vendor shall, prior to proceeding with that portion of the Work, promptly report to the Owner and Architect apparent discrepancies or defects in, or arising from, the activities of the Owner or separate vendors or contractors, that would impede the Vendor in achieving proper execution and results. If the Vendor fails to report reasonably discoverable discrepancies or defects, it shall be responsible for deficiencies or defects in its Work due to such deficiencies or defects.

§ 11.3 The Vendor shall reimburse the Owner for costs the Owner incurs that are payable to a separate vendor or contractor ~~because of the Vendor's delays, improperly timed activities, or damage to the work of a separate vendor or contractor. The~~ Owner shall be responsible to the Vendor for costs the Vendor incurs because of the delays, improperly timed activities, or damage to the Work caused by a separate vendor or contractor.

§ 11.4 If a dispute arises among the Vendor, separate vendors, or contractors, and the Owner as to the responsibility under their respective contracts for maintaining the Project premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 12 PROTECTION OF PERSONS AND PROPERTY

§ 12.1 Safety Precautions and Programs

The Vendor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Vendor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work, and materials and FF&E to be incorporated therein, whether in storage on or off the Project premises, under care, custody, or control of the Vendor or sub-vendors; and

.3 other property at the Project premises or adjacent thereto.

The Vendor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury, or loss. The Vendor shall promptly remedy damage and loss to property caused in whole or in part by the Vendor, sub-vendors, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Vendor is responsible under Sections 12.1.2 and 12.1.3. The Vendor may make a claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect, or of anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Vendor. The foregoing obligations of the Vendor are in addition to the Vendor's obligations under Section 5.14.

§ 12.2 Hazardous Materials and Substances

§ 12.2.1 The Vendor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials or substances. If the Vendor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the Project premises by the Vendor, the Vendor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Vendor. By written agreement between the Owner and Vendor, the Contract Time shall be extended appropriately, and the Contract Sum shall be increased in the amount of the Vendor's reasonable additional costs of shutdown, delay, and start-up.

§ 12.2.2 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Vendor, sub-vendors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area, if in fact, the material or substance presents the risk of bodily injury or death as described in Section 12.2.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 12.2.3 If, without negligence on the part of the Vendor, the Vendor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Vendor for all cost and expense thereby incurred.

ARTICLE 13 INSURANCE

§ 13.1 The Vendor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in this Article 13 or elsewhere in the Contract Documents. The Vendor shall purchase and maintain the insurance required by this Agreement from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Vendor shall maintain the required insurance from the date of commencement of the Work to the date of completion of the Work, unless a different duration is stated below.

§ 13.2 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than ($) each occurrence, ($) general aggregate, and ($) aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;

.2 personal and advertising injury;

.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of completed operations; and

.5 the Vendor's indemnity obligations under Section 5.14.

§ 13.3 Automobile Liability covering vehicles owned by the Vendor and non-owned vehicles used by the Vendor, with policy limits of not less than ($) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance, and use of those motor vehicles along with any other statutorily required automobile coverage.

§ 13.4 The Vendor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as those required under Sections 13.2 and 13.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ 13.5 Workers' Compensation at statutory limits.

§ 13.6 Employers' Liability with policy limits not less than ($) each accident, ($) each employee, and ($) policy limit.

§ 13.7 If the Vendor is required to furnish professional services as part of the Work, the Vendor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than ($) per claim and ($) in the aggregate.

§ 13.8 The Vendor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article 13 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final invoice and thereafter upon renewal or replacement of such coverage until the expiration of the period required by Section 13.1. The certificates will show the Owner as an additional insured on the Vendor's Commercial General Liability and excess or umbrella liability policy.

§ 13.9 The Vendor shall disclose to the Owner any deductible or self- insured retentions applicable to any insurance required to be provided by the Vendor.

§ 13.10 To the fullest extent permitted by law, the Vendor shall cause the commercial liability coverage required by this Article 13 to include (1) the Owner, the Architect, and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Vendor's negligent acts or omissions during the Vendor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Vendor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's Consultants, CG 20 32 07 04.

§ 13.11 Within three (3) business days of the date the Vendor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Article 13, the Vendor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Vendor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by

the procurement of replacement coverage by the Vendor. The furnishing of notice by the Vendor shall not relieve the Vendor of any contractual obligation to provide any required coverage.

§ 13.12 Other Insurance Provided by the Vendor
(List below any other insurance coverage to be provided by the Vendor and any applicable limits.)

Coverage	Limits

§ 13.13 Waiver of Subrogation
§ 13.13.1 The Owner and Vendor waive all rights against (1) each other and any of their sub-vendors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) separate vendors or contractors, if any, and any of their sub-vendors, subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by this Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Vendor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, separate vendors and contractors, and sub-vendors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 13.13.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual, or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 13.13.2 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Owner shall pay the Architect and Vendor their just shares of insurance proceeds received by the Owner, and by appropriate agreements, written where legally required for validity, the Architect and Vendor shall make payments to their consultants and sub-vendors in similar manner.

ARTICLE 14 CLAIMS AND DISPUTES
§ 14.1 Binding Dispute Resolution
For any claim subject to, but not resolved by, mediation pursuant to Section 14.6, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 14.7 of this Agreement

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Vendor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction.

§ 14.2 Claims, disputes, and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Architect but excluding those arising under Section 12.2, shall be referred initially to the Architect for decision. Such matters, except those waived as provided for in Section 14.12, shall, after initial decision by the Architect or 30 days after submission of the matter to the Architect, be subject to mediation as a condition precedent to binding dispute resolution.

§ 14.3 Notice of Claims
Claims by either the Owner or Vendor shall be initiated by notice to the other party in accordance with Section 1.11.2.

§ 14.4 Time Limits on Claims

The Owner and Vendor shall commence all claims and causes of action against the other and arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in this Agreement, whether in contract, tort, breach of warranty, or otherwise, within the period specified by applicable law, but in any case not more than 10 years after the date of completion of the Work. The Owner and Vendor waive all claims and causes of action not commenced in accordance with this Section 14.4.

§ 14.5 If a claim, dispute, or other matter in question relates to or is the subject of a mechanic's lien, the party asserting such matter may proceed in accordance with applicable law to comply with the lien procedures, including notice or filing deadlines.

§ 14.6 The parties shall endeavor to resolve their disputes by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with their Construction Industry Mediation Procedures in effect on the date of this Agreement. A request for mediation shall be made in writing, delivered to the other party to this Agreement, and filed with the person or entity administering the mediation. The request may be made concurrently with the binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 14.7 If the parties have selected arbitration as the method for binding dispute resolution in this Agreement, any claim, subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association, in accordance with the Construction Industry Arbitration Rules in effect on the date of this Agreement. Demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 14.8 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation; (2) the arbitrations to be consolidated substantially involve common questions of law or fact; and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 14.9 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, any party to an arbitration may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a Claim not described in the written Consent.

§ 14.10 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to this Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 14.11 Continuing Contract Performance

Pending final resolution of a Claim, except as otherwise agreed in writing, the Vendor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 14.12 Waiver of Claims for Consequential Damages

The Vendor and Owner waive claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Vendor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business, and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages. Nothing contained in this Section 14.12 shall be deemed to preclude an assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

ARTICLE 15 ENUMERATION OF CONTRACT DOCUMENTS

§ 15.1 The Contract Documents are defined in Article 1 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 15.2 The Agreement is this executed AIA Document A151™–2019, Standard Form of Agreement Between Owner and Vendor for Furniture, Furnishings, and Equipment.

§ 15.3 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203–2013 incorporated into this Agreement.)

§ 15.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages

§ 15.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

§ 15.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to quotations or proposal requirements are not part of the Contract Documents unless the quotation or proposal requirements are enumerated in this Article 15.

§ 15.7 Additional documents, if any, forming part of the Contract Documents:

.1 Other Exhibits:
(Check all boxes that apply.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**VENDOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

Additions and Deletions Report for
AIA® Document A151™ – 2019

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 11:46:03 ET on 03/03/2020.

There are no differences.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 11:46:03 ET on 03/03/2020 under Order No. 3701447273 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A151™ – 2019, Standard Form of Agreement between Owner and Vendor for Furniture, Furnishings, and Equipment (FF&E) , as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Blank

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: | | None | | See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Init.
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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

Additions and Deletions Report for

AIA® Document A312™ – 2010

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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PAGE 1

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Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:48:16 on 01/09/2017 under Order No. 5347028594 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ - 2010, Payment Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Blank

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: | | None | | See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

Additions and Deletions Report for

AIA® Document A312™ – 2010

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:49:01 on 01/09/2017.

PAGE 1

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Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:49:01 on 01/09/2017 under Order No. 5347028594 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ - 2010, Performance Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

SECTION 27 0500 COMMON WORK RESULTS FOR DIVISION 27 AND 28

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions and DIVISION 1, General Requirements, are a part of this Section and shall be binding on the Contractor and/or Subcontractor who performs this work. Note also all Addenda.

B. The requirements in DIVISION 26 shall also govern the work under this section.

C. DIVISION 01 for Closeout Submittals including “Warranties and Bonds” for warranty requirements applicable to the work of this section.

D. Work to be done in this Section is shown on the power drawings and technology drawings.

E. Additional Related DIVISIONS and Sections that are included in the Contract Documents for this project.
1. Section 01 03 13 PROJECT COORDINATION
2. DIVISION 06 WOOD PLASTICS AND COMPOSITES
3. Section 08 71 00 DOOR HARDWARE
4. DIVISION 26 ELECTRICAL
5. DIVISION 27 COMMUNICATIONS
6. DIVISION 28 ELECTRONIC SAFETY AND SECURITY
7. Section 28 46 00 FIRE DETECTION AND ALARM SYSTEM

F. Examine all Project Specifications and Drawings for requirements that affect this Section, whether or not such work is specifically mentioned in this Section.

G. DIVISION 27 COMMUNICATIONS Contractor shall not be required to provide the specific un-related requirements of DIVISION 28 ELECTRONIC SAFETY AND SECURITY, unless otherwise noted in the DIVISION 27 COMMUNICATIONS contract documents.

H. DIVISION 28 ELECTRONIC SAFETY AND SECURITY Contractor shall not be required to provide the specific un-related requirements of DIVISION 27 COMMUNICATIONS, unless otherwise noted in the DIVISION 28 ELECTRONIC SAFETY AND SECURITY contract documents.

1.2 SCOPE OF WORK

A. Work includes, but is not limited to the following:

1. The Technology Contractor for the applicable system/solution shall provide all inter-trade coordination, any and all additional hardware, software, cabling, interfaces, etc. for completely operational system. If there are any concerns by the Technology Contractor that the contract documents do not provide a completely operational system, the Technology Contractor shall bring these concerns to the attention of specifying authorizes a minimum of 7-days prior to the Bid Date. If no concerns by the Technology Contractor are provided within this time frame, the Technology Contractor shall provide a completely operational System.
2. Furnish office, field, factory, manufacturers' representatives, and contractors' shop engineering, supervision, labor, materials and methods required to provide the complete System work, in first class condition, as indicated on the Contract Documents.
3. Where the Drawings, Specifications, Codes, Regulations, Laws, and the requirements of the local Authority Having Jurisdiction conflict, provide the higher quality and higher quantity indicated or required, and follow the strictest requirement.
4. Testing, identification, and administration for the systems.
5. All work shall be conducted in coordination with Owner and other building trades.
6. The work covered by this/these DIVISION(s) consists of furnishing all materials, accessories, connectors, supports, electrical protection, equipment, tools, setup, preparation, labor, supervision, incidentals, transportation, storage, and related items and appurtenances, and performing all operations necessary to complete the work as indicated in the project contract documents. It is the intent and purpose of this specification to have, upon completion of the project, a "turn-key" system designed, built, coordinated, complete and operable in all respects. Completely install, connect, and test all systems, equipment, devices, etc., shown or noted or required to final connections and leave ready for satisfactory operation. Provide any minor items omitted from the design, but obviously necessary to accomplish the above intent.
7. Where the Drawings, Specifications, Codes, Regulations, Laws, or the requirements of the local Authority conflict, provide the higher quality and higher quantity indicated or required, and follow the strictest requirement.
8. Special Insurance, provide insurance fully covering all equipment against loss and damage during shipment, storage, installation, testing, adjustment and demonstration.

B. Provide all requirements as indicated in Contract Documents, including but not limited to:
   1. Equipment, Materials, Cabling, Software, Terminations, Programming, Testing, Training, Demonstrations, Warranty.
   2. Factory Assembled Products
   3. Compatibility of Related Equipment
   4. Special Tools and Kits
   5. Anchoring and Supports
   6. Connections to Grounding and Bonding
   7. Cutting and Patching, as detailed in contract documents, provided by Electrical Contractor

8. Concealment
9. Equipment Modification, if applicable
10. Equipment Racks and Cabinets.
11. Wall-Mounted Relay Brackets.
12. Cable Management.
13. Surge and Lightning Protection for UTP, Coax and Multi-Conductor Backbone Cabling run through underground PVC conduits.
14. Protection of new and existing work.
15. Record Drawings and Documentation.
16. Staging.
17. Operation and Maintenance Instructions and Manuals for the Section's work.
18. Nameplates, Labels, and Tags.
19. Testing and Certification of all cabling systems.
20. Fireproofing of Penetrations and Openings, as detailed in contract documents, provided by Electrical Contractor.
21. Access panels and doors.
22. Phasing of work and maintenance of service to existing and temporarily relocated items, owner equipment, or workstations, etc. as required to meet the project schedule.
23. Coordination with manufacturers, other trades, and Owner.
24. Interface and Integration Between Applicable Systems
25. Provide and maintain in safe adequate condition all staging and scaffolding required for the proper execution of the work of this Section.
26. The cabling installer shall remove and re-install all ceiling tiles as required for the work of this Section.
27. Replace all ceiling tiles damaged as a result of the work of this Section at no cost to the owner.
28. Removal of all trash from site and clean up of all areas of work under this Section
29. Building Preparation, as detailed in contract documents, provided by Electrical Contractor.
30. Mounting elements
31. Existing Cabling: Upon completion of construction, all cables that are not active or tagged to remain for future use, shall be removed end-to-end as per the NEC.
32. Local Audio/Video Systems
    a. Cabling for Audio/Video System shall be provided by others under separate contract.
    b. Audio/Video Presentation equipment shall be provided by others under separate contract.

1.3 RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification, apply to this Section.

B. Refer to the following contract documents and provide all inter-trade coordination and any additional hardware, software, building preparation, cabling, interfaces, etc. for completely operational systems.

C. Review all other contract documents sections, as required, to achieve complete inter-trade coordination.

D. The work shall be so performed that the progress of the entire building construction, including all other trades, shall not be delayed and not interfered with. Materials and apparatus shall be installed as fast as conditions of the building will permit.

E. The following Sections are the Responsibilities, Cooperation and Coordination requirements between other trades related to DIVISION 27 COMMUNICATIONS and DIVISION 28 ELECTRONIC SAFETY AND SECURITY:

F. DIVISION 27 COMMUINICATIONS - CONTRACTOR
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements for your trade.
   2. Contractor shall be responsible for: providing, installing, terminating, troubleshooting, and warranty service of all cabling, terminal equipment, and headend equipment specified in this Section for a completely operational system.
   3. DIVISION 28 VIDEO SURVEILLANCE SYSTEMS and/or DOOR ACCESS CONTROL SYSTEM – Data Network Cabling for cameras and servers shall be as indicated on the drawings and shall be provided by the DIVISION 27 COMMUNICATIONS - CONTRACTOR.
   4. MDF Room, provide for DIVISION 28:
      a. Floor space for LIFE SAFETY AND SECURITY lockable Equipment Cabinet, this cabinet shall be located next to the applicable 271000 rack that houses the 280000 data switches.
      b. Share rack space in 271000 STRUCTURED CABLING Racks for associated 282000 VIDEO SURVEILLANCE SYSTEM Data Switches (provided by 28000 LIFE SAFETY AND SECURITY Contractor) that interface to applicable 282000 VIDEO SURVEILLANCE SYSTEM cameras and servers.
         1) 271000 contractors shall provide all applicable path panels and patch cords for the data switches provided by 28000 LIFE SAFETY AND SECURITY Contractor.
         2) 280000 Contractor shall interface applicable LIFE SAFETY AND SECURITY servers to the 271000 data rack patch panel/data switch.
   5. IDF’s, provide for DIVISION 28.
      a. Share rack space in 271000 STRUCTURED CABLING Racks for associated 282000 VIDEO SURVEILLANCE SYSTEM Data Switches (provided by 28000 LIFE SAFETY AND SECURITY Contractor) that interface to applicable 282000 VIDEO SURVEILLANCE SYSTEM cameras and servers.

1) 271000 contractors shall provide all applicable path panels and patch cords for the data switches provided by 28000 LIFE SAFETY AND SECURITY Contractor.
2) 280000 Contractor shall interface applicable LIFE SAFETY AND SECURITY servers to the 271000 data rack patch panel/data switch.

6. All technology devices that require specialty/custom boxes (i.e. speakers, clocks, microphone, amplifier, wall boxes, floor boxes, etc..), and all exterior antennas for the System shall be furnished by this Low Voltage Contractor and installed by the Electrical Contractor.
   a. All Custom Backboxes provided by the Electrical Contractor shall be submitted 1st to the Electrical Engineer for review and approval and then forwarded to GTC for review and approval.
7. Local Audio/Video Presentation cabling, except where indicated, shall be provided by others.
8. Local Audio/Video Presentation equipment shall be provided by others.
9. Voice/Telephone System Head-end and Field Devices shall be provided by others.
10. Interface with public utilities telephone service shall be arranged by the Owner's service provider and coordinated with the Low Voltage Contractor.
11. Attend project coordination meetings as required to coordinate work of this Section, work of other trades, this project and phasing requirements.

G. DIVISION 28 ELECTRONIC SAFETY AND SECURITY - CONTRACTOR
1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements for your trade.
2. Contractor shall be responsible for: providing, installing, terminating, troubleshooting, and warranty service of all cabling, terminal equipment, and headend equipment specified in this Section for a completely operational system.
3. DIVISION 28 VIDEO SURVEILLANCE SYSTEMS and/or DOOR ACCESS CONTROL SYSTEM – Data Network Cabling for cameras and servers shall be as indicated on the drawings and shall be provided by the DIVISION 27 COMMUNICATIONS contractor.
4. MDF Room, provide for DIVISION 28:
   a. Floor space for LIFE SAFETY AND SECURITY lockable Equipment Cabinet, this cabinet shall be located next to the applicable 271000 rack that houses the DIVISION 28 data switches.
   b. Share rack space in 271000 STRUCTURED CABLING Racks for associated 282000 VIDEO SURVEILLANCE SYSTEM Data Switches (provided by 28000 LIFE SAFETY AND SECURITY Contractor) that interface to applicable 282000 VIDEO SURVEILLANCE SYSTEM cameras and servers.
      1) 271000 contractors shall provide all applicable path panels and patch cords for the data switches provided by 28000 LIFE SAFETY AND SECURITY Contractor.
      2) 280000 Contractor shall interface applicable LIFE SAFETY AND SECURITY servers to the 271000 data rack patch panel/data switch.
5. IDF's, provide for DIVISION 28

a. Share rack space in 271000 STRUCTURED CABLING Racks for associated 282000 VIDEO SURVEILLANCE SYSTEM Data Switches (provided by 28000 LIFE SAFETY AND SECURITY Contractor) that interface to applicable 282000 VIDEO SURVEILLANCE SYSTEM cameras and servers.
   1) 271000 contractors shall provide all applicable path panels and patch cords for the data switches provided by 28000 LIFE SAFETY AND SECURITY Contractor.
   2) 280000 Contractor shall interface applicable LIFE SAFETY AND SECURITY servers to the 271000 data rack patch panel/data switch.

