Fayetteville Public Library Foundation & Fayetteville Public Library

New Library Addition

Audiovisual Systems

March 3, 2020
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SECTION 1 – BIDDING REQUIREMENTS AND CONDITIONS OF THE CONTRACT

PART 1 - GENERAL

1.1 GENERAL


B. Project Number:
   1. The Sextant Group Project number P002997.00

C. Project name: Fayetteville Public Library, New Library Addition.

D. Project Substantial Completion Date and/or Schedule:
   1. Project shall be substantially complete with fully operational systems by October 1, 2020.

E. Minority Business Policy
   1. It is the policy of the Fayetteville Public Library that minority business enterprises shall have the maximum opportunity to participate in the Library's purchasing process. Therefore, the Library encourages all minority businesses to compete for goods, services, and construction contracts.

F. Non-Collusive Affidavit
   1. By submitting a bid, the Bidder and the individual personally signing the bid represent and warrant that such bid is genuine and is neither collusive nor made for or on behalf of any person not named, and that he has neither induced nor solicited any other company to place a sham bid nor directly or indirectly caused another company to refrain from or be unable to present a bid.

G. Non-Discrimination
   1. The Bidder shall not discriminate against, or segregate, a person or a group of persons on account of race, color, creed, religion, sex, sexual orientation, marital status, familial status, national origin, ancestry, disability or condition of acquired immune deficiency syndrome (AIDS) or AIDS-related complex in carrying out its duties and obligations pursuant to this agreement nor shall the company or any person claiming under or through the company establish or permit any such practice or practices of discrimination or segregation. The company must include in any and all subcontracts a provision similar to the proceeding.

H. Penalty for Collusion
   1. If at any time it shall be found that the person, firm or corporation to whom a contract has been awarded has, in presenting any bid, colluded with any other party or parties, then, in the sole discretion of the Library, the contract so awarded shall be null and void or considered breached and the contractor shall be liable to the Library for any and all loss and damage of whatsoever nature, which the Library may suffer and the Library may seek a new contractor.

I. Proprietary Information
   1. All information submitted in response to this bid is public after the bid opening. The bidder should not include as a part of the response to the invitation to bid any information which
the bidder believes to be a trade secret or otherwise privileged or confidential. If the bidder wishes to include such material with a bid, then the material should be supplied under separate cover and identified as confidential. The Library does not warrant or agree to, but will endeavor to, keep that information confidential. Contractor acknowledges that information in the possession of the Library may be subject to the provisions of the Arkansas Freedom of Information Act.

1.2 INSTRUCTIONS TO BIDDERS

A. Definitions

1. Bidding Documents, includes the following:
   a. Bidding Requirements and Conditions of the Contract
   b. General Conditions
   c. Design and Performance Requirements
   d. Appendices
   e. Project Drawings
   f. Addenda (Issued prior to receipt of bids).

2. Bidder: Is a person or entity who submits a Bid.

B. Bidder Representation: Bidder, by submitting a Bid, represents that

1. Bidder has read and understands the Bidding Documents, and Bid is based upon equipment, materials, labor, programming, training, documentation, and support as required by Bidding Documents without exception.

2. Bidder has attended Pre-Bid meeting, if mandatory.

3. Bidder has become familiar with local conditions under which the Work is to be performed within the requirements of the Bidding Documents.

C. Obtaining Bid Documents and Addenda:

1. All bid Documents and subsequent addenda may be obtained via the Fayetteville Public Library website: https://www.faylib.org/doingbusiness-fpl

D. Contractor Qualification Requirements: Bidder shall submit on or before the date of the Pre-Bid Meeting evidence of his/her qualifications to perform the work specified. Contractor qualifications shall be the most current information available but not more than one year old. Submit one copy of documentation to both Owner and Consultant for review and approval. Transmit documentation to be received no later than the scheduled time of Pre-Bid Meeting. All contractor qualifications shall be communicated by way of the enclosed Contractor Qualification Requirements Form (APPENDIX C), and shall include the information listed below.