6. All technology devices that require specialty/custom boxes (i.e. speakers, clocks, microphone, amplifier, wall boxes, floor boxes, etc..), and all exterior antennas for the System shall be furnished by this Low Voltage Contractor and installed by the Electrical Contractor.
   a. All Custom Backboxes provided by the Electrical Contractor shall be submitted 1st to the Electrical Engineer for review and approval and then forwarded to GTC for review and approval.
7. Attend project coordination meetings as required to coordinate work of this Section, work of other trades, this project, and phasing requirements.

H. Section 01 03 13 PROJECT COORDINATION - General Contractor Responsibilities, Cooperation and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS and 28 00 00 ELECTRONIC SAFETY AND SECURITY.
1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
   a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
   b. DIVISION 27 COMMUNICATIONS
   c. DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
2. Refer to the following contract documents and provide all inter-trade coordination and any additional hardware, software, building preparation, cabling, interfaces, etc. for completely operational systems.
3. Review all other specification Sections, as required, to achieve complete inter-trade coordination.
4. Coordinate all work between Low Voltage Contractor and all other trades as required for completely operational systems.
5. Structural blocking to support wall and ceiling-mounted equipment including displays/televisions/monitors shall be provided by the General Contractor.
6. Interface with public utilities telephone service (DEMARC) shall be arranged by the Owner's service provider and coordinated with the Low Voltage Contractor for interface to:
   a. Public Address System
   b. Intrusion Alarm System
   c. Other systems as required.
   d. Cabling between DEMARC and applicable system shall be provided by applicable system Contractor.

7. The installation, operating cost, and maintenance of the controlled environmental conditions for equipment located on site, as required by the manufacturer, NFPA 70B, or as specified in these specifications, shall be the responsibility of the General Contractor.

I. DIVISION 06 WOOD PLASTICS AND COMPOSITES – Wood Plastic and Composite Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS and 28 ELECTRONIC SAFETY AND SECURITY.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
      a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
         1) DIVISION 27 COMMUNICATIONS
         2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
   2. DIVISION 06 shall provide rough finish carpentry, and coordinate size, type (with backboard stand-offs, etc.) and location of plywood backboards, painted black or grey with fire retardant paint at all headend locations, IDF's and MDF as directed by the Low Voltage Contractor, to accommodate mounting of all Low Voltage system head ends, trough, etc.
         1) Typical backboard sizes are 4' X 4' and 4' X 8'

J. Section 08 71 00 DOOR HARDWARE – Door Hardware Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
      a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
         1) DIVISION 27 COMMUNICATIONS
         2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
   2. The Door Hardware Contractor shall be responsible for providing the following unless otherwise noted within this entire Section.
   3. All applicable door locations for a completely operational door.
      a. Refer to the Low Voltage System contract documents for additional information.
   4. The correct electronic locking hardware (door strike, magnetic lock, electronic hinge, power transfer, crash bar, ADA power operated door, etc..) that meets code requirements.
      a. All devices noted above shall include cable-whips and terminations at door hardware devices as required, then extend cable whips to Door Access Control Junction Box.
      b. Request-To-Exit - Electronic lock shall include a built-in request-to-exit function

5. Drill all holes for applicable door status switches and door contacts, coordinate size of hole (generally ¾" or 1") with Low Voltage Contractor.
    a. Provide doors status switches and door contacts designed for the applicable door construction type (wood, metal, glass, etc.), use doors status switches and door contacts types as directed by the low voltage system contractor at applicable locations.
        1) DPDT Contact:
            a) Provide applicable door status switch/contact to match each applicable door material type: Steel, Wood, Glass, etc.
            b) For door locations that include both Access Control Door Status Switches and Intrusion Alarm Door Contacts Door, these shall be combine, provide a single DPDT contact to support both Door Access Control Door Status Switches and Intrusion Alarm Door Contacts.
        2) For door locations that include Door Access Control Door Status Switches only, provide SPDT contacts for future expandability.
        3) For door locations that include Intrusion Alarm System Door Contacts only, provide SPDT contacts for future expandability.
6. Electrical subcontract shall provide/terminate all 120/220VAC power as required per door.
7. Coordinate low voltage cabling requirements at each door.
    a. Electrical Contractor shall provide/terminate all related low voltage door cabling (proper cabling per manufactures recommendations) to a junction box in ceiling above door. EC shall provide all applicable conduits and backboxes for the items detailed below:
        1) Electrical Contractor shall coordinate with Low Voltage Contractor the cabling requirements for the following related devices: Card Reader, Keypad-Reader, Door Status Switch, Door Contact, Request-to-Exit (if not built-in to electronic lock), Door Release Button, etc.

K. DIVISION 26 ELECTRICAL – Electrical Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS and 28 00 00 ELECTRONIC SAFETY AND SECURITY.
1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
    a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
        1) DIVISION 27 COMMUNICATIONS
        2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
2. This entire Section: The Electrical Subcontractor shall read this Section in its entirety and shall provide all requirements of the Electrical Subcontractor as detailed in this Section.
3. The building preparation work shall be so performed that the progress of the entire building construction, including all other trades, shall not be delayed or interfered with. Materials and apparatus shall be installed as fast as construction conditions permit and must be installed promptly as directed.

4. Provide all related building preparation, including, but not limited to: outlet boxes with plaster rings, floor boxes, poke through devices, pathways, VAC power, cableways, J-Hooks, hangers, supports, cable tray, ladder rack, snake tray, cable protection, surface mounted metal raceway, surface raceways, cable supports, conduits with bushings, conduit stubs with bushings, sleeves with bushings.
5. All conduits, stubs, sleeves, etc. shall be brought to the nearest open cavity, an accessible hallway ceiling or an accessible area below floor; backboxes, plaster rings, pull strings, bonding, grounding, core drilling, cutting, patching, grouting, fireproofing of penetration and openings, environmental seals, smoke-and-fire-stopping seals, including all conduits, raceways, sleeves, slots etc. where cables pass from one location to another.
6. Technology Symbols that represent technology Equipment, Head-ends, Field Devices, etc. all shall require building preparation provided by DIV 26 Electrical Engineer.
    a. All building preparation (including but not limited to: backboxes {including specialized backboxes}, conduits, sizes of conduits, pull strings, sleeves, power and locations of applicable equipment and field devices {including: AFF, AFG, Wall, Ceiling, Floor, etc.}) requirements for all the technology systems shall be Hosted on Revit Drawings by the DIV 26 Electrical Engineer.
    b. The Technology drawings shall show Flatten Revit Symbols on the Technology Drawings that interfaced to the applicable building preparation provided by the DIV 26 Electrical Engineer.
    c. DIV 26 Electrical Engineer shall refer to DIV 27 and DIV 28 Technology Drawings for all applicable building preparation requirements.
7. Corrosive Areas:
    a. Provide ruggedized stainless steel or corrosion-resistant supports, pathways, conduit, backboxes, faceplates in corrosive areas, needs to meet code for Ruggedized/Corrosive areas such as: Pool Areas, Freezers, Refrigerators, Shower Rooms, Exterior Devices, etc.
    b. Provide all exterior rated cabling, field devices, equipment, and materials within these areas.
    c. These areas shall include but are not limited to the following:
        1) Corrosion-Resistant, highly resistant to interference from heat, humidity, dust and water ingress.
        2) Ruggedized stainless-steal faceplates shall be corrosion-resistant.
        3) Rugged outlet housing
        4) Ruggedized patch cord plug assembly provides a seal with cord, as well as strain, flex and impact relief.
        5) Provide ruggedized protective caps, can be used to protect unused outlets or to seal an outlet during cleaning periods when the outlet and plug may be disconnected. The protective caps shall have a retention chain, which prevents them from being misplaced when not in use.
        6) Cabling shall be outdoor rated from outlet/field device to the headend.

8. The Electrical Contractor is responsible for installing all required sleeves for a complete installation whether they are shown or not on the floor plans, the routing of cables is determined by the Architect.
    a. No Ethernet cable can exceed 90m distance rating of CAT6 or CAT6A cable use
9. The Electrical Subcontractor shall provide ladder rack over each rack and cabinet to facilitate a neat and orderly installation of cables and to secure the top of the racks to the structure. Cables shall drop straight down to equipment racks. Ladder rack shall be secured at both ends to the structure and connected for a complete contiguous installation. Utilize proper supports to support the ladder rack to the building structure as well as the equipment rack and cabinet. Submit mounting supports for approval before installation.
    a. Ladder Rack shall be a minimum of 18 inches wide.
10. 120VAC/220VAC, all circuits related to DIVISION 27 and 28 shall be provide with built-in Surge Protection, as per recommendation by the Technology Consultant.
    a. Examples of these 120VAC/220VAC circuit locations that support the following technology equipment:
        1) MDF and IDF Locations
        2) Local Sound System Equipment Racks
        3) Door Access Control Panels in the MDF and IDF's, but also panels located in the field.
        4) Intrusion Alarm System Panels
        5) Video Surveillance Headend
        6) Servers in the MDF and IDF's, but also servers located in the field.
11. MDF and IDF's
    a. MDF - The Electrical Subcontractor shall provide 120VAC Quad 20amp dedicated circuits at each wall located termination panel or backboard, no more than 6 feet apart, a Quad twist lock 20amp dedicated circuit in cable tray over each rack and cabinet and a 220VAC twist-lock Quad 20amp dedicated Circuit with isolated ground over each rack and cabinet in the system. It is recommended that these circuits be on Emergency Generator Power.
    b. IDF's - The Electrical Subcontractor shall provide 120VAC Quad 20amp dedicated circuits at each wall located termination panel or backboard, no more than 6 feet apart, a Quad twist lock 120VAC 20amp dedicated circuit with isolated ground in cable tray over each rack and cabinet. It is recommended that these circuits be on Emergency Generator Power.
12. Provide all work-related building preparation, including, but not limited to providing/terminating 120/220VAC power connection to and for equipment.
13. Local Sound Systems 120VAC
    a. Provide a "Clean Power" 120VAC Quad 20amp dedicated circuit at rack and/or cabinet location.
14. The Electrical Subcontractor shall also accept delivery and properly store and secure all equipment and materials required by the systems Low Voltage Contractor.
15. Electrical Subcontractor shall provide 4 11/16" X 3 1/4" Deep square backboxes for all Single-gang and Dual-gang outlet faceplates. Electrical Subcontractor shall

provide single- gang and dual-gang plaster rings for the specified Single-gang and Dual-gang outlet faceplates.

16. Removal and re-installation of new and/or existing ceiling tiles as required.
17. The Electrical Contractor shall be responsible for providing/terminating the following at all applicable Low Voltage System locations for a completely operational system.
    a. Refer to the Low Voltage System contract documents for additional information.
18. Grounding
    a. Provide 18" Grounding Bus mounted on plywood backboard.
19. All Low Voltage equipment racks and cabinets shall be bonded to the Ground Bus with #8 ground conductor.
    a. Connect the ladder rack to the ground with a #8 ground conductor.
    b. Provide 18" Grounding Bus mounted on plywood backboards.
20. All technology devices that require specialty/custom boxes (i.e., speakers, clocks, microphone, amplifier, wall boxes, floor boxes, etc..), and all exterior antennas for the System shall be furnished by this Low Voltage Contractor and installed by the Electrical Contractor.
    a. All Custom Backboxes provided by the Electrical Contractor shall be submitted 1st to the Electrical Engineer for review and approval and then forwarded to GTC for review and approval.
21. Floor boxes and poke-through devices shall be provided by the Electrical Contractor.
22. Electronic door hardware and door contacts by Door Hardware Contractor.
    a. All Electronic Locks (with built-in Request-to-Exit), electronic hinges, power transfer, door status switches, door contacts shall include cable-whips and terminations at door hardware devices as required, then extend cable whips to Door Access Control Junction Box at door location.
        1) Cabling provided by Door Hardware Contractor
    b. Electrical subcontract shall provide/terminate:
        1) All low voltage cabling and pathways for: readers (card reader, keypad readers, etc.), stand-alone Request-to-Exit devices, etc. at each door and run cabling to a junction box (provided by Electrical Contractor) in ceiling above each door; and terminate cabling.
23. Provide blank matching project faceplates for applicable backboxes.
24. Camera low voltage cabling must be separated from any adjacent high voltage cabling by a metal barrier (i.e., cameras mounted on light poles, etc.). See requirements of the NEC.

L. Section 27 10 00 STRUCTURED CABLING – Structured Cabling Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS and 28 ELECTRONIC SAFETY AND SECURITY.
    1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
        a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:

1) DIVISION 27 COMMUNICATIONS
2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.

2. All cabling shall be per manufacturers recommendations.
3. Provide all Plenum Cable throughout facility: Listed and labeled for plenum installation.
4. DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
   a. Shall provide all related data switches, data switches shall meet or exceed system manufacturers requirements.
5. Section 27 10 00 STRUCTURED CABLING shall provide the following associated with DIVISION 28 ELECTRONIC SAFETY AND SECURITY:
   a. Rack space in MDF and IDF's for 28 00 00 ELECTRONIC SAFETY AND SECURITY provided data switches.
   b. Patch Panels
   c. Patch Cords
   d. Ethernet Data Drops for all cameras and all other DIVISION 28 ELECTRONIC SAFETY AND SECURITY ethernet data drops as required.

M. Section 27 30 00 VOICE COMMUNICATIONS – Voice Communications Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS and 28 ELECTRONIC SAFETY AND SECURITY.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
      a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
         1) DIVISION 27 COMMUNICATIONS
         2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
   2. Interface between the Public-Address System and the Telephone System for telephone code authorized access to intercom system, zone paging, all-call paging and other features as specified.
      a. Public Address System Contractor shall provide cabling to support 4-port interfaces between both systems, Telephone Contractor shall provide proper interface/programming to the telephone systems.
         1) Low Voltage Contractor shall provide proper interface/programming to the public-address system and other features as specified.
   3. Voice Outlets - Interface with public utilities telephone service voice outlets for the Intrusion Alarm system. This is to be arranged by the Owner's service provider and coordinated/interfaced to the security system by the security system Contractor.
   4. When Intrusion Alarm System is in alarm mode, shift Public Address speakers to "listening mode". Provide authorized remote telephone access that allows call-in and listen to speaker activity.
      a. Intrusion Alarm System Contractor shall provide cabling between both systems, the Telephone Contractor shall proper interface/programming to the telephone systems.
         1) Low Voltage Contractor shall provide proper interface/programming to the public-address system.

N. Section 27 51 16 PUBLIC ADDRESS AND INTERCOM SYSTEM, with interface to stand alone MASTER CLOCK SYSTEM 27 53 13 – Public Address and Intercom; Master Clock, Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS and 28 00 00 ELECTRONIC SAFETY AND SECURITY.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
      a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
         1) DIVISION 27 COMMUNICATIONS
         2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
   2. When Intrusion Alarm System is in alarm mode, provide authorized remote telephone access that allows call-in and listen to speaker activity.
      a. Intrusion Alarm System Contractor shall provide cabling between both systems, the Telephone Contractor shall proper interface/programming to the telephone systems.
         1) Low Voltage Contractor shall provide proper interface/programming to the public-address system.

O. Section 28 10 00 DOOR ACCESS CONTROL – Electronic access Control Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
      a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
         1) DIVISION 27 00 00 COMMUNICATIONS
         2) DIVISION 28 00 00 ELECTRONIC SAFETY AND SECURITY.
   2. Electronic door hardware and door contacts by Door Hardware Contractor.
      a. All Electronic Locks (with built-in Request-to-Exit), electronic hinges, power transfer, door status switches, door contacts shall include cable-whips and terminations at door hardware devices as required, then extend cable whips to Door Access Control Junction Box at door location.
         1) Cabling provided by Door Hardware Contractor
      b. Electrical subcontract shall provide/terminate:
         1) All low voltage cabling and pathways for: readers (card reader, keypad readers, etc.), stand-alone Request-to-Exit devices, etc. at each door and run cabling to a junction box (provided by Electrical Contractor) in ceiling above each door; and terminate cabling.

P. Section 28 15 23 AUDIO VIDEO INTERCOM SYSTEM – Audio Video Intercom Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS.

1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
   a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
      1) DIVISION 27 COMMUNICATIONS
      2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
2. Section 28 15 23 Contractor shall provide proper cabling between both applicable systems noted below and proper interface to the Section 28 15 23 systems.
   a. Interface to Network Video Recorder (NVR) for recording of all Audio/Video Door Intercom Station activities on the network video recorder when Audio Video Intercom has an event.
      1) Low Voltage Contractor shall provide proper interface/programming to the Network Video Recorder.
   b. Interface to Door Access Control System for controlling the associated electronic door lock from the Audio Video Intercom Systems' Master Consoles.
      1) Low Voltage Contractor shall provide proper interface/programming to the Door Access Control System.

Q. Section 28 20 00 VIDEO SURVEILLANCE SYSTEM – Video Surveillance Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
      a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
         1) DIVISION 27 00 00 COMMUNICATIONS
         2) DIVISION 28 00 00 ELECTRONIC SAFETY AND SECURITY.
   2. Interface between the Audio/Video Intercom Door Stations and the Video Surveillance System Recording Equipment.
      a. Audio/Video Door Intercom Contractor shall provide cabling between both systems, the Video Surveillance System Contractor shall provide proper interface/programming to the Video Surveillance System Recording Equipment.
         1) Low Voltage Contractor shall provide proper interface/programming to the Audio/Video Door Intercom.

R. Section 28 31 00 INTRUSION DETECTION SYSTEM – Intrusion Detection Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.

a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
   1) DIVISION 27 COMMUNICATIONS
   2) DIVISION 28 ELECTRONIC SAFETY AND SECURITY.

2. Section 28 31 00 Contractor shall provide proper cabling between both applicable systems noted below and proper interface to the Section 28 31 00 systems.
   a. Activate alarm siren signal over Public Address speakers when Intrusion Alarm System is in alarm mode.
      1) Cabling between both systems shall be provided by the Intrusion Alarm System Contractor, and proper interface/programming to the Public Address System shall be provided by the Public Address System Contractor.
         a) Low Voltage Contractor shall provide proper interface/programming to the intrusion alarm system.
         b) Low Voltage Intrusion Alarm System Contractor shall provide proper interface/programming to the Intrusion Alarm System.

S. Section 28 46 00 FIRE DETECTION AND ALARM SYSTEM – Fire Detection and Alarm Contractor Responsibilities and Coordination Between Trades and the Contractor for DIVISION 27 COMMUNICATIONS and 28 00 00 ELECTRONIC SAFETY AND SECURITY.
   1. Review Section RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES in its entirety and provide Contractor requirements noted and other requirements applicable to your trade.
      a. Refer to the following Sections for RESPONSIBILITIES, COOPERATION AND COORDINATION WITH OTHER TRADES that provide more detailed information related to:
      b. DIVISION 27 COMMUNICATIONS
      c. DIVISION 28 ELECTRONIC SAFETY AND SECURITY.
   2. Each of the applicable Technology Contractors shall provide cabling between both systems.
   3. Fire Detection Contractor shall provide proper interface/programming to the Fire Detection system.
      a. The Low Voltage Contractor shall provide proper interface/programming to the applicable systems.
         1) Systems:
            a) Door Access Control System
            b) Local Sound Systems
   4. Door Access Control:
      a. Provide proper interface to interrupt power to electrically locked access-controlled doors, so that they may be remotely released during a fire alarm condition.
   5. Local Sound Systems:
      a. The audio messages from the Fire Alarm System's Mass Notification System shall automatically take priority and mute the local sound system audio, in the local sound system areas for the duration of the Mass Notification System message. Once the Mass Notification message is

completed, automatically return the audio system to its normal mode of operation.

1.4 COORDINATION

A. Coordinate layout and installation of system components and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

B. All cost associated with procurement of telephone circuits from the servicing telephone utility shall be borne by owner. The Contractor shall act under a letter of agency as the owner's representative in all matters concerning procurement of these circuits.

1.5 REGULATIONS AND CODE COMPLIANCE

A. References to regulations, codes, and standards mean the latest edition, amendment and revisions to the regulations, codes, and standards in effect on the date of the Contract Documents.

B. All work and materials shall conform to and be installed, inspected, and tested in accordance with the governing rules and regulations of federal, state, and local government agencies.

C. Installations, materials, equipment and workmanship shall conform to the specifications and drawings and all applicable provisions of the following regulations, codes, and standards including all applicable addendum, including but not limited to:
1. ANSI/NEC (NFPA 70)
2. NESC (IEEE)
3. National Life Safety Code (NFPA 101)
4. ASTM Standards
5. IEEE Standards
6. NEMA Standards
7. ANSI/TIA/EIA – Telecommunications Cabling Standards including but not limited to 568- C.0, 568-C.1, 568-C.2, 568-C.3, 569-B, 606-A, 607-B, 758-A, 862.
8. FCC Code of Federal Regulations (CFR)
9. Applicable State codes including Department of Labor Rules and Regulations.
10. Applicable Municipal Codes
11. Applicable codes and regulations of other authorities having lawful jurisdiction pertaining to the work required.
12. Americans with Disabilities Act (ADA)
13. Owner Standards
14. BICSI Telecommunications Distribution Methods Manual, Telecommunications Cabling Installation Manual, Customer-Owner outside Plant Manual, LAN and Internetworking Design Manual.
15. NEC - National Electric Code
16. NFPA-70 - National Fire Protection Association
17. ANSI/TIA/EIA-568 Commercial Building Telecommunications Cabling Standard

18. TIA/EIA-568-C.2-1, Transmission performance specification for 4 pair 100 Ohm Category 6e and 6A cabling.
19. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces
20. ANSI/TIA/EIA-606 The Administration Standards for the Telecommunications Infrastructure of Commercial Building
21. ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications
22. ANSI/TIA/EIA-TSB-67 Telecommunications System Bulletin Technical Systems Bulletin, Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems.
23. FCC Part 15 (addresses electromagnetic radiation).
24. FCC Part 68 (connection of premises equipment and wiring to the network).
25. ANSI/ICEA Insulated Cable Engineers Association
26. National Electrical Safety Code Handbook. (NESC)
27. EIA/TIA Building Telecommunications Wiring Standards:
    a. Sound Systems, EIA 160.
    b. Loudspeakers, Dynamic Magnetic Structures, and Impedance, EIA 299.
    c. Racks, Panels, and Associated Equipment, EIA 310 A.
    d. Amplifiers for Sound Equipment, SE 101 A.
    e. Speakers for Sound Equipment, SE 103.
    f. No. 568B Series - Telecommunications Wiring Standards
    g. No. 569A - Telecommunications Pathways and Spaces
    h. No. 606 - The Administration Standard For the Telecommunications Infrastructure
    i. No. 607 - Grounding/Bonding
    j. Article 300, Part A. Wiring Method. NFPA 70.
    k. Article 250, Grounding, NFPA 70.
    l. Article 310, Conductors for General Wiring, NFPA 70.
    m. Article 725, Remote Control, Signaling Circuits, NFPA 70.
    n. Article 800, Communication Systems, NFPA 70.
28. Materials and workmanship shall conform to the latest issue of all industry standards, publications, or regulations referenced in this Section and with the following references as applicable.
    a. NFPA 72 – National Fire Alarm Code.
    b. NFPA 101 - Life Safety Code.

D. All modifications required by the referenced codes, rules, regulations, and authorities shall be made by the Contractor without additional charge to Owner.

E. Report immediately to Owner personnel and/or the Consultant/Engineer, in writing, any part of the design which does not conform to the requirements of these codes or requirements, or otherwise be held responsible to provide and install material which will comply with these codes and regulations.

F. Applicable codes and ordinances and local interpretations take precedence when they conflict with or are more stringent than the design. Drawings and specifications take precedence where design is more stringent than codes and ordinances.

G. All materials, appliances, equipment, and devices shall conform to the applicable standards of Underwriters Laboratories (UL), and shall be listed by UL if a UL listing category has been established. Furnish products that have been tested and qualified to meet the rating criteria by UL or other testing firm acceptable to authority having jurisdiction.

H. Give the proper Authorities all requisite notices or information relating to the work under this Section. Obtain and pay for all fees, licenses, permits and certificates. Comply with the rules and regulations of all local, state, and federal authorities having jurisdiction, Building Codes, the rules and regulations of the National Board of Fire Underwriters, and the public utility companies serving the building.

I. Public utility back charges will be paid for by the Owner and are not to be included in the base bid. Markups on utility back-charges will not be allowed.

J. Perform work in accordance with Nationally Recognized Testing Laboratory (NRTL) listing or labeling requirements, OSHA regulations, NFPA Standards, Electrical Code, the Americans with Disabilities Act Accessibility Guidelines (ADAAG), EIA/TIA, and BICSI. The Drawings and Specifications do not attempt to indicate all work required by codes, regulations, and authorities.

K. Nothing in these Contract Documents shall be construed to permit work not conforming to applicable codes and regulations. When conflicts occur, the more restrictive requirements shall govern.

L. Toxicity: Comply with applicable codes and regulations regarding toxicity of combustion products used or hazardous materials used, or disposed of.

M. Legally dispose of all material. Adhere to all regulations regarding disposal of hazardous material. Recycle hazardous material where recycling is possible. Submit certificates of legal recycling or disposal to the Architect. Include copy in the Owner and Maintenance Manual.

N. Should the Facility have established building standards, rules, or regulations, obtain a copy from the Building Owner, and comply with them.

1.6 SAFETY AND HEALTH REQUIREMENT

A. Comply with specific Owner safety requirements.

B. Receive training if working in hazardous area.

C. Provide hazards training certificates.

D. Inspect work sites for hazards regularly.

E. Provide safety program documents.

F. Comply with National Electrical Safety Code NESC C2-2007 including but not limited to:
   1. Section 42, General Rules for Employees
   2. Section 43, Additional Rules for Communications Employees

G. The contractor shall be aware of and comply with Owner site safety regulations.

1.7 ASBESTOS / LEAD

A. In the event the Technology Contractor encounters suspected asbestos/lead containing materials which have not been rendered harmless, the Technology Contractor shall immediately stop work in the area affected and report the condition to Contractor, Owner verbally and followed by written notice. If in fact the material contains asbestos/lead and has not been rendered harmless, the project work in the affected area shall not thereafter be resumed except by written agreement of Owner and the Contractor. In the absence of asbestos/lead, or when it has been rendered harmless, project work shall be resumed by written agreement of Owner and the Contractor.

1.8 DEFINITIONS

A. Every effort has been made to use industry standard terminology throughout this specification, but industry standard terminology is not used by all manufacturers and in many cases, industry standard terminology does not exist. Contractor shall notify the Owner and/or the Consultant/Engineer to define terminology used in specifications if they believe any questions could arise.
   1. ANSI: American National Standards Institute
   2. ASTM: American Society of Testing and Materials
   3. BICSI: Building Industry Consulting Services International
   4. EIA: Electronic Industries Association
   5. FCC: Federal Communications Commission
   6. IEEE: Institute of Electrical and Electronic Engineers
   7. ISO: International Organization for Standardization
   8. NEC: National Electric Code
   9. NEMA: National Electrical Manufacturers Association
   10. NESC : National Electrical Safety Code
   11. NFPA : National Fire Protection Association
   12. OSHA: Occupational Safety and Health Administration
   13. TIA: Telecommunications Industry Association
   14. UFBC: Uniform Fire Prevention and Building Code
   15. UL:Underwriter's Laboratories, Inc.
   16. Approved/Approval: Written permission to use a material of system
   17. Technology Contractor: Applicable Telecommunications Contractor or Electronic Safety and Security Contractor performing work under DIVISION 27 and/or DIVISION 28
   18. Engineer: Applicable Telecommunications Engineer and/or Electronic Safety and Security Engineer for DIVISION 27 and/or DIVISION 28

19. Equal/Equivalent: Equally acceptable as determined by Owner or Engineer
20. Final acceptance: Owner acceptance of the project from Contractor
21. Inspection: Visual observation at the job site by Owner representative
22. Jack: Modular connector for station cabling at work-area outlet
23. Outlet: Box and faceplate to accommodate jacks at the work-area
24. Pull-Box: Box to be used for pull-through of cabling in a conduit run
25. Relocate: Disassemble, disconnect, and transport to new locations,
26. Installation: Cleaned, tested, and installed ready for use
27. Replace: Remove and provide new item
28. ARC: Aluminum rigid conduit.
29. GRC: Galvanized rigid conduit.
30. IMC: Intermediate metal conduit.
31. RTRC: Reinforced thermosetting resin conduit.
32. EPDM: Ethylene-Propylene-Diene-Monomer rubber.
33. NBR: Acrylonitrile-butadiene rubber.
34. LAN: Local area network.
35. RCDD: Registered Communications Distribution Designer.
36. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."
37. Install: The term "install" is used to describe operations at project site including the actual “unloading, unpacking, rigging in place, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”
38. Provide: The term "provide" means to "furnish and install, complete and ready for the intended use."
39. Installer: The "Installer" is the Technology Contractor who uses his/her own employees for performance of all construction activity related to their specified responsibilities, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform and the “Installers” must be authorized manufacturers’ representatives, certified, experienced and qualified to provide, install, program, troubleshoot, train, warrant, and service the systems in this Section in their entirety.
40. The term “Technology Contractor” and “Low Voltage Contractor” and “Communications Contractor” and “Telecommunications Contractor” and “ Electronic Safety and Security Contractor” used in the Bid Documents, Plans & Specifications includes all of the applicable low-voltage system Contractors for all systems being provided in DIVISIONs 27 and 28.
41. Electrical Contractor: The "Electrical Contractor" is the contractor responsible for the entire DIVISION 26. The Electrical Contractor works for, and reports to, the General Contractor.
42. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
43. EMI: Electromagnetic interference.
44. IDC: Insulation displacement connector.
45. UTP: Unshielded twisted pair.
46. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

47. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
48. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.
49. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
50. ADA: Americans with Disabilities Act
51. Bid: Herein, used interchangeably with “proposal”
52. CATV: Cable Television, Central or Master Antenna Television (broadband)
53. DSP: Digital Signal Processor
54. IR: Infrared
55. NIC: material and work which is Not In Contract and for which the Installer is not responsible except as otherwise detailed herein.
56. OFE: “Owner Furnished Equipment” which will be provided by The Owner. Be responsible for installing and integrating this equipment as detailed herein.
57. OFCI: “Owner Furnished Contractor Installed” Equipment which will be provided by The Owner. Be responsible for installing and integrating this equipment as detailed herein.
58. The term “shall” is mandatory.
59. The term “will” is informative.
60. The term “should” is advisory.
61. Term “provide” means furnish and install.
62. Bidder: Qualified firm intending to tender a bid on the systems described herein.
63. Construction Manager (CM) or General Contractor (GC): The representative responsible for general building construction and onsite coordination between sub-contractors
64. NIST: The National Institute of Science and Technology.
65. PC: Personal computer.
66. UTC: Universal time coordinated. The precisely measured time at zero degrees longitude; a worldwide standard for time synchronization.
67. AFF – Above Finished Floor
68. AOR – Area of Refuge/Rescue
69. AV – Audio Visual
70. BAS – Building Automation Systems
71. BDF – Building Distribution Frame
72. CATV – Cable Television
73. EF – Entrance Facility
74. ER – Equipment Room
75. TR – Telecommunication Room
76. HVAC – Heating, Ventilating, and Air-conditioning
77. IDF – Intermediary Distribution Frame
78. LAN – Local Area Network
79. MDF – Main Distribution Frame
80. MH – Maintenance Hole
81. OEM – Original Equipment Manufacturer
82. OTDR – Optical Time Domain Reflectometer
83. PoE – Power over Ethernet, IEEE 802.3af standard

84. RF – Radio Frequency
85. RMU – Rack Mount Unit
86. RPS – Redundant Power Supply
87. TLT – Telecommunications Infrastructure Layout Technician
88. TR – Telecommunications Room
89. UPS – Uninterruptible Power Supply
90. UTP – Unshielded Twisted Pair
91. VMIU – Video Mask Interdiction Unit
92. WAO – Work Area Outlet
93. WI-FI – Wireless Fidelity
94. WLAN – Wireless Local Area Network
95. VoIP – Voice over Internet Protocol
96. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
97. Open Cabling: Passing cabling through open space (e.g., between the studs of a wall cavity).
98. Signal Ground: The ground reference point designated by manufacturer of the system that is considered to have zero voltage.
99. CPU: Central processing unit.
100. Credential: Data assigned to an entity and used to identify that entity.
101. dpi: Dots per inch.
102. DTS: Digital Termination Service. A microwave-based, line-of-sight communication provided directly to the end user.
103. GFI: Ground fault interrupter.
104. Identifier: A credential card; keypad personal identification number; or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.
105. I/O: Input/Output.
106. Location: A Location on the network having a PC-to-controller communications link, with additional controllers at the Location connected to the PC-to-controller link with a TIA 485-A communications loop. Where this term is presented with an initial capital letter, this definition applies.
107. PCI Bus: Peripheral Component Interconnect. A peripheral bus providing a high-speed data path between the CPU and the peripheral devices such as a monitor, disk drive, or network.
108. PDF: Portable Document Format. The file format used by the Acrobat document-exchange-system software from Adobe.
109. RAS: Remote access services.
110. RF: Radio frequency.
111. ROM: Read-only memory. ROM data are maintained through losses of power.
112. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.
113. TWAIN: Technology without an Interesting Name. A programming interface that lets a graphics application, such as an image editing program or desktop publishing program, activate a scanner, frame grabber, or other image-capturing device.
114. UPS: Uninterruptible power supply.
115. USB: Universal serial bus.

116. WAV: The digital audio format used in Microsoft Windows.
117. WMP: Windows media player.
118. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.
119. Windows: Operating system by Microsoft Corporation.
120. Workstation: A PC with software that is configured for specific, limited security-system functions.
121. WYSIWYG: What You See Is What You Get. Text and graphics appear on the screen the same as they will in print.
122. CCTV: Closed-circuit television.
123. PIR: Passive infrared.
124. RFI: Radio-frequency interference.
125. Control Unit: System component that monitors inputs and controls outputs through various circuits.
126. Master Control Unit: System component that accepts inputs from other control units and may also perform control-unit functions. The unit has limited capacity for the number of protected zones and is installed at an unattended location or at a location where it is not the attendant's primary function to monitor the security system.
127. Monitoring Station: Facility that receives signals and has personnel in attendance at all times to respond to signals. A central station is a monitoring station that is listed.
128. Protected Zone: A protected premises or an area within a protected premises that is provided with means to prevent an unwanted event.
129. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.
130. Systems Integration: The bringing together of components of several systems containing interacting components to achieve indicated functional operation of combined systems.
131. Zone. A defined area within a protected premises. It is a space or area for which an intrusion must be detected and uniquely identified. The sensor or group of sensors must then be assigned to perform the detection, and any interface equipment between sensors and communication must link to master control unit.
132. AGC: Automatic gain control.
133. BNC: Bayonet Neill-Concelman - type of connector.
134. B/W: Black and white.
135. CCD: Charge-coupled device.
136. FTP: File transfer protocol.
137. IP: Internet protocol.
138. MPEG: Moving picture experts group.
139. NTSC: National Television System Committee.
140. PTZ: Pan-tilt-zoom.
141. RAID: Redundant array of independent disks.
142. TCP: Transmission control protocol - connects hosts on the Internet.
143. WAN: Wide area network.

B. Where DIVISION 27 and/or DIVISION 28 indicates work to be performed by the words “shall” or “secure” or other performance functions, it shall be assumed that such

work shall be performed by the Technology Contractor performing work under the applicable DIVISION 27 and/or DIVISION 28

1.9 DRAWINGS AND SPECIFICATIONS

A. It is the intention of these specifications and related project drawings to call for finished work, tested and ready for operation in complete accordance with all applicable codes, regulations, standards, and ordinances.

B. These specifications and the project drawings are complimentary, and what is called for in either of these shall be binding as though called for by both. Should any conflict arise between the drawings and specifications, such conflict shall be brought to the attention of the Engineer for resolution. If the Contractor fails to contact Engineering in writing of any conflict between the specifications and the project drawings, the Contractor shall be subject to re-work the area of conflict at the Contractor's cost.

C. Quantity and Quality, these specifications and the project drawings are complimentary, and what is called for in either of these shall be binding as though called for by both. Should any conflict arise between the quantity and/or quality of materials, provide the higher quantity and higher quality.

D. Omissions from the specifications and/or project drawings or the incorrect description of details of work which are evidently necessary to carry out the intent of the specifications and project drawings, or which are customarily performed, shall not relieve the Contractor from performing such omitted or incorrectly described detail of the work. All work shall be performed as verified in field measurements, field construction criteria, material catalog numbers and similar data checked and coordinated with each shop drawing by the Contractor.

E. The project drawings are diagrammatic and indicate general design, layout, and arrangement of equipment and various systems. Being diagrammatic, the drawings may not necessarily show all details such as pull-boxes, conduit runs or sizes, etc., necessary for a complete and operable system. Unless detailed dimensioned drawings are included, exact locations are subject to approval of Owner.

F. Do not scale project drawings for dimensions. Field verify all dimensions and measurements from the site and actual equipment to be furnished. All dimensions, measurements, and the location and existence of underground equipment must be verified in the field since actual locations, distance, and elevations will be governed by actual field conditions. The Technology Contractor shall be responsible for all measurements taken from the field.
   1. All measurements shall be taken at the building before fabrication commences.

G. The Technology Contractor shall advise as early as possible of any product delays and minimum quantity requirements that may affect the project timeline.

H. Should conflicts, discrepancies, deficiencies, or errors arise which require changes in the Contract Documents, immediately notify the Technology Consultant/Engineer. Failure to do so shall be interpreted as the intention of the Technology Contractor to supply all necessary labor and materials for the suitable completion of this work. Obtain written approval on necessary adjustments before the installation is started.

I. If the Technology Consultant/Engineer is required to provide additional engineering services as a direct result of The Technology Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents, then the Technology Consultant/Engineer's expenses in connection with such additional services shall be paid by the Technology Contractor and may be deducted from any monies owed the Technology Contractor.

J. In the event that the Technology Consultant/Engineer is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Technology Contractor, or changes by the Technology Contractor in dimension, weight, power requirements of the equipment and accessories furnished, or if the Technology Consultant/Engineer is required to examine and evaluate any changes proposed by the Technology Contractor solely for the convenience of the Technology Contractor, then the Technology Consultant/Engineer's expenses in connection with such additional services shall be paid by the Technology Contractor and may be deducted from any monies owed the Technology Contractor.

K. Items referred to in singular number in Contract Drawings shall be provided in quantities necessary to complete work.

L. The right is reserved to make reasonable changes in locations of work prior to rough-in at no additional cost.

1.10 EXAMINATION OF PROJECT SITE

A. Prior to any project work, examine the project site carefully, including all project drawings showing existing (if applicable) systems and equipment. The Contractor shall be fully informed and shall identify all utility, state, and local requirements that will affect the DIVISION 27 and/or DIVISION 28 work at the project site.

B. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

C. It shall be the Contractor's responsibility to determine if the installation of the proposed systems will affect the operation or code compliance of existing (if applicable) or new systems with Owner approval, relocate, modify, or otherwise revise existing (if applicable) systems as required to maintain operational integrity and code compliance.

D. The Contractor shall become familiar with the local conditions under which the work is to be performed and correlate the on-site observations with the requirements of the

specifications and project drawings. No allowance will be made for claims of concealed conditions which the Contractor, in exercise or reasonable diligence in examination of the site, observed or should have observed.

E. Before ordering any materials or doing any project work, verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of unverified differences between actual dimensions and the measurements indicated on the project drawings. Any discrepancies found shall be submitted in writing to the Engineer for consideration before proceeding with the project work.

F. Notify Architect of conditions that would adversely affect installation or subsequent use.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

H. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of system.

I. Examine roughing-in for embedded and built-in anchors to verify actual locations of field devices connections before.

J. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of system.