1. Corporate Profile
   a. Location of Corporate Headquarters
   b. Number of offices and locations
   c. Location of office assigned to this project
   d. Corporate History
      1). How Many years in this business?
      2). Under what former names has your organization operated
      3). Date(s) of incorporation
      4). State of incorporation
      5). Officers names and addresses
e. Litigation Experiences Within the Last 5 Years
   1). Project Related:
      a). Nature of Litigation
      b). Plaintiff or Defendant
      c). Outcome
   2). Non-Project Related
      a). Nature of Litigation
      b). Plaintiff or Defendant
      c). Outcome

2. Financial
   1). Trade and Bank Credit References (List 3)
   2). Dunn & Bradstreet ranking
   3). Insurance Limits
   4). Name of Bonding Company
   5). Name and address of Agent
   6). Maximum Bonding Capacity
   7). Current Bonding Capacity
   8). Performance Bond ever exercised?

3. Staffing
   a. Number and Type of Full-Time Staff
      1). Total number of employees
      2). Number of design staff
      3). Number of installation staff
      4). Number of project management staff
      5). Number of software programming staff
   b. Identify key personnel that will be assigned to this project including:
      1). Project Executive
      2). Project Manager
      3). Systems Engineer/Designer
      4). Lead Installer/Crew Chief/Superintendent/Lead Technician
      5). Control Systems Programmer
      6). Audio DSP Programmer
      7). Commissioning Agent
      8). Trainer
   c. For each Individual listed above provide a resume that includes:
      1). Office Location
      2). Percentage of individual's time that will be allocated to this project
      3). Work History
      4). Previous Project Experience:
         a). The assigned Project Manager shall have a minimum of five (5) years' experience in the fabrication, assembly, and installation of audiovisual systems of similar magnitude and quality to that indicated for this project.
b). The assigned Systems Engineer/Designer shall have a minimum of five (5) years' experience in the fabrication, assembly, and installation of audiovisual systems of similar magnitude and quality to that indicated for this project.

5). Length of Employment


7). The project will utilize XTP products by Extron Electronics. The Contractor's Lead Installer shall hold a current Extron XTP Systems Technician Certification or Extron XTP Systems Design Engineer Certification. The Bidder shall submit the name of the Lead Installer, certification expiration date and certification number.

8). The project will utilize NAV products by Extron Electronics. The Contractor's Lead Installer shall hold a current Extron NAVS Certification. The Bidder shall submit the name of the Lead Installer, certification expiration date and certification number.

9). The project will utilize control system products by Extron Electronics. Due to the potential complexity of the control system, an Extron Certified Control Specialist(s) with active EAP certification shall be required to author the programming component of this project. The Bidder shall provide documentation listing project team member(s) who will create the control system programming including a listing of years of experience, a statement of manufacturer authorization, certification type, date of certification and the certificate number.

10). Due to the potential complexity of the Audio DSP system, a manufacturer certified programmer(s), with active certification(s), shall be required to author the programming for the Audio DSP component of this project. The Bidder shall provide documentation listing project team member(s) who will program the Audio DSP including a listing of years of experience, a statement of manufacturer authorization, certification type and date of certification. In addition to the DSP certifications, the bidder shall provide any audio supportive certifications of merit (i.e. Syn-Aud-Con and AVIXA/InfoComm certifications relevant to audio training and/or CompTIA and Cisco certifications relevant to network training).

4. Resources
   a. A manufacturers' line card for products in which the Bidder is an authorized Distributor or Dealer. Include date initially authorized.
   b. A list of any manufacturers' specialized technical certifications or designations held by the Bidder.
   c. A list of manufacturers for whom the Bidder is an authorized service center.
   d. A list of computer software and/or systems owned by the Bidder, which will be used to communicate, measure, draw, and/or document the project.
   e. A list of system test equipment owned and used by the Bidder, including manufacturer, model number and, where applicable, latest software revision.

5. References
   a. Include three project references, including:
      1). Contact name
      2). Institution name
      3). Phone number
      4). E-mail address
   b. Include three projects of:
1. Similar scope and scale.
2. Similar technology applications
3. Provide Project cost for each
   c. List any past projects where Bidder has worked with the Owner, Consultant, Architects, or Construction Manager who are part of this project team.

E. Mandatory Pre-Bid Meeting: All Bidders are required to attend, and other interested parties are invited to attend, a Pre-Bid Meeting for distribution of information and tour of the Project Site.
   1. Time: 10:00 AM local time
   2. Date: March 10, 2020
   3. Place: Boardroom, Fayetteville Public Library

F. Pre-Bid Request for Information: All requests for information shall be communicated by way of the enclosed Request For Information Form (APPENDIX C). RFI forms may be e-mailed to the Owner at cmoody@faylib.org. Verbal requests for information shall be permitted only during the Pre-Bid meeting. All Bidder questions and responses to Bidder questions shall be issued via Addenda and made public to all Bidders on the Fayetteville Public Library website. All Requests for Information must be received by Owner on the date and time listed below. Requests for Information received after this date shall not be honored.
   1. Time: 5:00 PM local time
   2. Date: March 17, 2020

G. Pre-Bid Substitutions:
   1. Where Bidding Documents refer to any items, materials, products and equipment by means of one or more manufacturer's trade name, catalog reference or similar means of identification of manufacturer, such reference establishes standard of required quality, appearance, dimension or function. It is not an intention of this specification to limit or restrict Bid Responses to those containing products by specific manufacturers, but rather to set a baseline of operational performance and functionality that all Bid Responses must meet or exceed.
   2. Requests for proposed substitution shall be made in writing and submitted electronically to the Owner at cmoody@faylib.org by way of the enclosed Substitution Request Form (APPENDIX C). All substitution request responses shall be issued via Addenda and made public to all Bidders on the Fayetteville Public Library website.
      a. Request shall be received by Owner no later than
         1). Time: 5:00 pm local time
         2). Date: March 17, 2020
      b. Request shall include name of material, product, or equipment to be substituted and a complete description of proposed substitution including drawings, performance and test data and other information necessary to demonstrate that the substitution will meet all intentions of this Specification or required for a complete evaluation.
      c. Bidder shall assume and bear all responsibility for coordinating and performing related changes in the Work necessitated by such substitution and has included such costs in the Bid.
      d. Burden of proof of merit of proposed substitution is upon Bidder.
   3. Some manufacturer's names and product descriptions used in this specification are product specific with no substitutions allowed. These “Brand Specific” products are required to meet compatibility with the Owner’s existing systems and to maintain continuity of support. Refer to Section 4-Appendices for a listing of Brand Specific products.
4. All approved substitutions shall be communicated by Addenda. No Bidder shall rely upon approvals made in any other manner.

5. No substitutions will be considered after award of Contract, unless otherwise approved by Owner.

H. Exceptions: The Contractor shall notify the Consultant, prior to bid submission, of any and all exceptions to these specifications and related drawings. This shall include any errors or omissions in the system design and/or any inconsistencies or ambiguities between package documents that, in the Contractor’s opinion, may impact costs to the Owner or prevent the systems from achieving all purposes of the Specification.

I. Addenda:

1. Written or graphic instruments issued by Consultant prior to execution of Contract, which modify or interpret Bidding Documents by additions, deletions, clarifications or corrections. Addenda shall be binding and become part of Contract Documents.

2. Prior to receipt of Bids, Addenda will be issued to all recorded by Consultant as having received a complete set of Bidding Documents.

3. Bidder is responsible to verify with Consultant that Bidder has received all addenda. Failure to receive such addenda shall not relieve Bidder from any obligation under his/her Bid as submitted.

4. Addenda issued after receipt of Bids will be delivered to the selected Bidder.

J. Subcontract Information: As part of the Bid Response, the Bidder shall indicate any portion of the project for which the Bidder intends to engage a Subcontractor. The Bidder shall further identify all responsibilities and all work to be performed by the Subcontractor. All work performed by the Subcontractor shall be under the supervision of the Contractor and shall be the responsibility of the Contractor.

K. Sales and Use Tax:

1. The Bidder shall provide totals for all applicable state and local taxes where indicated on the bid form.


L. Preparation of Bids:

1. Bids shall be submitted on Bid Form included in Bid Documents (Appendix C).

2. All blanks on Bid Form shall be filled in and executed with non-erasable ink product. Any alteration or erasure shall be initialed by the signer of Bid.

3. Bid Form shall state the legal name of Bidder and shall be signed by person or persons legally authorized to bind Bidder to a contract. Bid submitted by a corporation shall also give the state of incorporation and have corporate seal affixed. Bid submitted by an agent shall have a current power of attorney attached certifying agent’s authority to bind Bidder.