K. Inspect built-in and cast-in anchor installations, before installing field devices, to verify that anchor installations comply with requirements. Prepare inspection reports.
   1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.
   2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

L. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

M. Examine roughing-in for LAN, WAN, and IP network before device installation.

1.11 CONFORMITY AND COMPATIBILITY

A. In order to prevent incompatibility between any of the components for their proper operation and anticipated required function of the finish product, whether specified and/or as an approved equal product, the Technology Contractor shall be responsible to provide assured conformity of all operating systems to the Technology Consultant/Engineer prior to the purchase and/or installation of all equipment under this Section.

1.12 PROJECT MANAGEMENT

A. If required, the Technology Contractor shall designate and identify a Project Manager to oversee the project work specified in this DIVISION and to attend all project meetings as a representative of the Technology Contractor. The Technology Contractor's Project Manager shall have the authority to act for the Technology Contractor, and all communications given to the Project Manager will be deemed to have been given to the Technology Contractor.

B. The Technology Contractor shall not begin construction on any project without written notice to proceed.

C. All additional costs must be approved in writing with a change order signed by the General Contractor, the Architect, the Technology Consultant/Engineer and Owner.

D. Perform project management and coordinate all phases of the project with Owner.
   1. Attend weekly project management meetings at the job site.
   2. Provide and maintain a complete project schedule and timeline for all project activities including installation, inspection, and testing for each work activity in each building. The project schedule will be provided by the Technology Contractor's Project Manager at the first project meeting within one week of contact award. The project schedule and timeline shall be updated as appropriate and will be provided and reviewed at each weekly project meeting thereafter.

E. Job Supervision:
   1. Designate and identify job supervisor in advance.
   2. Provide no more than one supervisor per job.
   3. Provide one primary contact and one backup contact.
   4. Inform Owner if contact is unavailable.
   5. Remove employees with behavior unacceptable to the project and to the Owner and replace with an appropriate employee approved to perform the specific work required.

F. Maintain the following information on the job site:
   1. Specifications
   2. Project drawings
   3. Addenda
   4. Submittals
   5. Change Orders
   6. Field Observation and inspection reports
   7. Test results
   8. Schedule and outage logs
   9. As-Built drawings showing all changes

G. Assist Owner in performing inspections in evaluation and functional testing of the subsystems as completed and the total systems.

H. Conduct an overall quality assurance program.

I. Apply and install materials, equipment, and specialties in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the specifications shall be referred in writing to Owner for resolution

J. All products, components, devices, equipment and materials shall be new and unused, clean, free from defects, and free from damage and corrosion.

K. Installation and service shall be performed by manufacturer trained and authorized personnel.

1.13 WORKMANSHIP

A. Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for one full year from final acceptance for each project. All equipment, software, cable integrity and associated terminations shall be thoroughly inspected, fully tested and guaranteed as free from defects, transpositions, opens/shorts, tight kinks, damaged jacket insulation, etc.

1.14 PERMITS, LICENSES, INSPECTIONS AND FEES

A. The Technology Contractor shall obtain all required permits, licenses and inspections and shall pay all legal and proper fees and charges including taxes, royalties, and other related charges. No work shall be started before obtaining all necessary permits and paying all required fees.

B. The Technology Contractor shall at inception of the work provide Owner with copies of all required building and trade permits, if said are required.

C. The Technology Contractor shall furnish and file with the proper authorities all drawings required.

D. The Technology Contractor shall be responsible for arranging all inspections and for securing all required approvals and signatures. Upon completion of the work, properly completed permits shall be returned to Owner.

1.15 PERIODIC FIELD OBSERVATION REPORTS

A. Owner will conduct site visits as required to monitor the progress and quality of the workmanship and the work environment as well as the surrounding facility. Any item found by Owner to be deficient will be documented.

B. The Technology Contractor shall take appropriate action to immediately correct and rectify any items deemed unsatisfactory by Owner. The Technology Contractor shall not wait for a hard copy of the deficiency if the action required to rectify the situation is obvious and clear.

1.16 INSPECTION AND TESTS

A. The Technology Contractor shall furnish promptly, without additional charge, all test equipment, instruments, facilities, labor, and material needed to perform safe and convenient inspection and testing.

B. Prior to beginning work, the Technology Contractor shall submit to the General Contractor, the Architect, the Technology Consultant/Engineer and Owner a complete project schedule and timeline including installation, inspection, and testing for each project area so that interim inspections can be conducted as work progresses. Owner shall not be obligated to inform the Contractor of its intent to inspect job sites while work is in progress.

C. The Technology Contractor shall perform pre-testing of the installed systems to determine compliance and notify the General Contractor, the Architect, the Technology Consultant/Engineer and Owners personnel when the system is ready for final inspection and testing.

D. At such time as Owner and/or the Consultant/Engineer may direct, and in the presence of the Owner representative and/or Consultant/Engineer, conduct final inspection and testing of all systems, both new and existing (if applicable) where modified.

E. Except as otherwise provided in the specifications, inspection and testing of materials and workmanship shall be made at reasonable times and at the site of the work. Owner may determine that inspection or testing of materials shall be made off-site, at the place of production, manufacture, or shipment of the material. Such off-site inspection or testing shall not relieve the Technology Contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of Owner after acceptance of the completed work.

F. Work shall not be covered up or enclosed until inspected by the General Contractor, the Technology Consultant/Engineer and Owner personnel and regulating authorities. Should any work be covered up or enclosed before such inspection, it shall be uncovered, inspected, and after approval, restored by the Technology Contractor to finished condition at no additional cost to Owner.

G. All work that is determined to be unsatisfactory shall be corrected immediately. The Technology Contractor shall, without charge, replace any material or correct any workmanship found by Owner not to conform to the specifications, unless Owner consents to accept such material or workmanship with appropriate adjustment in price. The Technology Contractor shall promptly segregate and remove rejected material from the premises. The Technology Contractor will pay the additional cost of any test or inspection of the replaced material or corrected workmanship.

H. The Technology Contractor shall prepare a written report of final test results and all additional pertinent information and submit these to Owner and/or the Consultant/Engineer for acceptance.

1.17 SUBSTITUTIONS

A. Any system and/or equipment proposed as an equal to that specified must be proven to conform to the standards contained herein. The contractor must obtain the Architect's approval in writing, prior to bidding equipment other than that specified. The manufacturer's name, model numbers, and three (3) copies of shop/working drawings complete with catalog sheets, technical and installation data shall be submitted for approval.

B. General: The Contractor has the burden of proving, at the Contractor's own cost and expense and to the satisfaction of the Architect, that the proposed product is similar and equal to the named product.

C. Basis:
   1. Requests for acceptance of proposed equivalents made following the award of bid will be considered by the Architect only in the following cases:
      a. The named products cannot be obtained by the Contractor because of strikes, lockouts, bankruptcies or discontinuance of manufacturer and the Contractor makes a written request to the Architect for consideration of the proposed equivalent.
      b. The proposed equivalent, in the opinion of the Architect, is equal or superior to the named product and its use is to the advantage of the Owner.
   2. A formal request must be made for the substitution documenting fully the above reason. Include complete data on the proposed substitution substantiating compliance with the Contract Documents including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by Addenda, with data relating to Contract time schedule, design and artistic effect where applicable, and its relationship to separate contracts. Accompany the request by accurate installed cost data on the proposed substitution in comparison with the product specified.

D. Consideration:
   1. A request for substitution is a representation by the Contractor that:
      a. The Contractor has personally investigated the proposed substitution and determined that it is equal or superior in all respects to that specified.
      b. The Contractor will provide the same warranty for the substitution that would be for that specified.
      c. The cost data presented are complete and include all related costs under this Contract, but exclude costs under separate contracts and exclude Architect's re-design costs, and that the Contractor waives all claims for additional costs related to the substitution which subsequently become apparent.
      d. Indicate if there will be any cost impact on work by other trades.
      e. The Contractor will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

2. An accepted substitution will be documented by Change Order modifying the Specifications. The Contract Price will be changed only if the substitution results in cost savings to the Owner.

1.18 DELIVERY, STORAGE, HANDLING AND STAGING

A. Supply, transport, deliver, unload, move to the installation location, unpack, place, assemble, secure, connect, and install all equipment needed to complete the installation. Be responsible for transportation, parking, delivery, and on-site storage of the system's equipment. Be responsible for all transportation of personnel to and from the site.

B. Reconfirm before delivery that hallways, stairways, passages, doorways, rooms, entries, elevators and foyers are of sufficient size to accommodate the passage and installation of the equipment and systems. Off-site pre-staging of goods is encouraged.

C. The Owner's acknowledgment of delivery of goods and any payment made on account of such delivery shall not constitute acceptance (partial or otherwise) and shall not diminish obligations as specified.

D. The actual dates of delivery shall be under the absolute control of the Owner. The dates and times for delivery/installation are critical to the successful completion of the project. Deliveries shall normally be accepted only Monday through Friday 8:00 a.m. to 4:00 p.m. In the event it becomes necessary for goods to be installed outside these hours comply with the instructions of the Owner. Deliveries attempted outside these hours without prior consent of the Owner may be turned away. Comply with all instructions of the Owner and the Contractor concerning time of arrival at the site; which entrance shall be utilized for delivery; routes to be taken to reach the installation location; and other matters relating to the orderly and timely installation of the system.

E. Installation shall commence immediately upon delivery of materials to the jobsite, except as directed by Construction Manager. Time required from delivery date to completion of project shall be in accordance with the approved schedules.

F. Test cables upon receipt at Project site.
   1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
   2. Test optical fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
   3. Test each pair of UTP cable for open and short circuits.

1.19 TRAINING

A. Training: Provide training in the operation and maintenance of the system for personnel designated by the Owner. Record owner training sessions on DVD or other agreed upon media, and make training videos available to the owner at no charge. The training shall be organized as follows:

1. The contractor shall instruct personnel designated by the owner in the proper use, basic care, and maintenance of the equipment. Such training shall be provided as an integral component of the system. These training sessions will be on both the general operation and basic programming of these systems.
2. Training shall be provided on the project at the convenience of the owner in blocks of One (1) hour, eight (8) hours total training.
3. One (1) hour training classes for system technical operation and maintenance. This class shall cover the following topics:
   a. Review of signal flow diagrams.
   b. Review of all equipment functions, relevant to the function in this system.
   c. Review of initial equipment settings.
   d. Demonstration of all functional connections from a user perspective.
   e. Review & demonstration of replacement procedures for consumables (e.g., lamps).
   f. Review of manufacturers' recommended routine maintenance procedures.
4. One (1) hour training classes for system engineering concerns. This class shall cover the following topics:
   a. Review of signal flow diagrams.
   b. Review of all equipment functions, relevant to the installation.
   c. Review of initial equipment settings.
   d. Review of manufacturer's recommended routine maintenance procedures.
   e. Review & demonstration of replacement procedures for consumables.
   f. Review & demonstration of control system software replacement/upgrade procedures.

1.20 QUALIFICATIONS

A. It is the sole intent of this section to ensure to the end-user, single source responsibility from a single qualified technology subcontractor.
   1. The Technology Subcontractor (Firm and Employees) shall be experienced in the operations they are engaged to perform.
   2. Bidders must provide documentation that they themselves are factory-authorized representatives of all systems specified. Bidders may NOT sub-contract any portion of this specification.
   3. This Section shall be provided/installed, in its entirety, by a single firm/company that is a qualified technology subcontractor.
   4. The systems integrator must customarily furnish the size, scope and nature of this Section IN ITS ENTIRETY WITH LABOR CONSISTING OF EMPLOYEES WITH WHOM ARE ON THEIR PAYROLL and must be an authorized manufacturers representative, certified, experienced and qualified to provide, install, program, troubleshoot, train, warrant and service all the systems in this Section in there entirety.
   5. The systems integrator must provide (as part of the submittal process) a list of at least three (3) projects (provide the following information for each project: name, address, contact person, title of contact person, telephone number of contact person) of similar size, scope and nature and demonstrate that these projects where; furnished with persons on their payroll whom were authorized, certified,

experienced and qualified to provide, install, program, troubleshoot, train, warrant and service these projects, in their entirety, satisfactorily.

a. For each project listed by the Systems Integrator, provide the following information:
b. List all the systems provided for the project.
c. Manufactures name and model number of each system provided on the project.
d. Manufacturers telephone numbers.
e. Submit a valid certificate from each manufacturer indicating the Systems Integrator is an authorized distributor for the system (or systems).
f. Submit a valid certificate of completion of installation and service training from each applicable manufacturer to the System's Integrator by a present employee of the systems integrator.

B. The system shall be supplied by the manufacturer's authorized representative and must have a minimum of 5 years of representation of the product. Certification shall be submitted verifying that the contractor is the manufacturer's authorized representative. Included shall be certificates for attendance of manufacturer's installation / maintenance training by the contractor's directly employed personnel.

C. The system assemblies shall be completely factory built and tested by manufacturers of established reputation, who have and can refer to similar systems which are currently installed and functioning properly. The factory pre assembled cabinets, consoles, and power supplies shall be approved and listed by a National Recognized Testing Laboratory (NRTL) such as ETL or UL.

D. The contractor shall furnish all equipment, accessories and material required for the installation of a comprehensive System in strict compliance with these specifications and applicable contract drawings. Any material and/or equipment, not specified or described herein necessary for the proper operation of the system shall be deemed part of this specification.

E. The contractor shall make available and maintain a service department capable of furnishing equipment inspection and timely service at the owner's location. The contractor shall be prepared to offer a service contract for the maintenance of the system beyond the factory warranty period.

F. The Technology Contractor must customarily furnish the size, scope and nature of this Section and must be an authorized manufacturer's representative, certified, experienced and qualified to provide, install, program, troubleshoot, train, warrant and service all the systems in this Section in their entirety.

G. The Technology Contractor and his/her Employees shall be experienced in the operations they are engaged to perform.

H. Bidders must provide documentation that they themselves are factory-authorized representatives of all systems specified.

I. Qualification Statement: Submit the following.

1. Up-to-date licenses, certifications, and training certificates for the equipment to be installed.
2. A valid certificate or correspondence from each manufacturer, indicating that the Technology Contractor is an authorized installer and System Integrator for the system(s).
3. A valid certificate of completion of installation and service training of a present employee of the Technology Contractor from each applicable manufacturer.
4. Documented evidence demonstrating bidder has been in business for at least five continuous years, and that his/her primary business is providing systems similar to those specified herein.
5. References: Furnish references from the last five (5) projects of similar size and scope.
    a. For each project listed, provide the following information:
    b. Name of project
    c. Address
    d. Scope of project.
    e. Contact person, title, telephone number.
    f. Name of contact and telephone numbers of General Contractor, Owner's Representative, Architect, and Electrical Engineer.
    g. List all the systems provided for the project.
    h. List manufacturer's name and telephone number.
    i. List each system model number provided on the project.

J. Evidence of ability: Qualified firms shall have demonstrable design and installation training, with certifications of competence.

K. Provide a full time on site Project Manager to supervise the project.

L. Each Foreman and Installer working on this project shall be trained by the Manufacturer whose equipment is being provided on this project. The training shall consist of proper installation techniques of the specific equipment to have a complete operating system that meets or exceeds the requirements specified herein. Each Foreman and Installer working on this project shall have from the manufacturer, documentation indicating that he/she has been adequately trained prior to the start of the project. Only Foremen and Installers who have been properly trained and documented by the manufacturer whose equipment is being provided on this project shall be allowed to install same.

M. Maintain at the site an updated copy of the Manufacturer Trained Installers list, including a copy of their training documentation from the manufacturer. This documentation shall be made available to the Architect upon request.

N. Product Demonstration: The Technology Contractor may be required to provide product demonstrations and interviews with the owner and his representatives or may be required to provide side-by-side demonstrations with other vendors. These demonstrations may be required before a contract is issued. Offerors should be prepared to demonstrate each feature called for in this specification.

1.21 PERFORMANCE REQUIREMENTS

A. Examine all Project Specifications and Drawings for requirements that affect work of this Section, whether or not such work is specifically mentioned in this Section.

B. All system configuration(s) shall be included to attain a fully functional system and shall be within the Scope of work of the awarded contractor of this Bid package.

C. Environmental Conditions – System(s) shall withstand the environmental conditions without mechanical or electrical failure, damage or degradation of its operating capacity

1.22 SEISMIC REQUIREMENTS

A. Equipment and work shall meet the restraint requirements for a Seismic Zone - 2 locations, including installation and connections of material and equipment to the building structure.

B. Manufacturer Seismic Qualification Certification: Submit certification that distribution racks, patch panels, and their components will withstand seismic forces defined in DIVISION 26 Section "Electrical Supports and Seismic Restraints." Include the following:
   1. Basis for Certification: Base certification on the maximum number of components capable of being mounted in each rack type. Identify components on which certification is based. Indicate whether withstand certification is based on actual test of assembled components or on calculation.
      a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
      b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

C. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity of each rack-mounted component and of each assembled rack type, and locate and describe mounting and anchorage provision.

D. Detail description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Provide all supports, supplementary steel and channels required for the proper Seismic installation, mounting, and support of all work installed under this Section.

F. All supports, supplementary steel and channels shall be furnished, installed, and secured with all fittings, support rods, and appurtenances required for a complete support or mounting system.

G. Supplementary steel and channels shall be firmly connected to the building construction in a manner approved by the Owner prior to the installation of same. Submit to the Owner, the locations proposed for using supplementary steel and channels for the support of equipment, fixtures, and raceways. The submittal shall indicate the mounting methods,

size, and details of the supports, channels and steel. Submittal shall also indicate the weight that the supports, channels, and supplementary steel are to carry.

H. The type and size of the supporting channels and supplementary steel shall be of sufficient strength and size for seismic restraint and shall allow only a minimum deflection in conformance with the channel and supplementary steel manufacturer's requirements for loading.

I. All supplementary steel and channels shall be installed in a neat and workmanlike manner, parallel to the walls, floor, and ceiling construction. All turns shall be made with 90-degree and 45-degree fittings, as required to suit the construction and installation conditions.

J. All supplementary steel, channels, supports, and fittings, shall be Underwriters' Laboratories, Incorporated-approved, be galvanized steel, and be manufactured by Steel City, Unistrut, Power-Strut, T. J. Cope, Chalfant, or approved equal.

K. Provide supports to meet the required Seismic rating, as indicated under "Part One" of this Specification.

L. Provide beam clamps with set screws (C-clamp type).

M. Work under this Section shall be held in place by Seismic-rated methods.

N. Supporting from the roof decking will not be acceptable.

O. Provide expansion anchors on masonry units or brick work. Power-actuated supports will not be accepted.

P. Support work from the building structure, independent of suspended ceilings, roof deck, or other trades work. Where ductwork, pipes, pipe racks, type of building construction materials, or structural framing members provide obstruction or difficult support means, hanger rods shall be used in association with horizontal Sections of steel support channels, in an approved manner.

Q. All work shall be installed in a rigid and satisfactory manner, and shall be supported by bar hangers in frame construction, or shall be fastened directly with wood screws on wood, bolts with expansion shields on concrete, or brick toggle bolts on hollow masonry units, and machine screws or welded threaded studs on metal. Threaded studs of the proper type and holding capacity, driven-in by a power charge, and provided with lock washers and nuts, are acceptable for mounting of equipment on solid concrete walls or slabs.

R. Obtain written permission from the Owner to allow use of power-activated charges. Use only properly trained and licensed operators.

S. Do not use power charge-driven supports for any work that is to be hung from a horizontal surface without written permission from the Owner.

T. Preset inserts of the proper type and holding capacity shall be used in overhead slab construction wherever possible.

U. Provide lateral supports for work to prevent excessive movement during a seismic event, using rods, braces, or galvanized or stainless-steel cables.

V. Pendants, supports, or hanging rods longer than 12 inches (300mm) shall be laterally braced.

W. Where installed in damp, wet areas, and areas requiring wash-down, all surface-mounted panels, boxes, junction boxes, conduits, etc., shall be supported by spacers to provide clearance between wall and equipment.

1.23 SUBMITTALS

A. Review is only for conformance with the general design criteria.
   1. Review by the Reviewing Authority does not relieve the contractor of responsibility for quantities, submittal errors, omissions or from meeting all the requirements of the Contract Documents.
   2. Approval of item(s) does not relieve the contractor from the responsibility to provide for a fully functioning system(s) as delineated in the specifications and/or drawings associated with the project, or from providing the necessary quantities for the item(s) or from meeting all the requirements of the Contract Documents.
   3. The review is undertaken solely to satisfy Engineer's obligations and does not relieve Contractor from its obligation fully to perform all Contract requirements, nor shall such review give rise to any right or action or suit in favor of Contractor or third persons, against the Owner.
   4. Review does not authorize changes to contract requirements unless stated in separate change order or letter.

B. All data sheets, shop drawings, and coordination drawings shall be submitted at one (1) time in their entirety.

C. Product Data for all materials specified and shown on drawings to be installed.

D. Submittal Format.
   1. Submittals shall be electronically submitted as follows:
      a. All 8 ½ " X 11" to 11' X 17" information shall be submitted in color PDF format
      b. All information larger than 11" X 17" shall be submitted in PDF or AutoCAD format.
         1) Hard copies of this larger format information shall also be submitted with electronic copies.
   2. Provide a Submittal Bill of Materials Index/Equipment List, with column headings that clearly identify the information requested herein for every item submitted.
      a. Each and every specification sheet submitted shall include a page number in the lower outside corner of the sheet. Double-sided specification sheets shall be identified by two (2) separate page numbers.

b. On each and every specification sheet submitted, indicate the applicable part numbers (s), and indicate any applicable related options being submitted for review on the sheet (s) by one of the following methods:
   1) Circling the applicable part number (s)
   2) Putting an arrow next to the applicable part number (s)

3. The Submittal Bill of Materials Index/Equipment List column headings shall identify the following minimum information. Submittals must be submitted using the following "headings" in the order indicated from left-to-right on the Bill of Materials Index/Equipment List:
   a. All Bill of Material items shall be listed in the Bill of Material Index/Equipment List.
      1) Bill of Material Index/Equipment List shall be in the SAME ORDER AS THEY APPEAR IN THE SPECIFICATION, starting from the beginning of the specification.
      2) Provide reviewing authority with an electronic file/copy of the Bill of Material Index/Equipment List.
   b. "Specification Paragraph # Information", reference specification paragraph/line number/location, that identifies each individual item, for every item specified and submitted.
      1) Example of paragraph/line number/location: 2.13, B., 7., c., 4), e) Power Supply
   c. "Description" of each item
   d. Manufacturer's "Name" for each item
   e. Manufacturer's "Model #" for each item
   f. "Quantity" of each item being provided for reference use.
   g. "Submittal Page Number(s)" of data/specification sheet(s) for each item

E. Example of cover page for the Submittal Bill of Material Index/Equipment List column headings for each and every item submitted:

1. Spec. Pharag. # - Descri. – Manu. Name – Manu. Model # - Qty. – Data Sheet Page # (s)

2. 2.12, C., 4, b., 2). UPS APC SUM1500RMXL 6 27 to 31

3. Any submittal that does not include a submittal Bill of Materials, and provides a minimum of the information requested herein, shall be rejected without further review and returned to the applicable parties.
4. When this Contractor is responding to submittal review comments by the reviewing authority, provide both the reviewing authorities Comment and the Contractor's written responses electronically in MS Word Format, and forward to the reviewing authority.

F. If proposed equipment deviates from the Specifications or Drawings, indicate in writing on Company letterhead those differences and provide sufficient data to justify acceptance. Failure to indicate deviations or substitutions implies full compliance with drawings and specifications.

G. Shop Drawings and Data Sheets.

1. Shop Drawings for all equipment, floor plan areas and coordination issues, as called for in this Section, shall be required to be submitted to the Construction Manager.
2. It is the intent for the system contractor to prepare and submit, as a single submittal, complete equipment and cabling shop drawings, and coordinated conduit and wiring drawing package.
3. Partial submittals of cable, conduit drawings, and equipment/components, data sheets, WILL NOT be reviewed. They will be returned "Rejected" for non-compliance with the submittal requirements of the contract documents.
4. The Drawings and Specifications are intended to supplement each other so that any details or equipment shown on the Drawings and not mentioned in the Specifications or vice versa shall be executed the same as if mentioned in the Specifications and shown on the Drawings. Shop Drawings shall reflect this coordination of Drawings and Specifications.
5. Submit a set of complete Shop Drawings, by system, showing equipment to be installed. Include system configuration block diagrams of all equipment, indicating equipment type and model numbers. Show each and every component, system and subsystem, as well as all proposed connections between system components, and proposed layouts of equipment racks for the entire system.
    a. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
    b. Wiring diagrams to show typical wiring schematics including the cross-connects.
    c. Cross-connects and patch panels. Detail mounting assemblies and show elevations and physical relationship between the installed components.
    d. Cable tray layout showing cable tray route to scale with relationship between the tray and adjacent structural, electrical and mechanical elements.
6. The Contractor shall submit, for approval, in accordance with General and Supplementary General Conditions, in the Submittal Format requested in this section, Shop Drawings; Data Sheet Package and if requested Samples of the equipment being provided.
    a. Conduit and wire routing drawings of all work in ceilings, walls and floors.
    b. All rack, console, and related device mounting and housing equipment.
    c. Any other component of system as specified herein or as called for in the Drawings, or as required to achieve specified system operation.
7. All Shop Drawings and samples shall be returned to the Contractor for corrections and additional information and shall be resubmitted, properly corrected, and with required supplemental information.
8. Shop Drawings and Data Sheets that shall be re-submitted under the following criteria:
    a. The shop drawing and Data Sheet documents shall be resubmitted with a copy of the engineer's original review report. The resubmission will respond in writing to each item of the engineer's original review report, specifying what has been done to update, change, and/or rectify the original comment.
    b. The shop drawing and Data Sheets documents shall be resubmitted as a whole package, NOT AS A PARTIAL SUBMITTAL, unless coordinated with the engineer prior to submission. These resubmissions need to include

all shop drawings and Data Sheets, whether previously approved or not, and shall include new submission index/bill of materials and dates as if the package were a brand new submittal

9. Under no condition shall the contract Drawings be re-titled, or otherwise reprocessed, and used as a Shop Drawing submission.

H. Coordination Drawings.
1. The Contractor shall create field installation Coordination Floor Plan Drawings, which specifically convey the required conduit size to accomplish specified system operations using conduit, equipment and cabling submitted in the Shop Drawings.

I. As Built/Record Drawings And O&M Manuals
1. The Contractor shall create and maintain in accordance with the General Conditions and this Section, the following evidence of the "As-Built" condition of the project.
2. The Contractor shall maintain, on the job site, one complete dedicated set of Drawings and Specifications of all items which are part of the system's installation and all changes of materials, equipment, or dimensions from the contract documents or shop drawings shall be recorded and kept current on a daily basis and shall be made available to the Engineer at all times during the construction process.
3. Upon completion of the work, Contractor shall furnish final As-Built Drawings showing work as actually installed, to be submitted as a part of the "Project Manual."
4. Submission shall be signed by the Contractor with a certification attesting to correctness, and marked "As-Built", and dated, with Contractor's title block. Final submission shall also be provided on CAD disks, using AutoCAD latest version at time of creation.
5. Provide "As Built" architectural quality plan Drawings at 1/8 inch = 1 ft-0 in. scale. Provide an electronic copy of the "As Built" drawings on CD(s).
6. Simplified single line block diagrams showing the interconnection of all equipment and functional relationships. Show all equipment, patch panels, cables and jacks, whether connected or not. The intent of these diagrams is to provide sufficient clear and complete information that a technician of average skill may efficiently troubleshoot and service the system, even if unfamiliar with the installation.
7. All technical diagrams and drawings shall be mounted on the wall behind a clear plastic cover for protection. There shall be 1 set of the above drawings and diagrams provided per equipment room, this includes both the MDF Room and all IDFs.
8. Operations and Maintenance Manuals (O&M)
   a. The manual should be laid out in a neat and concise format and should include an index, which will correlate with major subsystem index tabs. Each index tabbed section should also be broken down further with individual colored separator pages between subsections and/or individual devices.

b. The manual shall be submitted either in 3 ring binder or bound booklet fashion format with a front cover and spine that indicate the job, the system and the date of submission.

9. A legend explaining all abbreviations and details.

J. Test Reports

1. Test reports are required for the work of this Section. These reports shall be submitted to document pre-acceptance factory equipment "burn-in" test, as well as documentation of all site tests performed for final system functional checkout and acceptance. Two test reports shall be submitted as required for review and record documentation purposes.

K. Rigging and Mounting Drawings

1. Submit full size drawings outlining mounting and installation details of all equipment requiring integration with cabinetry or architectural elements.
2. Details, stamped and signed by an appropriately licensed engineer, of all equipment mounting methods and materials provided by the Scope of Work, wherein failure of method or materials used for mounting or hanging permanently installed equipment could result in serious personal injury.
   a. Details provided by or requiring approval by licensed engineer may include: method of attachment to building structure or attachment and/or suspension points; method of attachment to supported equipment; all suspension materials; a materials list including specifications of all suspension materials; calculations used to determine loads and strengths of suspension materials, other as deemed necessary by the engineer.
3. In the absence of submitted approved, stamped and signed mounting and hanging details, the Owner reserves the right to acquire such engineering approval at the expense of the Contractor. Owner will notify Contractor of such intent. Contractor shall remedy within two weeks or Owner may proceed without Contractor approval and without relieving Contractor from any other obligations set forth by Contract.

L. Color Selection

1. Color options for all items as applicable coordinate with Architect.
2. Wall plate finishes should be coordinated with the Architect.

M. Samples

1. Color and finish samples of any furniture or lecterns coordinate with Architect (if applicable).

1.24 CLOSEOUT SUBMITTALS

A. At the completion of the installation, but before Final Acceptance, provide for review and approval the following, in compliance with DIVISION 1 Section Closeout Procedures.

1. Operation and Maintenance Manuals:
   a. Equipment manufacturer's operation and service manuals for each make and model of equipment.

b. System Operation Manual. Produce a manual specifically for the subsystems detailed herein. The manual shall describe all procedures necessary to activate each system to provide for the functional requirements, except as specifically excluded by the Owner. This section shall provide a simple "How-to" users guide for the procedures needed to operate the system. This document shall contain a section on operating the systems equipment in the event of control system failure. Control system touch panel layouts shall be accompanied by narrative text describing "step-by-step" function engagement.

2. Warranty
   a. Provide list and dates of activation of equipment warranties
   b. Provide original manufacturers' certificates.
3. As-built Drawings
   a. Include contractor generated (mark-up of contract documents is not acceptable) digital record diagrams for all systems including, but not limited to:
   b. Schematic wiring diagrams with cable markings.
   c. Internal wiring diagrams of the equipment rack cabinets.
   d. Custom equipment modifications.
   e. Final test results and nominal settings for all adjustable controls.
4. Software Passwords (if Applicable)
   a. Software Passwords Schedule (i.e., a spreadsheet listing the manufacturer, model number and location in the Facility, of each piece of audio/video equipment, the software for which is password-protected).
   b. Provide to Owner's Representative as a secure document separate from
   c. Operating and Maintenance Manuals and As-Built Drawings.
5. Software and Firmware Operational Documentation:
   a. Software operating and upgrade manuals.
   b. Program Software Backup: On USB media or compact disk, complete with data files.
   c. Device address list.
   d. Printout of software application and graphic screens.
6. Editable Control System Codes
   a. Provide the final control system codes in an editable format.
7. Laminated Instruction Cards
   a. Provide 8 ½ x 11 Instruction cards, approved by the Owner. Laminate step-by- step instructions outlining system operations for each room that has an Audio system. Provide editable file of card to Owner.

B. Operation and Maintenance Data: For system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
   1. Microsoft Windows software documentation.
   2. PC installation and operating documentation, manuals, and software for the PC and all installed peripherals. Software shall include system restore, emergency boot media and drivers for all installed hardware. Provide separately for each PC.
   3. Copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware.

4. System installation and setup guides with data forms to plan and record options and setup decisions.

C. Record/Documents
1. Provide all Record Drawings, “As-built” Drawings, and Project Documentation Ten (10) working days prior to Substantial Completion of each construction phase of the work of this Contract.
2. Provide "as-built" in electronic format, AutoCAD 2016 or above, with at least the minimum information including "required linkages", "other linkages" and "user codes" required by EIA/TIA 606 for the following:
   a. Pathway Records
   b. Termination Hardware Records
   c. Space Records
   d. Termination Position Records
   e. Cable Records
   f. Grounding Records
3. Provide “as-built” drawings in hard copy and in electronic format, AutoCAD 2016 or higher, with the following information.
   a. All cable identifications.
   b. All Wire Closets and Racks identified.
4. Provide complete test reports for all cable systems.
5. Provide all warranty information.
6. “As-built” drawings shall be submitted for approval prior to final inspection for acceptance of the work for each construction phase of the project.
7. Availability of approved “as-built” drawings shall be a prerequisite for scheduling any final inspection for acceptance of the work for this Section.

D. Operational guidelines shall be given in written form in sufficient numbers so that all key personal have operational instructions for programming, use and special features. Copies of these instructions shall be provided for permanent record in the operations and maintenance manuals specified herein.
1. Provide for each system and applicable field devices.

E. Lists of extra materials, spare parts and replacement components recommended to be stored at the site for ready access.
1. See MAINTENANCE MATERIALS Section
   a. Provide (1) of each type of field device

F. Obtain written receipts of acceptance closeout submittals submitted. Receipts shall specifically detail what is being delivered (description, quantity, and specification section) and shall be dated and signed by firm delivering materials, and by the Owner's Representative.

1.25 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.
   1. Coordination
   2. Coordinate this Section with work of other Project Manual sections and associated trades.
   3. Specific references, herein, requiring coordination of certain work shall not obviate responsibility for other required coordination.
   4. Coordinate access to the site and all facets of the installation with the GC. Attend coordination meetings as needed.

C. Standards and Codes
   1. Comply with
      a. Local, state and federal codes
      b. Applicable National Electrical Code
      c. American National Standards Institute
      d. Underwriters' Laboratories, Inc. standards.
   2. All equipment, material, accessories, and loose items provided by Contractor shall be new and shall conform to applicable requirements of the above-mentioned agencies.
   3. If required by local authorities, provide certificates and labels indicating compliance with above-mentioned codes and standards where applicable.

D. Point of Contact
   1. Designate to the Owner in writing, the responsible person who shall ensure timely and consistent communication with the Owner on progress of the contract. The designated representative shall have full knowledge of all engineering and production procedures and shall report status of the installation and upcoming work plans to the Owner's Project Manager and Consultant on a weekly basis.
   2. Project manager shall have successfully managed not less than two (2) projects of similar size and scope (as defined in previous sections). Bid submission shall detail the percentage of time that the project manager and other key personnel will be involved with the project.

E. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
   1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings, and field testing program development by an RCDD.
   2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. DIVISION 27 Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.

H. Grounding: Comply with ANSI-J-STD-607-B.

1.26 MATERIAL AND EQUIPMENT STANDARDS

A. Manufactures:
   1. Manufacturers are listed for the purpose of establishing a specification standard for that particular item. Other manufacturers shall be considered for approval, provided they meet or exceed all the specification requirements.

B. Except where no substitutions are indicated, where materials or equipment are specified by patent proprietary name or name of the manufacturer, such specification is used for the purpose of establishing a standard for that particular item. If more than one manufacturer is listed, the Contract Documents are based on the first manufacturer listed, and every other manufacturer is considered a substitution.

C. If three or more manufacturers are indicated without the term "or equal", or "or approved equal", then the material and equipment shall be supplied by one of those indicated and that material and equipment shall conform in all respects to the Drawings and Specifications.

D. No equipment or material shall be used, furnished, or installed unless previously reviewed and accepted by the Architect.

E. Materials shall be new, unused, of recent manufacture, not previously installed, full weight, standard, and the best quality of its kind and acceptable to the Architect.

F. Provide NRTL-listed or labeled products whenever there are NRTL standards, listings, or labeling available for that product category.

G. The Specifications or notes and description following a catalog number is basically to identify the item, but may also call for accessories, options, or modifications that are not indicated in the catalog number.

H. Provide products of one manufacturer for each classification of equipment.

I. State of the Art Development
   1. Supply only the manufacturer’s latest developed product. In cases where product development surpasses the criteria of the specification, inform the Architect and make the newer product available to the project at no additional cost. In no case shall discontinued or obsolete equipment be acceptable. The same requirement applies to software programs developed/updated during the warranty period.
   2. Should a manufacturer discontinue a specified product, provide the manufacturer’s recommended replacement at no additional cost to the owner. Should the manufacturer have no direct replacement product, Technology Contractor shall propose a product of equal or greater specification from an alternate manufacturer at no additional cost to the owner.
   3. Should a product recall by a specified manufacturer require temporary or permanent replacement of a product specified under this section, notify the Architect at the earliest possible time and arrange to replace the product in question as quickly as possible.

a. Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the jobsite.
b. Equipment defect or intended recall shall not relieve the Technology Contractor from any contractual obligations with regard to delivery schedule of product.
c. Under no circumstances shall arrangement for alternate product require the Owner to accept superseded equipment except on a temporary basis.

J. Non-Equipment Charges, including but not be limited to:
1. Engineering: Including all required design drawings, run sheets, instruction manuals, console layout, step-by-step user guide, etc.
2. Pre-Installation: Work performed on the Installer's premises including all fabrication, modification, assembly, rack wiring, etc.
3. Installation: Including all on-site installation and wiring, shop drawing, coordination and supervision, testing, checkout, Owner training, etc., performed on the Owner's premises.
4. General and Administrative: Including all shipping, insurance, and guarantees.

K. Owner Furnished Equipment (OFE, OFCI)
1. Identify any Owner Furnished Equipment assumed in the Bid Proposal to be installed and integrated under this contract. Identify all assumed Owner Furnished equipment within each room/space type that will be required to complete the Audio systems installation.

1.27 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the Owner Representative and the respective trades responsible for installing interface work and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Refer to the overall scheduling of the work of the project. Schedule work, process Submittal and order materials and equipment to conform to this schedule and install work so as not to delay nor interfere with the progress of the project.

C. Inform the Architect immediately of any delays or potential delays. Furnish manufacturer's letter to verify order date, equipment delays, expected shipment date, order number, and potential remedies to speed up delivery. Any costs to speed up delivery shall be implemented at no cost to the project if the equipment or material was not ordered as soon as possible after Contract award or within the time frames indicated with the Submittal.

D. Include premium time required to comply with the project scheduling and all project phasing.

E. Be aware of and plan for project scheduling and phasing. Provide for complete continuous operation of all systems. Coordinate scheduling and phasing with the Owner, other Trades, and the General Contractor.

F. Project Phasing:
1. Coordinate with construction manager, other trades and the owner during all project phases. All Communications, Systems, Devices, MDF, IDF's must be maintained at all times unless directed by the specifying authority that phasing requires otherwise. Interruptions and shutdowns shall be scheduled in advance and approved for time to complete work. Tag all cables to remain during all phases to properly keep all Communications, Systems, Devices active. Upon completion of construction, all cables that are not active or tagged to remain for future use, shall be removed end-to-end as per the NEC.

1.28 FINAL ACCEPTANCE AND WORK CLOSEOUT

A. The Technology Contractor shall inspect the entire system installation to assure all work is completed and all systems are completely operational before calling for final inspection, testing and acceptance of work.

B. Punch-List Closeout
1. Notify the General Contractor, the Architect, the Technology Consultant/Engineer and Owner when work is ready for final inspection and punch list preparation.
2. Resolve all punch list items before final invoicing.
3. Final payment will not be authorized until all punch list items have been resolved and completed to the satisfaction of the Owner.

C. After the successful installation inspections and functional testing by Owner and the Technology Consultant/Engineer, Owner will determine if there are any open issues or discrepancies and notify the Technology Contractor. Upon completion or determined failure, Owner will issue written notification to the Technology Contractor as to the status of the installation acceptance.

D. Room Names and Numbers – System Programming
1. This contractor shall include in his bid all costs associated with changing all of the room names and numbers at the end of the job from the names and numbers shown on the construction documents to a new set of room names and numbers, inclusive of all re-programming of all electrical/network systems, etc. Final room numbers will be provided by the Architect to the trade contractors at or around the date of Substantial Completion.

1.29 WARRANTY

A. Furnish a written warranty to Owner for a minimum of:
1. One-year materials warranty on parts and labor to repair/replace defective materials specified herein. This warranty only applies to materials provided by Contractor and does not apply to materials provided by Owner. Resolve all punch list items before final invoicing.
2. Structured Cabling 27 1000, Telecommunications – Twenty-Five (25) year Manufacturer materials warranty on parts and labor to repair/replace defective telecommunications station cabling materials. The installer/contractor shall be

certified by Manufacturer to provide the materials warranty. One-year installation workmanship warranty on parts and labor to resolve problems related to telecommunications system installation workmanship.

B. The Contractor shall be responsible for and make good, without expense to Owner, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation, or poor workmanship.

C. During the warranty period, provide all labor required to repair or replace defects in DIVISION 27 and DIVISION 28 system, at no cost to Owner.

D. During the warranty period, provide new materials to repair or replace defects in the system, at no cost to Owner.

1.30 MAINTENANCE

A. There shall be no cost to the Owner for maintenance performed during the warranty period beyond the fixed cost of the contract.

B. Provide a total of eight (8) engineering/ service labor hours to conduct preventive maintenance and the Owner directed system adjustments.

C. Each visit will include:
1. Conducting subjective and objective tests of the installed systems.

D. Repair and/or adjust any malfunctioning components located by the technician during this testing. Include control system programming updates and modifications as part of this service contract, providing an updated editable copy of the source code to the Owner.

E. Provide a service telephone number, staffed by a qualified technician familiar with the equipment installed. Staff this number during normal business hours.

F. Service response shall be within twenty-four (24) hours of the initial request for service and shall be provided twenty-four (24) hours per day, seven (7) days per week and three hundred sixty-five (365) days per year, for all equipment and system failures.

G. Replace or repair, at no cost to the owner, any failed equipment hardware or software installations required to provide full system operations.

H. During the warranty period, advise the Owner in writing each time any routine software and firmware updates become available, giving the Owner the opportunity to upgrade the software/hardware should they so desire at no additional cost. Provide any necessary system modifications after installation of these updates to maintain a fully functioning system.

I. Provide updates to firmware during service period. Provide any necessary system modifications after installation of these updates to maintain a fully functioning system.

J. Maintenance shall include two (2) semi-annual inspections and tests to verify the intended operation of the system(s). System testing shall include but not be limited to the testing of all devises, fault modes and batteries. A detailed test report indicating these results and any corrective measures shall be furnished to the owner.

K. The Contractor shall provide software and firmware upgrades as required and available to the Owner.

1.31 SCHEDULE OF VALUES

A. As part of the Submittal, provide a Schedule of Values with Unit Pricing.
   1. Unit Pricing
      a. Unit price is an amount proposed by bidders, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.
         1) The unit price for an add-on or deletion shall be the same price.
      b. Unit price shall include all necessary: cost of delivery, insurance, applicable taxes, overhead, profit, hardware, software, labor, faceplate, outlets, back box, conduit, cabling, installation, termination, supervision, cutting & patching, testing, documentation, training, warranty, etc. for a completely operational system, the equipment and components shown in the contract documents.

1.32 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
   1. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.
      a. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

B. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
   2. Interior, Controlled Environment: System components, except central-station control unit, installed in controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
   3. Interior, Uncontrolled Environment: System components installed in non-controlled interior environments shall be rated for continuous operation in ambient

temperatures of 0 to 122 deg F and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250 enclosures.

4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches. Use NEMA 250 enclosures.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
6. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use NEMA 250 enclosures.
7. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

C. Corrosive Areas:
   1. Shall meet code for Ruggedized/Corrosive areas such as: Pool Areas, Freezers, Refrigerators, Shower Rooms, Exterior Devices, etc.
   2. Provide all exterior rated cabling, field devices, equipment and materials within these areas.
   3. These areas shall include but are not limited to the following:
      a. Corrosion-Resistant, highly resistant to interference from heat, humidity, dust and water ingress.
      b. Ruggedized stainless-steal faceplates shall be corrosion-resistant.
      c. Rugged outlet housing
      d. Ruggedized patch cord plug assembly provides a seal with cord, as well as strain, flex and impact relief.
      e. Provide ruggedized protective caps, can be used to protect unused outlets or to seal an outlet during cleaning periods when the outlet and plug may be disconnected. The protective caps shall have a retention chain, which prevents them from being misplaced when not in use.
      f. Cabling shall be outdoor rated from outlet/field device to the headend.

1.33 PROTECTION OF WORK AND PROPERTY

A. Be responsible for the care and protection of all work included under this Section until it has been tested and accepted.

B. Protect all equipment and materials from damage from all causes, including theft. All materials and equipment damaged or stolen shall be replaced with equal material or equipment at the option of the Owner.

C. Materials and equipment stored for this project shall be protected and maintained according to the manufacturer's recommendations and requirements, and according to the applicable requirements of NFPA 70B.

D. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen, and make reparations for any damage caused.

E. Use caution to avoid damage to existing work, and to prevent harm to personnel working in all areas.

F. Observe all safety precautions and requirements for the construction.

G. When open-flame or spark-producing tools, such as blower torches, welding equipment, etc., are required in the process of executing the work, the General Contractor shall be notified not less than twenty-four hours in advance of the time that the work is to begin and the location where the work is to be performed. Provide, where necessary, fire protective covering and maintain a constant non-working fire watch where work is being performed, and until it is completed.

H. The Technology Contractor and the Installer are responsible for initiating, maintaining, and supervising all safety precautions and requirements during construction under this Section.

1.34 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning with Substantial Completion, provide software support for 1-years.
   1. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within 1-year from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
   2. Provide 30-days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS MINIMUM REQUIREMENTS

A. Cabling:
   1. Provide all Plenum Cable throughout facility: Listed and labeled for plenum installation.

B. All materials and equipment shall be new, free from defects, installed in accordance with manufacturer's current published recommendations in a neat manner and in accordance with standard practices of the industry.

C. Where no specific material, apparatus, or appliance is mentioned, any standard, first-class product made by reputable manufacturer regularly engaged in the production of such material may be used providing it conforms to the contract requirements and meets the approval of Owner Personnel and/or the Consultant/Engineer.

D. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.

E. Materials shall meet or exceed the following minimum requirements:
   1. Where applicable, all materials and equipment shall bear the label and listing of UL. Application and installation of all listed equipment and materials shall be in accordance with such labeling and listing.
   2. Equipment shall meet all applicable FCC regulations.
   3. Electrical equipment and systems shall meet UL standards and requirements of the NEC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
   4. The listing of a manufacturer as "acceptable" does not include acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the specifications and meet the quality of the specified item.
   5. Materials and equipment shall bear the manufacturer's name or trademark and model/serial number permanently marked.

F. Products: Quantities are only provided as a convenience. If a quantity differs between the drawing and this text, the greater quantity of items prevails. Items not listed, i.e. connectors, terminal strips, power supplies, etc. are the contractor's responsibility to complete a whole, fully functional system.
   1. All items provided by contractor shall be current models and "brand new" in manufacture.
   2. Demonstration models, tested equipment, or previously used items will not be accepted.
   3. Owner or owner's representative reserves the right to accept or decline any proposed equipment substitute.

G. Custom Manufactured Items

All custom fabricated items are to be submitted in CAD format with submittal package and subject to the approval of the owner or owner's representative. Contractor is responsible for incurring costs if samples of fabricated panels are requested. Custom made panels are to be new in origin and made to order for this specific project.

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. Provided by DIVISION 26 Electrical Contractor.

B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

C. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

D. Sleeves for Rectangular Openings: Galvanized sheet steel.
   a. Minimum Metal Thickness:
   b. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
   c. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.3 SLEEVE SEALS

A. Provided by DIVISION 26 Electrical Contractor.

B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Metraflex Co.
      d. Pipeline Seal and Insulator, Inc.
   2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
   3. Pressure Plates: Plastic. Include two for each sealing element.
   4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 GROUT

A. Provided by DIVISION 26 Electrical Contractor.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FACTORY ASSEMBLED PRODUCTS

A. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for the final assembled unit:
   1. All components of an assembled unit need not be products of the same manufacturer.
   2. Constituent parts, which are alike, shall be the product of a single manufacturer.
   3. Components shall be compatible with each other and with the total assembly for intended service.
   4. Contractor shall guarantee performance of assemblies of components and shall repair or replace elements of the assemblies as required to deliver the specified performance of the complete assembly.

2.6 COMPATIBILITY OF RELATED EQUIPMENT

A. In order to prevent incompatibility between any of the components for their proper operation and anticipated required function of the finish product, whether specified and/or as an approved equal product, the Technology Contractor shall be responsible to provide assured conformity of all operating systems to the Technology Consultant/Engineer prior to the purchase and/or installation of all equipment under this Section.

2.7 SPECIAL TOOLS AND KITS

A. The Contractor shall furnish any special installation equipment, tools, or kits necessary to properly complete the DIVISION 27 and/or DIVISION 28 system installations that the contractor is responsible for installing. This may include, but is not limited to, tools for pulling, splicing, terminating, and testing the cables, communication devices, stands for cable reels, cable wenches, assembly and adjustment devices, etc.

2.8 FIRESTOPS AND PENETRATION SEAL MATERIALS

A. Provided by DIVISION 26 Electrical Contractor.

B. Use qualified systems to firestop through penetrations in fire-rated walls and floors for pipes, cables, conduits, ducts, inner-ducts, and cable trays.

C. Firestopping for openings through fire and smoke-rated walls and floor assemblies shall be listed or classified by an approved independent testing laboratory for “Through-

Penetration Firestop Systems." The system shall meet the requirements of "Fire Tests of Through- Penetration Firestops" designated by ASTM E814.

D. Inside all conduits, the firestop system shall consist of a dielectric, water-resistant, non-hardening, permanently pliable/re-enterable putty along with appropriate damming or backer materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal cable movement without being displaced.

E. Foam sealant shall meet all fire test and hose stream test requirements of ASTM E-119-73 and shall be UL classified as a wall opening protective device.

F. Provide devices/systems fire tested by a third party according to ASTM E 814 (or UL 1479) tested under positive pressure.

G. Provide specific combinations of materials installed and supported or anchored.

H. Provide only material combinations that are qualified by independent agencies based on the material's performance when tested in a particular configuration.

I. Match the thickness (and/or depth) of firestop materials to that recommended by the manufacturer.

J. Thickness of materials must be established by formal ASTM E814 or UL 1479 tests.

K. Firestop for fire-rated floors and walls: Specified Technologies, Inc (STI), EZ-Path

2.9 ANCHORING MATERIALS AND SUPPORTS

A. Metal bars, plates, channel tubing, shall confirm to ASTM Standards:
   1. Steel plates, shapes, bars and grating – ASTM A36
   2. Cold-formed steel tubing – ASTM A500
   3. Hot-rolled steel tubing – ASTM A501
   4. Steel pipe – ASTM A53, Schedule 50, welded

B. Metal fasteners shall be zinc-coated.

C. Anchoring Materials:
   1. Structural Steel
   2. Steel Channel: Galvanized or Painted
   3. Uni-Strut

2.10 GROUNDING AND BONDING MATERIALS

A. Provided by DIVISION 26 Electrical Contractor.

1. Technology Contract shall provide interface to local Bonding and Grounding material points.

B. Mechanical Connectors: Bronze

C. Bonding Conductor: 6 AWG minimum copper

D. All grounding equipment shall be UL Listed for that purpose.

2.11 SURGE AND LIGHTNING PROTECTION FOR OUTDOOR & UNDERGROUND CABLES (IF APPLICABLE)

A. Provide Surge and Lightning Protection for all exterior copper cables above ground and all copper cables underground.

B. All surge and lightning protection devices shall be connected to a low inductive path to earth ground.

C. All exterior mounted surge and lightning protection devices shall include weatherproof housings.

D. Provide lightning protection devices with the proper voltage rating for the applicable cable applications, per manufacturers' recommendations.

E. For Non-Fiber Cables (i.e. 25V Speaker, 24V Clock, 24V Intrusion Alarm, 24V Access Control, etc.)
   1. DEMARC TO MDF - all cables run from the DEMARC to MDF through underground conduits shall be OSP rated cables with each conductor protected on both ends by lightning/surge protectors. Lightning/surge protectors shall be equivalent Citel #E280 series, see the following additional information for the application.
   2. MDF to IDF - all cables run from the MDF to IDF Closets through underground conduits shall be OSP rated cables with each conductor protected on both ends by lightning/surge protectors. Lightning/surge protectors shall be equivalent Citel #E280 series, see the following additional information for the application.
   3. MDF, IDF, OTHER INTERIOR LOCATIONS, ETC. to exterior locations - All cables run from the MDF Closet, IDF Closets, etc. to Exterior Locations through underground conduits shall be OSP rated cables with each conductor protected on both ends by lightning/surge protectors. Lightning/surge protectors shall be equivalent Citel #E280 series, see the following additional information for the application.
      a. Basis of design Manufacturer. CITEL, 1515 N W 167th Street - Suite 5-223, Miami, FL 33169, TEL: 800-248-3548 / 305-621-0022 or L-com Inc., Erico or approved equal. Base was first word
      b. Surge Protection Device. Base used is a Citel #FP10-110.
         1) Cable Capacity: 10 pairs
         2) Connector type: 110.

3) Module Capacity: 4 Citel #E280-24V Module used for the applicable applications.
4) 25V Public Address.
5) 24V Clock Applications.
6) 24V Intrusion Alarm.
7) 24V Access Control
8) Other low voltage cabling applications.

2.12 SURGE PROTECTED POWER STRIP

A. Provide for all low-voltage systems including:
   1. All DIVISION 27 and 28 Systems including Headends and associated sub-panels,

B. Provide products meeting the requirements of the Drawings and Specifications from one of the following Manufacturers
   1. APC, Wiremold, Sentrex, TrippLite, or S.L. Waber.

C. Surge protected power strip shall be provided:
   1. For all Racks and Cabinets: Rack mount type with 10-foot cord.
   2. For all Wall, Ceiling or other type of Mounted Equipment.

D. Surge protected power strip with six NEMA 5-15R outlets 15-amp capacity, 120 volts, UL 1449 listed, maximum surge current of 33,000 amps, clamping voltage of 260 volts, maximum 5 picosecond response time, resettable overload circuit breaker, surge suppression warning light, surge protection for line to neutral, line to ground, neutral to ground, EMI/RFI filters. One required for each load up to 1200 watts (total of individual connected equipment loads).

2.13 UNINTERRUPTIBLE POWER SUPPLIES

A. Uninterruptible Power Supplies are shall be APC Smart-UPS #SU SUA2200RM2U. Provide six feet (6') custom extension cord.
   1. APC Smart-UPS #SU SUA2200RM2U, or equal
      a. Output Power Capacity: 1980 Watts / 2200 VA
      b. Nominal Output Voltage: 120V
      c. Output Voltage Distortion: Less than 5% at full load
      d. Output Frequency (sync to mains): 47 - 53 Hz for 50 Hz nominal, 57 - 63 Hz for 60 Hz nominal
      e. Waveform Type: Sine wave
      f. Output Connections: (2) NEMA 5-20R and (6) NEMA 5-15R
      g. Nominal Input: Voltage 120V
      h. Input Frequency: 50/60 Hz +/- 3 Hz (auto sensing)
      i. Input Connections: NEMA 5-20P
      j. Surge energy rating: 480 Joules
      k. Filtering: Full time multi-pole noise filtering: 0.3% IEEE surge let-through: zero clamping response time: compliant with UL 1449
      l. Regulatory Approvals: BSMI, CSA, UL 1778, FCC Part 15 Class A

m. Interface Port(s): DB-9 RS-232, Management Interface Slot, USB
n. Management interface: included
o. Manufacturer's Warranty: 2 years repair or replace

B. Confirm quantities needed for each rack or cabinet with the owner before installing.
1. Provide a minimum of:
a. (2) for the MDF in the project and shall be installed in bottom of rack or cabinet.
b. (1) for each IDF rack or cabinet in the project and shall be installed in bottom of rack or cabinet.
c. (1) for each Cabinet installed in the bottom of the cabinet, including:
1) Security System Cabinet
2) Public Address System Cabinet
3) All other Cabinets

2.14 EQUIPMENT CABINETS

A. Manufacturer: Provide products meeting the requirements of the Drawings and Specifications from one of the following Manufacturers:
1. Chatsworth, Great Lakes, Hubbell, Middle Atlantic, or approved equal.

B. Free Standing, Wall Mounted and Roll Out Rotating Equipment Cabinets (Provide quantity as required).
1. Provide for system equipment that is part of this project, including but not limited to:
a. Dedicated Cabinet for:
1) Video Surveillance System Servers and Rack Mountable Headend Equipment
2) Door Access Control System Server and Rack Mountable Headend Equipment
3) Intrusion Alarm System Server and Rack Mountable Headend Equipment
4) Audio/Video Door Intercom Server and Rack Mountable Headend Equipment
b. Dedicated Cabinet for:
1) Public Address and Intercom System Server and Rack Mountable Headend Equipment
2) Master Clock System Server and Rack Mountable Headend Equipment
3) Telephone System Server and Rack Mountable Headend Equipment
4) Other Technology Low Voltage System Servers and Rack Mountable Headend Equipment that is indicated in contract documents and part of the Technology Contractors Scope of Work.
c. Dedicated Cabinet for Each:
1) Specialized Local Sound System Rack with Mountable Headend Equipment

C. Free Standing Equipment Cabinet (Provide quantity as required) If Applicable.

1. Racks shall be extruded (not sheet metal) with square hole equipment mounting rails. Mounting holes that require supplemental threaded clips are specifically prohibited.
2. Equipment Cabinets shall be 84 inches, seven feet (2134 mm) high, 24 inches (600 mm) wide, and 31.5 inches (800 mm) deep, free standing cabinets as indicated on the drawings. Cabinet features shall include the following:
   a. Cabinets shall be welded construction, steel or aluminum, piano-hinged doors with keyed locks and access handles on front and rear. Door locks shall be keyed alike. Color shall be approved by the Architect. Front door shall have integral shatter-proof vision panels in a metal frame. Rear door shall be steel with the upper half having ventilation louvers.
   b. Integral EIA nineteen-inch (518 mm) wide, four (4) post equipment rack. Rack shall be as described herein this specification. Rack shall be located within the cabinet in order to properly mount all passive and active electronic components.
   c. Shelves for electronic equipment with load-carrying capacity to support at least 125 percent of each piece of electronic equipment weight. Shelves shall have adequate openings within them to dissipate heat and allow for adequate electronic equipment ventilation.
   d. Mounting brackets (rails) shall be adjustable and specifically designed to support the equipment installed within the cabinet.
   e. Hook and loop (Velcro) cable strain-relief system on rear of rack to support horizontal and backbone cables. Tie-wraps are specifically prohibited.
   f. Hook and loop (Velcro) horizontal and vertical cable management on front of rack to support patch cable and cross-connect wiring. Tie-wraps are specifically prohibited.
   g. Hook and loop (Velcro) cable management system independent of Structured Cabling management to properly dress the electronic equipment power cords through the cabinet, maintaining as much clearance between the two as possible. Tie-wraps are specifically prohibited.
   h. Integral fans and louvers to adequately ventilate the equipment within the cabinets. The individual cabinet shall have adequate ventilation in order to have a temperature within the cabinet be no greater than 88 degrees F based on an ambient room temperature of 78 degrees F in the warmer months of the year and 68 degrees F in the colder months of the year.
   i. Bonding and grounding cables for all equipment not directly bolted to equipment rack (i.e. shelf mounted electronic equipment, etc.).
   j. Bonding and grounding bus bar with individual set screw terminals for at least six #6 Cu. bonding cables.
   k. Surge protected power strip as described in this specification.
   l. Patch panels as described in this specification.
   m. Blank/louvered panels, where required, to fill gaps between equipment within the rack.
   n. All hardware, supplementary steel, channel and supports as required properly assembling the cabinet and securing it to the building structure.
3. All equipment cabinets and their hardware shall be properly assembled and match in appearance and shall be provided by the same manufacturer.

D. Wall Mounted Equipment Cabinets (Provide quantity as required) If Applicable.
   1. Mounting Height – The top of the Wall Mounted Cabinet shall be mounted 72 inches AFF.
   2. Racks shall be extruded (not sheet metal) with square hole equipment mounting rails. Mounting holes that require supplemental threaded clips are specifically prohibited.
   3. Racks shall be extruded (not sheet metal) with 10 - 32 threaded equipment mounting holes. Mounting holes that require supplemental threaded clips are specifically prohibited.
   4. Each wall Mounted Equipment Cabinet shall be a swing-out wall-mount cabinet, sized appropriately to accommodate at least 125 percent of the equipment to be installed. Cabinet features shall include the following:
      a. Cabinets shall be welded construction, steel or aluminum, piano-hinged doors with keyed locks and access handles. Door locks shall be keyed alike. Color shall be approved by the Architect. Front door shall have integral shatter-proof vision panels in a metal frame.
      b. Integral EIA 19-inch (518 mm) wide, four (4) post equipment rack. Rack shall be as described herein this specification. Rack shall be located within the cabinet in order to properly mount all passive and active electronic components.
      c. Shelves for electronic equipment with load-carrying capacity to support at least 125 percent of each piece of electronic equipment weight. Shelves shall have adequate openings within them to dissipate heat and allow for adequate electronic equipment ventilation.
      d. Mounting brackets specifically designed to support the equipment installed within the cabinet.
      e. Hook and loop (Velcro) cable strain-relief system on rear of rack to support horizontal and backbone cables. Tie-wraps are specifically prohibited.
      f. Hook and loop (Velcro) horizontal and vertical cable management on front of rack to support patch cable and cross-connect wiring. Tie-wraps are specifically prohibited.
      g. Hook and loop (Velcro) cable management system independent of Structured Cabling management to properly dress the electronic equipment power cords through the cabinet, maintaining as much clearance between the two as possible. Tie-wraps are specifically prohibited.
      h. Integral fans and louvers to adequately ventilate the equipment within the cabinets. The individual cabinet shall have adequate ventilation in order to have a temperature within the cabinet be no greater than 88 degrees F based on an ambient room temperature of 78 degrees F in the warmer months of the year and 68 degrees F in the colder months of the year.
      i. Bonding and grounding cables for all equipment not directly bolted to equipment rack (i.e. shelf-mounted electronic equipment, etc.).
      j. Bonding and grounding bus bar with individually set screw terminals for at least six #6 Cu. bonding cables.
      k. Surge-protected power strip as described in this specification.
      l. Patch panels as described in this specification.

m. All hardware, supplementary steel, channel and supports as required to properly assemble the cabinet and secure it to the building structure per manufacturer's recommendations.

5. All equipment cabinets and their hardware shall be properly assembled and match in appearance and shall be provided by the same manufacturer.

E. Roll out Rotating System (Provide quantity as required)

1. EIA compliant 19" roll out rotating system in steel host enclosure shall be Middle Atlantic or equal
2. Racks shall be extruded (not sheet metal) with square hole equipment mounting rails. Mounting holes that require supplemental threaded clips are specifically prohibited.
3. Products model # WR-44-42. Overall dimensions shall be 24" W x 88.86" H x 42.875" D. Rotating design of rack allows enhanced access to rear equipment connections, simplifying wiring. Rack will have a 36" useable depth and the rack frame shall be housed in a 42.875" depth host enclosure.
4. Rack shall be of fully welded construction. Weight capacity shall be 750 lbs. when 1/2 of total equipment weight is mounted in lower 1/3 of the rack. Rack shall be constructed of the following materials:
   a. top and bottom (rack and outer frame) and roller carriage shall be 14-gauge steel; side panel and horizontal braces shall be 16-gauge steel.
   b. Rackrail shall be constructed of 11-gauge steel with tapped 10-32 mounting holes in universal EIA spacing with black e-coat finish and marked rackspaces.
   c. Rack shall have removable split rear knockout panels with 1/2", 3/4", 1" & 1-1/2" electrical knockouts installed in base and removable split rear knockout panels with 1/2", 3/4", 1" & 1-1/2" electrical knockouts and BNC knockouts for UHF / VHF antennae installed in top.
   d. Knockouts on sides to accommodate 4" electrical conduit and cable pass-through. Detachable rack frame allows for off-site integration. Roll out frame ships installed in rack. Rack shall be UL Listed in the US and Canada.
5. Rack shall be GREENGUARD Indoor Air Quality Certified for Children and Schools. Rack shall be RoHS EU Directive 2002/95/EC compliant.
6. Rack shall be manufactured by an ISO 9001 and ISO 14001 registered company.
7. Rack shall be warrantied to be free from defects in material or workmanship under normal use and conditions for a period of three years.
8. Rear rail kit shall be 11-gauge, 10-32 threaded, sold in pairs, hardware included part #WR-RR-XX (XX = # of rackspaces, refer to chart)
9. Top panels, 16-gauge steel, model # MW-VT (vented top), # MW-4FT (four 4-1/2" fans)
10. Integrated fan tops shall include a proportional speed thermostatic fan control and (4) 4-1/2" quiet fans, model # MW-4QT-FC.
11. WR rear access panel shall be constructed of 18-gauge steel and shall be part # WR-RAP-24 (24 = # of rack spaces)
12. • Grommet ring for 4" electrical knockout in side of WR shall be part # GK4, 4 pieces
13. • Gland grommet for 4" electrical knockout in side of WR shall be part # GK-4G, 4 pieces

F. Equipment cabinets with cables entering from above shall have enclosed square raceway to above ceiling. Raceway shall be code gauge steel, sized per code, attached and terminated at equipment cabinet and building structure with approved bushed terminations. Raceway shall be painted to match equipment cabinets.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. The requirements of Part 1 and Part 2 of the Specifications also apply to the execution of the work.

B. Include the cost of all work in order to avoid work stoppages and jurisdictional disputes. The work shall conform to precedent agreements and decisions of record. Jurisdictional assignment shall be a responsibility under this Section's contractual obligation.

C. The approximate locations of existing (if applicable) and new outlets, cabling, field devices, equipment and materials will be indicated on the project drawings; however, the drawings are not intended to give complete and accurate information. Contractor is responsible to field verify existing locations prior to submitting quote. Determine the exact location after thoroughly examining the general building plans and by actual measurements before and during construction, subject to the approval of Owner and/or the Consultant/Engineer.

D. Request the General Contractor to provide, as soon as possible after approval, two copies of approved submittals of equipment that requires electric service, electric connections, or electric controls. Review these submittals for characteristics and return the submittals to the General Contractor, noting any non-agreement within two weeks of receipt.

E. Equipment and systems shall not be installed without first coordinating the location and installation of equipment and systems with the General Contractor and all other Trades.

F. Before construction work commences, visit the site and identify the exact routing for all pathways and equipment placement. Verify all dimensions, locating the work and its relation to existing work, all existing conditions and their relation to the work and all manmade obstructions and conditions, etc. affecting the completion and proper execution of the work as indicated in the project drawings and specifications.

G. If core drills are required, the exact core locations shall be identified and coordinated with Owner.

H. All equipment locations shall be coordinated with Owner, other trades and existing conditions to eliminate interference with required clearances for equipment maintenance and inspections.

I. Coordinate work with Owner, other trades and existing conditions to determine exact routing of cable, cable tray, hangers, conduit, before fabrication and installation.

J. Install cabling and equipment to facilitate maintenance and repair or replacement of equipment components. Provide easy, safe and code mandated clearances at equipment racks and enclosures, and other equipment requiring maintenance and operation. Coordinate with Owner exact location and mounting height of all equipment in finished areas, such as equipment racks, termination equipment, communication and electrical

devices. As much as practical, connect equipment for ease of disconnecting, with a minimum of interference with other installations.

K. Coordinate ordering and installation of all materials and equipment with long lead times or having major impact on work by other trades so as not to delay the job or impact the schedule.

L. Set all equipment to accurate line and grade, level all equipment and align all equipment components. All work shall be installed level and plumb, parallel and perpendicular to other building systems and components.

M. Provide all scaffolding, rigging, hoisting and services necessary for delivery, installation, and erection of materials, equipment, and apparatus furnished into the premises. These items shall be removed from premises when no longer required. Use of Owner owned supplies and equipment is prohibited.

N. Comply with NECA 1.

O. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

P. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

Q. Equipment: Install to facilitate service, maintenance, and repair or replacement of system components all applicable DIVISION 27 and DIVISION 28 systems and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

R. Right of Way: Give to piping systems installed at a required slope.

S. Change Orders, Modifications, Revisions, and Directives:
   1. When change orders, modifications, revisions, or Architect's Directives are issued or authorized, provide the required additional material, equipment, personnel, and workers to prevent delays in the work, and to complete the work within the time limit of the Contract, unless a specific time extension is requested with the change and accepted. Include costs for expediting deliveries, where required.
   2. Requests for additional compensation shall be submitted broken down and associated by item, task and Drawing, or sketch number, with material and labor costs, so that quantities can be easily verified.
   3. Requests shall be properly and adequately identified so the scope of work can be clearly determined. Indicate who originated change in work.
   4. Cost breakdowns shall be submitted complete with backup for material and labor units and costs. Backup shall consist of actual vendor invoices or quotes, or from well-known national organizations such as R.S. Means Company, National Trade Service, Union labor rates or approved equal. Installing firm's in-house standard database for labor units may be used if consistent with the national organizations.

5. Submit on all credits, broken down as requested for add-ons. Credits shall be separately identified and accounted for. Do not indicate as net changes with add-ons.
6. Unit costs for labor and material shall be equal for add-ons, deletions and credits.

T. Additionally
1. All installation work shall be in accordance with, but not limited to, this specification and drawings. Work practices shall be performed in accordance with applicable standards, requirements, and recommendations of Federal and Local authorities having jurisdiction.
2. All discrepancies discovered and any discrepancies which are apparent at the date of submission of bids, shall be immediately corrected without additional charge to the Owner.
3. Clearly label all user controls for intended use and nominal setting. These labels shall be engraved and filled, or equal. Note: “Dymo” labels are not acceptable.
4. All equipment to be rack mounted shall be supplied with the appropriate rack mount kits.
5. All rack mounted equipment that does not require user interface shall have a cover plate or vent panel to block access to the controls.
6. All rack and instructor stations shall include “security type” screws to secure rack-mounted components.
7. All equipment shall be firmly secured in place unless requirements of portability dictate otherwise. Unless granted specific permission by the Owner, install and secure all boxes, equipment, etc., plumb and square.
8. Fastenings, mounting brackets and supports shall be adequate to support their loads with a safety factor of at least five (5). A safety chain or cable will be tied to all equipment suspended from above.
9. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
10. Installation to include all standard safety practices. Fastenings, cabling, and supports for all fixed equipment must include a minimum safety standard factor of three or greater.
11. Provide adequate ventilation for all active electronic equipment.
12. All lines installed in conduits shall be splice free. Cabling shall be free from installation damage.
13. All cables to be numbered and identified in “As Built Documents”. Provide permanent cable identification.
14. Project shall be adequately staffed at all times. Coordination with other trades and cooperation is mandatory.
15. All equipment shall be installed without dents, scratches, free of marks and blemishes.

U. System Software
1. Develop, install, and test software and databases for the complete and proper operation of systems involved. Assign software license to Owner.

V. Any and all material installed, or work performed, in violation of above requirements shall be re-adjusted and corrected by the Installer without charge.

3.2 INTEGRATOR/INSTALLER

A. Company will have 3 similar projects installed within the last 3 years.

B. Integrator/Installer must be certified in the product and have attended a certification training class within the last 24 months. A certificate of training must be submitted with the submittals.

C. Integrator/Installer will have direct Access to the product and licensed to buy, sell and repair equipment with a direct agreement with S2.

3.3 CONFORMITY AND COMPATIBILITY PRIOR TO INSTALLATION

A. In order to prevent incompatibility between any of the components for their proper operation and anticipated required function of the finish product, whether specified and/or as an approved equal product, the Technology Contractor shall be responsible to provide assured conformity of all operating systems to the Technology Consultant/Engineer prior to the purchase and/or installation of all equipment under this Section.

3.4 WORKMANSHIP

A. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.

B. Good workmanship and appearance shall be considered of equal importance with systems. Lack of quality workmanship shall be considered sufficient reason for rejection of a system in part or in its entirety. Carefully lay out all work in advance and install in a neat and workmanlike manner in accordance with recognized good practices and standards. Provide workmen who are skilled in their craft and a competent Project Manager who will be on the job at all times.

3.5 WIRING METHODS

A. Install wiring in metal pathways and wireways.
   1. Minimum conduit size shall be 1.00” inch. Control and data-transmission wiring shall not share conduits with other building wiring systems.
   2. Comply with requirements in DIVISION 26 "Pathways for Electronic Safety and Security."
   3. Comply with requirements in Section 260536 "Cable Trays for Electrical Systems."
   4. Comply with requirements in Section 270536 "Cable Trays for Communications Systems."

B. Install plenum cable in environmental air spaces, including plenum ceilings.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."

D. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

E. Wiring within Enclosures:
1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Install conductors parallel with or at right angles to sides and back of enclosure.

F. Support cables not enclosed in raceways on J-Hooks. Install, size, and space J-Hooks to comply with TIA/EIA-568-B.

G. Wiring Method: Install cables in raceways unless otherwise indicated.
1. Except raceways are not required in accessible indoor ceiling spaces and attics.
2. Except raceways are not required in hollow gypsum board partitions.
3. Conceal raceways and wiring except in unfinished spaces.

H. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

I. Refer to specific DIVISION 27 and DIVISION 28 Sections for additional information and details.

3.6 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1 and NFPA 70.

B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.

C. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

D. Install UTP, optical-fiber, and coaxial cables and connecting materials after spaces are complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

E. General Requirements for Cabling:
1. Comply with TIA-568-C.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels. Leave a minimum of 6 inches (150 mm) of slack at outlet terminations and coil loosely into box after termination on outlet fitting.

4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Maintain minimum cable bending radius during installation and termination of cables.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions. Do not exceed manufacturer's rated cable-pulling tension.
9. Riser Cable: Riser cable support intervals shall be in accordance with manufacturer's recommendations.

F. Installation of Cable Routed Exposed in Finished areas:
1. Pathways: Cabling shall be run within conduit or cable-tray with solid bottom, properly sized for all cabling, pathways provided by DIV. 26 ELECTRICAL.

G. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Cable [72 inches (1830 mm)] long shall be neatly coiled not less than [12 inches (300 mm)] in diameter below each feed point.

H. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-C recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communication cables or cables in nonmetallic pathways and unshielded power conductors and electrical equipment shall be as follows:
    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
3. Separation between communication cables in grounded metallic pathways and unshielded power lines or electrical equipment shall be as follows:
    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between cables in grounded metallic pathways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or hp and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

I. Audio-Video Cable Installation

1. Cables shall be installed in conduit. Cables of different levels shall be in separate conduits and adhere to the following schedule of placement:

	Mic	**Line**	**Speaker**	**AC Power**
Mic	Same	6” apart	12” apart	12” apart
Line	6” apart	Same	12” apart	6” apart
Speaker	12” apart	12” apart	Same	Adjacent
AC Power	12” apart	6” apart	Adjacent	Same

2. All wired microphones shall include at a minimum a 30ft. patch cable with heavy-duty jacket and XLR connectors (if applicable).
3. Loudspeakers operating at 8 ohms shall be installed with 12AWG cable as a minimum size/diameter.
4. Wall plate and floor box input/output panels shall be installed with audio/ video line drivers on runs exceeding 35ft (if applicable).
5. All cabling shall be neatly strapped, dressed, and adequately supported. Any exposed cabling shall be neatly enclosed in a protective covering.
6. Terminal blocks, boards, strips, or connectors shall be furnished for all cables, which interface, with racks, cabinets, consoles, or equipment modules.
7. All audio signal lines shall be balanced at Audio I/O plates. Provide ninety (90) degree connector adapters for all audio cabling at custom Audio I/O plates.
8. All cables shall be grouped according to the signals being carried. In order to reduce signal contamination, separate groups shall be formed for the following cables:
   a. Power cables
   b. Data cables (when applicable)
   c. Audio cables carrying low level signals
   d. Audio cables carrying line and high level signals
9. Supply cables as required to meet system performance standards. Any cabling installed in walls or ceilings shall be plenum rated. All cables shall be cut to the length dictated by the run plus the required service loop to permit future equipment movement and relocation.
10. For equipment mounted in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.

11. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer. Notify the construction manager in the event that a field condition interferes with the proper installation of any cables or equipment.
12. All RJ-45 connectors used for audio-visual transport shall utilize rugged connectors.
13. Grounding Procedures: In order to minimize problems resulting from improper grounding and to achieve maximum signal-to-noise ratios, the following grounding procedures shall be adhered to:
    a. General: Because of the great number of possible variations in grounding systems, follow good engineering practice, as specified herein, and to deviate from these practices only when necessary to minimize crosstalk and to maximize signal-to-noise ratios in the audio, video, and control systems. Inform the Consultant in the event that there is a deviation from the standard grounding practices prior to actually performing the work.
    b. System Ground: A single "system ground" shall be established for the system. All grounding conductors shall connect to this system ground. The system ground shall be provided in the equipment rack, and shall consist of a copper bar of sufficient size to accommodate all secondary ground conductors.
    c. A copper conductor, having a maximum of 0.1 Ohms total resistance, shall connect the system ground bar to the nearest grounded, metallic electrical conduit of at least 2 inches in diameter. Be responsible for determining if the metallic conduit is properly electrically bonded to the building ground system, and shall show the grounding path of a document that is provided with the system documentation.
    d. Secondary system grounding conductors shall be provided from all ungrounded equipment in each area, to the primary system grounding point for the area. Each of these grounding conductors shall have a maximum of 0.1 Ohms total resistance.
    e. Under no conditions shall the AC neutral conductor, either in the power panel or in a receptacle outlet, be used for a system ground.
14. Audio Cable Shields: All balanced audio cable shields shall be grounded at one point only.
15. For ungrounded portable equipment, such as microphones, the shield shall be connected at both ends but grounded at only one end.
16. Non-continuous cable supports
    a. Audiovisual cables shall be supported AFC with adjustable non-continuous cable supports.
    b. Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of audiovisual cables.
    c. Non-continuous cable supports shall have flared edges to prevent damage while installing cables.
    d. Installation and configuration shall conform to the requirements of the current revision levels of ANSI/ EIA/TIA Standards 568 & 569, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
    e. Do not exceed load ratings specified by manufacturer.

f. Follow manufacturer's recommendations for allowable fill capacity for each size non- continuous cable support.
g. Non-continuous cable supports shall be ERICO Cable Cat TM J-hook series or approved equal.

3.7 CONNECTIONS

A. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

B. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
1. Use crimping tool and the die specific to the connector.
2. Pretwist the conductor.
3. Apply an antioxidant compound to all bolted and compression connections.

C. Shielded Cable: Bond the shield of shielded cable to the signal ground. Comply with TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when grounding screened, balanced, twisted-pair cables.

D. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

3.8 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to DIVISION 26 Section "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:
1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.9 INSTALLATION OF HANGERS, SUPPORTS AND PATHWAYS

A. Provided by DIVISION 26 Electrical Contractor.

B. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

C. Installation of Pathways
1. Cable Trays: Comply with NEMA VE 2 and TIA-569-B.
2. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.

3. Comply with requirements in DIVISION 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
4. Install manufactured conduit sweeps and long-radius elbows whenever possible.
5. Pathway Installation in Equipment Rooms:
   a. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
   b. Install cable trays to route cables if conduits cannot be located in these positions.
   c. Secure conduits to backboard when entering room from overhead.
   d. Extend conduits 3 inches above finished floor.
   e. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
6. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.10 CUTTING AND PATCHING

A. Provided by DIVISION 26 Electrical Contractor.

B. Provide all cutting, patching and core drilling, etc., as necessary for work. Locate holes and outlets to be drilled and coordinate with work of other trades. Obtain approval of Owner prior to cutting or core drilling holes greater than ¾" in structural members.
   1. Cut and drill from both sides of walls and/or floors to eliminate splaying.
   2. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering and other finished surfaces. Patch and/or paint openings and damaged areas equal to existing surface finish.
   3. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.
   4. Openings for electrical work shall be carefully caulked or grouted as required. Spare conduits shall be tightly capped.
   5. All cutting in the building construction made necessary to admit work, repair defective materials, defective workmanship, or by neglect of the Contractor to properly anticipate his requirements, shall be done in accordance with these specifications with no additional cost to Owner. Patching shall be complete in every detail. Actual work involved in the repairs shall be done by skilled craftsmen in the trade involved.
   6. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.11 CONCEALMENT

A. Use existing conduit and cable trays where possible and practicable. Conceal all project work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impracticable, notify Owner and/or the Consultant/Engineer before starting that part of the work and install only after approval.

3.12 EQUIPMENT MODIFICATION

A. Where existing (if applicable) equipment is to be modified, Contractor shall furnish materials and labor as necessary to modify or add to the equipment. Modifications shall be done neatly with factory parts and assemblies approved for the application. Modification shall in no way jeopardize the compliance of existing equipment with any governing codes and regulations.

3.13 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR PENETRATIONS

A. Sleeves and Seals provided by DIVISION 26 Electrical Contractor.

B. Install sleeves and sleeve seals at penetrations of floor and wall assemblies. Comply with requirements in DIVISION 26 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

C. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

D. Penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

E. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

F. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

G. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

H. Cut sleeves to length for mounting flush with both surfaces of walls.

I. Extend sleeves installed in floors 2 inches above finished floor level.

J. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

K. Seal space outside of sleeves with grout for penetrations of concrete and masonry
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

L. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in DIVISION 07 Section "Joint Sealants."

M. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Section 07 8413 Section "Penetration Firestopping."

N. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

O. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

P. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.14 FIRESTOPS AND PENETRATION SEALS

A. Provided by DIVISION 26 Electrical Contractor.

B. Apply firestopping to penetrations of fire-rated floor and wall assemblies for all applicable DIVISION 27 and DIVISION 28 system installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Section 07 8413 Section "Penetration Firestopping."

C. Comply with TIA-569-B, Annex A, "Firestopping."

D. Comply with BICSI TDMM, "Firestopping Systems" Article.

E. All new and existing penetrations through fire-rated walls, floors, ceilings, etc. shall be sealed to prevent of the spread of smoke, fire, toxic gas, or water through the penetration either before, during, or after a fire. The fire rating of penetration seal shall be at least that of the wall, floor, or ceiling into which it is installed, so the original fire rating is maintained. The installation shall provide an air and watertight seal. This includes all existing cables and pathways to remain within the project area.

F. All new and existing conduit and sleeve openings used for the project shall be waterproofed or fireproofed upon cable placement through such passageways in compliance with Connecticut Building and Fire Codes.

G. Patch all openings remaining around and inside all new and existing conduit sleeves and cable penetrations to maintain the integrity of any fire-rated wall, floor, ceiling, etc.

H. Manufacturer’s installation standards shall be closely followed (minimum depth of material, use of ceramic fiber, procedures, etc.)

I. Brick, Concrete, and Concrete Block Walls:
   1. Provide metallic “sleeving” systems for routing of cables through these surfaces.

2. Ensure that sleeve extends from the front and back of the wall only far enough to attach the required bushing or collar.
3. Secure sleeves in place according to manufacturer's specifications.
4. Provide firestop seal between sleeve and wall, but do not use firestopping material to support or secure sleeve.
5. Firestop around any inner-duct used to contain fiber optic cable through a wall.
6. Firestop ends of "sleeving" or inner-duct after installation of cable, without exception.

J. Floor Openings:
1. Install firestop materials to stop openings between "sleeving" (or other supporting material) and core.
2. When coring through concrete flooring, use boots and packing materials to fashion core before installing firestopping materials.
3. If rectangular openings exist in concrete floors, use steel "sleeving" to fashion opening before installing firestopping materials.
4. Firestop around any inner-duct used to contain fiber optic cable through a floor.
5. Firestop openings in slots, sleeves or ducts after installation of cable, without exception.

K. Cable Trays:
1. Close cable tray penetrations with a qualified firestopping system.
2. Install the system according to the manufacturer's instructions.
3. Ensure that system provides proper support and relief of firestop materials.
4. Firestop materials must be easily removable if required.
5. Firestopping materials must provide for installation of cable through the opening without the replacement of material.
6. Use of intumescent sheets of approximately .5-inch maximum thickness is preferred.
7. Manufacturers: Subject to compliance with requirements, provide products by one of the following
    a. Chatsworth Products
    b. Cooper B-Line
    c. Middle Atlantic Products
    d. Other Approved Equal
8. Cable Tray Materials: Metal, suitable for indoors.
9. Nominally 18 inches wide, and a rung spacing of 12 inches (300 mm)

L. Fire-rated Gypsum Walls:
1. Sleeve all penetrations of gypsum walls used for cable routing if cable is not in conduit or inner-duct (fiber).
2. Firestop seal between sleeve, conduit, or inner-duct and wall on both sides of the wall.
3. Use qualified firestop systems to seal penetrations in gypsum wallboard assemblies.
4. Verify that penetration conditions fall within the following firestop system parameters:
    a. Hourly Rating

b. Opening Size
c. Annular Space

5. Install the firestop system symmetrically on both sides of the wall.
6. Install the materials according to manufacturer-tested methods.
7. Box out gypsum penetrations used for cable trays.
8. Firestop gypsum box with qualified system.
9. Use identical guidelines for penetrations of hollow lath or plaster surfaces.

M. Other Firestopping:
1. Firestop through penetrations according to the guidelines for the basic construction of the two outermost layers of the combination wall.
2. Firestop load-bearing stud walls that are part of combination walls by enclosing (i.e., boxing) the penetration in the cavity.
3. Firestop partial penetrations according to the recommendations for the type of wall being penetrated.
4. Firestop any penetrations which violate the fire-rating integrity of vertical shafts.
5. Firestop openings around outlet boxes installed in fire-rated walls, on both sides.

N. Firestop Installation Methods
1. Use drop cloths to protect other surfaces when installing.
2. Firestop completely around each cable individually – do not stop bundles of cables.
3. If using putty around a vertical penetration, use putty to build flooring of seal, fill with fiber or rock wool to required thickness, then top with putty according to Manufacturer's specifications.
4. The methods used shall incorporate qualities that permit the easy removal or addition of conduits or cables without drilling or use of special tools.
5. The product shall adhere to itself to allow repairs to be made with the same material and to permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling, and resulting reduction in fire rating.

O. The installed firestop system shall meet the requirements of "Fire Tests of Through-Penetration Firestops" designated ASTM E814.

P. Seal all foundation penetrating conduits and all service entrance conduits and sleeves to eliminate the intrusion of moisture and gases into the building. This requirement also includes spare conduits.

Q. Spare conduits shall be plugged with expandable plugs.

R. All service entrance conduits through the building shall be sealed or resealed upon cable placement.

S. Entrance conduits with cables in them shall be permanently sealed by firmly packing the void around the cable with oakum and capping with a hydraulic cement or waterproof duct seal.

T. The firestop system shall be submitted to Owner at the preconstruction meeting with a list or map of each location and system number used for the project.

3.15 ANCHORING METHODS

A. Anchor and brace all cabling, material, and equipment installed under this DIVISION as required by all codes, regulations, and standards. Provide required supports, beams, angles, hangers, rods, bases, braces, straps, struts, and other items to properly support project work. Supports shall meet the approval of Owner.

B. Supports shall be fabricated from structural steel, steel channel, or uni-strut, rigidly bolted or welded to present a neat appearance.

C. Fastenings and supports shall be adequate to support loads with ample safety factors.

D. Fasten hanger rods, conduit clamps to building structure.

E. Use toggle bolts, spider type expansion anchors, or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls.

F. Use lead expansion shields or expansion anchors or preset inserts in solid masonry walls.

G. Use self-drilling anchors or lead expansion anchor on concrete surfaces.

H. Use sheet metal screws in sheet metal studs.

I. Use wood screws in wood construction.

J. In pre-cast structures, use cast-in inserts wherever possible. Expansion anchors can be used with caution, but only with prior approval.

K. In cast-in-place concrete, use expansion anchors, preset inserts, or self-drilling masonry anchors.

L. Use lead expansion anchors, or preset inserts on metal surfaces.

M. Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.

N. Power-actuated anchors, plastic or fiber expansion anchors, and drive pin anchors are prohibited

O. Do not drill structural steel members.

P. Any anchoring must be able to be unsecured and removed should relocation be required. The old Hilti HIT-pin is not acceptable.

Q. Where necessary and with approval from Owner, modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit project work. If necessary in stud walls provide special supports from floor to structure above.

R. For precast panels/planks and metal decks, support communication work as determined by manufacturer and Owner.

S. Provide heavy gauge steel mounting plates for mounting project work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

T. Install freestanding equipment on concrete pads.

U. Support surface mounted cabinets, enclosures, and panelboards with a minimum of four anchors.

V. On exterior concrete walls below grade, provide 1" steel channel stand-offs for cabinets.

W. Use stud bridges at top and bottom of cabinets and enclosures that are flush mounted on hollow drywall walls.

X. Use suitable vibration isolation pads for vibrating equipment.

3.16 GROUNDING AND BONDING

A. Bonding and Grounding material points.
   1. Provided by DIVISION 26 Electrical Contractor.
   2. Technology Contract shall provide interface to local Bonding and Grounding material points.

B. Bond all new metallic cable shields and metallic supporting structures, in all equipment rooms and service entrances, including racks, frames, protectors, and cabinets to the existing technology grounding busbar (TGB), according to the manufacturer's specifications.

C. Do not make connections between the technology busbar system and building electrical grounds, or other types of connections, without Owner approval.

D. Bond metallic surfaces of hardware with #6 AWG grounding wire as straight as possible to the ground source/grounding bus bar.

E. Ensure that the grounding system is physically secured.

F. All grounding conductors leaving the MDF and/or IDF's shall be in a separate conduit from all communication cabling.

G. All grounding items shall be installed in complete compliance with DIVISION 26 and NEC.

H. Install low voltage wiring and cabling to comply with grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter, and Section 270526 and Section 280526 “Grounding and Bonding.”

I. Comply with TIA-607-B and NECA/BICSI-607 and J-STD-607-A.

J. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

K. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.17 EQUIPMENT RACKS, CABINETS, AND BRACKETS

A. Securely mount freestanding and wall-mounted equipment racks and cabinets to the building structure. Equipment racks shall be secured to the building structure at the top and bottom of the rack. 3/8" lag screws and expansion anchors shall be used. Proper quantity of supports shall be utilized. Drywall screws and other types of supports not specifically approved to support equipment are specifically prohibited. Submit mounting supports for approval before installation.

B. Position racks, cabinets, and wall-mounted relay brackets in order to have minimum three-foot clearance for easy access. Equipment racks, cabinets, and relay brackets mounted on or against walls shall have three-foot clearance in front of deepest component. Free-standing equipment racks and cabinets shall have three-foot clearance in front and rear of deepest components. Provide clearance between free-standing equipment racks or cabinets and any other obstruction to allow access from front to rear of rack or cabinet for maintenance.

C. The Electrical Contractor shall provide ladder rack over each rack and cabinet as required to facilitate a neat and orderly installation of cables, and to secure the top of the racks to the structure. Cables shall drop straight down to equipment racks. Ladder racks shall be secured to the structure at both ends, and connected together as required for a complete, contiguous installation. Utilize proper supports to support the ladder rack to the building structure, as well as the equipment rack and cabinet. Submit mounting supports for approval before installation.

D. Install terminating components such as patch panels (UTP, Fiber optic), cable management, etc. into the racks, cabinets and wall-mounted relay brackets.

E. Patch Panels: Mount patch panels onto the rack(s) in top-to-bottom fashion with the first patch panel mounted at the top of the rack. Uniquely label each patch panel according to the numbering convention outlined in the Labeling Section. Each port shall also have color-coded identifiers. Refer to details on the Drawings.

F. Cable Management: All cables shall enter the wiring closet to within the equipment racks and/or brackets. Secure the bundle(s) to the rack strain relief and wire management behind the patch panels, and cross-connect block panels. Install horizontal and side-mounted vertical cable management panels and brackets for routing and management of patch cables. Maintain EIA/TIA and BICSI standards on bundling, supporting, and bend radii.

G. Once the cabling system has been installed and terminated, install all active components and surge-protected power strips into the racks, cabinets and wall-mounted relay brackets.

H. Surge-Protected Outlet Strips: Mount UPS and surge-protected outlet strips per Manufacturer's directions. Refer to details on the Drawings for mounting location.

3.18 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

B. Protect installed cable trays and cables.
   1. Install temporary protection for cables in open trays to safeguard exposed cables against falling objects or debris during construction. Temporary protection for cables and cable tray can be constructed of wood or metal materials and shall remain in place until the risk of damage is over.
   2. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
   3. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

C. Protect installed systems from damage during construction.

3.19 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A and B. Comply with requirements in Section 260553 "Identification for Electrical Systems."

B. Comply with requirements in DIVISION 09 "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
   1. Provided by DIVISION 06 WOOD PLASTICS AND COMPOSITES

C. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:

D. Cables use flexible vinyl or polyester that flexes as cables are bent.

E. Refer to specific DIVISION 27 and DIVISION 28 Sections for additional information and details.

3.20 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

C. Perform operational-system tests to verify compliance with the Specifications and make adjustments to bring system into compliance.

D. Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

E. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

F. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.

G. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

H. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

I. End-to-end cabling will be considered defective if it does not pass tests and inspections.

J. Prepare test and inspection reports.

K. Once installed and the System Checkout is complete, the system shall be demonstrated as operational to the Owner.
   1. If unable to overcome repeated performance deficiencies within thirty (30) days, and if requested to do so by the Owner, remove the equipment and replace at no expense to the Owner.
   2. No warranties shall begin until the Owner has authorized final acceptance in writing.
   3. Right to Revoke Acceptance: If any equipment and/or goods which have been previously accepted, specifically or by the making of payment, are found to have defects, damage, deficiencies, or fail to conform to the specification, for any cause not attributable to the Owner, the Owner may revoke acceptance.

L. Conduct pre-acceptance tests
   1. Perform all system performance checks on the installed systems prior to final acceptance testing. The Owner / Consultant, may witness the pre-acceptance tests. The Owner / Architect may inspect and operate system components in order to evaluate installation progress and technical compliance prior to acceptance testing.

M. Contractor System Checkout
   1. Perform system checkout before acceptance tests are scheduled. Furnish all required test equipment. Perform all work necessary to determine and/or modify performance of the system to meet the requirements of this specification.
   2. During performance testing, all equipment shall be operated under standard conditions as recommended by the manufacture.
   3. Maintain documentation of all performance tests for reference by Consultant during the System Acceptance Tests.
   4. At the conclusion of the tests, return all equipment settings to previously calibrated positions.
   5. Provide written records of all test results in spreadsheet form.
   6. Check all control functions, from all controlling devices to all controlled devices, for proper operation.
   7. Adjust, balance, and align all equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for all level controls and record these settings in the "System Operation and Maintenance Manual."

N. Conduct pre-acceptance tests
   1. Perform all system performance checks on the installed systems prior to final acceptance testing. The Owner / Consultant, may witness the pre-acceptance tests. The Owner / Architect may inspect and operate system components in order to evaluate installation progress and technical compliance prior to acceptance testing.

O. Examine roughing-in for LAN and control cable conduit systems to PCs, Controllers, field devices, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

P. Proceed with installation only after unsatisfactory conditions have been corrected.

Q. Once installed and the System Checkout is complete, the system shall be demonstrated as operational to the Owner.
   1. If unable to overcome repeated performance deficiencies within thirty (30) days, and if requested to do so by the Owner, remove the equipment and replace at no expense to the Owner.
   2. No warranties shall begin until the Owner has authorized final acceptance in writing.
   3. Right to Revoke Acceptance: If any equipment and/or goods which have been previously accepted, specifically or by the making of payment, are found to have defects, damage, deficiencies, or fail to conform to the specification, for any cause not attributable to the Owner, the Owner may revoke acceptance.

R. Refer to specific DIVISION 27 and DIVISION 28 Sections for additional information and details.

3.21 CLEANING

A. Clean installed items using methods and materials recommended in writing by manufacturer.

B. Upon completion of all work and testing, thoroughly inspect all exposed portions of the installation and completely remove all exposed labels, markings, and foreign material.

C. The interior of all boxes and cabinets shall be left clean; exposed surfaces shall be cleaned and plated surfaces polished.

D. Repair damage to finished surfaces resulting from work under this Section.

E. Remove material and equipment from areas of work and storage areas.

F. All equipment shall be clean from dirt, dust, and fingerprints prior to final acceptance.

G. Touch up all damaged pre-finished equipment using materials and methods recommended by the Manufacturer.

3.22 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain each applicable system and components. Such training shall be provided as an integral component of the system.

B. Demonstrate that system functions and integrates properly with applicable systems.

C. Perform demonstration at final system inspection by qualified representative of manufacturer.

D. Systems installed under this Section shall be demonstrated to the Owner and Architect. Demonstrations are in addition to necessary testing and training sessions. Notify all parties at least seven (7) days prior to the scheduled demonstration. Schedule demonstrations in cooperation with, and at times convenient to, all parties, and so as to not disturb ongoing activities.

E. Systems shall be tested prior to the demonstrations and each system shall be fully operational and tested prior to arranging the Acceptance Demonstration. Final payments will be withheld until a satisfactory demonstration is provided for all systems indicated or requested.

F. If the demonstration is not complete, performing all functions, features and connections or interfaces with other systems, or if there is a failure during the demonstration, additional demonstrations shall be arranged.

G. Demonstrations shall be scheduled in ample time to complete all activities prior to final acceptance and Owner occupancy. Demonstrations shall take place at least 30 days prior to the scheduled project completion date and 30 days prior to owner's use and occupancy.

H. As a minimum, provide demonstrations for systems indicated under "Scope of Work" included under Part One of the Specifications. Provide demonstrations of additional systems as requested by the Owner, or Architect.

I. Project Open House:
   1. If the Owner elects to have an open house at the end of the project, provide assistance to the Owner. Cooperate and provide manpower to operate and demonstrate systems during the open house, as requested by the Owner.

3.23 PROJECT OWNER COORDINATION

A. Prior to Substantial Completion of the project and in ample time to address and resolve any coordination issues, request and arrange meetings between the Owner, Owner's Vendors and Consultants, Architect and General Contractor to discuss the Scope of Work for each system being provided, and the interface required for a fully functional and operational system upon project completion. Initial meetings shall be scheduled three months prior to the scheduled Substantial Completion date, or as soon as Submittals are submitted and reviewed for projects with shorter schedules.

B. At these meetings, the required interface shall be reviewed with the Owner, Requests for information required to complete programming or for coordination shall be presented, and system operation and philosophy shall be discussed.

C. Additional meetings shall be held as requested by any party so that all issues are resolved and with the goal and intent that all systems are fully operational and functional upon project Substantial Completion, and that the responsibility for all components required is clearly established.

3.24 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting all applicable systems to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 270500