4. The Bidder shall provide line item pricing for all equipment as an attachment. All pricing is to be inclusive of any applicable taxes, shipping, handling, expenses, insurance or other miscellaneous charges. The Bidder agrees that the Owner may increase, decrease, or delete entirely individual items, scheduled quantities of work to be done, or materials to be furnished after execution of the Contract.

M. Submission of Bids:
1. Submit Bid Form provided and with Bid Security and any other required documents enclosed.
2. Submit electronically one (1) copy of all documentation in PDF format.
3. Bidder is responsible for timely delivery of Bids.

N. Bid Receiving:
1. Receiving Time: 5:00 PM local time
2. Receiving Date: March 24, 2020
3. Receiving Place: Electronically to the Owner at cmoody@faylib.org

O. Reservations:
1. These bidding documents do not commit the Owner to award a contract, to pay any costs incurred in the preparation of a bid in response to this invitation, or to procure or contract for services or supplies.
2. The Owner reserves the right to accept, or reject, in part or its entirety, any bid received if it is in the best interest of the Owner to do so.

P. Rejection of Bids:
1. Bidder acknowledges right of Owner to reject any or all Bids, to waive any informalities or irregularities in Bids received and to re-advertise for Bid.
2. The Owner may reject any and all bids and may reject a bid of any party who has failed to perform, been unfaithful and/or delinquent in any former relationship with the Owner.
3. The Owner reserves the right to waive any irregularities or formalities in any solicitation or bid response.
4. The Owner shall be the sole judge as to which bid is best and, in determining that fact, may consider the contractor's business integrity, financial resources, experience, facilities and/or capacity for performing the work.
5. Bidder recognizes right of Owner to reject a Bid if Bidder failed to:
   a. Furnish any required Bid Security.
   b. Submit data required by Bidding Documents.
   c. Complete in any way the Bid Form.
   d. Attend the Pre-Bid meeting.

Q. Award of Contract:
1. Intent of Owner is to award a Contract to a responsible Bidder. In determining low responsible Bidder, consideration will be given to following factors associated with the Bidder, listed in no significant order:
   a. Ability, capacity, and skill to comply with Specifications and perform the Work required by the Contract.
   b. Bidder reputation, experience, and qualifications in installation of professional quality audiovisual systems.
   c. Input from references for similar size and scope projects.
   d. Ability to perform the Contract within time specified with qualified personnel.
   e. Comprehensiveness and timeliness of the project implementation plan
   f. Clarity and completeness of the submitted proposal
   g. Ability of the Vendor to conduct successful contract negotiations with the Library
   h. Affordability and price of the proposed system and with clearly defined annual costs
2. Owner will review all proposals that meet the criteria below and reserves the right to request clarification on any unclear aspect of a proposal.

3. Owner also reserves the right to review proposals based on Owner’s derived understanding provided from any proposal materials presented without clarification from the vendor.

4. It is not Owner’s responsibility to gather information, clarify or consult with a Bidder who may have omitted any requested information.

R. Post-Bid Interview: Upon receipt of Bid Responses, the Owner, Architect, and Consultant may require Bidders to participate in a Post-Bid Interview in Fayetteville, Arkansas. Bidders should be prepared to attend, answer questions, and clarify any discrepancies in Bid Responses.

S. Submission of Post Bid Information:

1. Upon notification by Owner, apparent responsible Bidder shall submit within 5 days:
   a. Designation of the Work to be performed by Bidder with his/her own forces.
   b. List of names of subcontractors, other persons, organizations, or entities (include those who furnish materials or equipment fabricated to a special design) proposed for such portions of the Work designated in Bidding Documents or names of subcontractors proposed for principal portions of the Work.
   c. Bidder shall establish to the satisfaction of Consultant and Owner; reliability and responsibility of persons or entities proposed to furnish and perform the Work described in Bidding Documents.
   d. Prior to final determination of low responsible Bidder, Owner will notify apparent low Bidder in writing if, Owner has reasonable or substantial objection to and refuses to accept any person or firm on list. If Owner has objection, Bidder may withdraw Bid or submit a substitute with adjustment in cost to cover any difference. Owner shall accept adjusted Bid price or disqualify Bidder. In either condition, Bid Security shall not be forfeited.

2. Subcontractors, other persons, organizations, or entities proposed by Bidder and accepted by Owner must be used on the Work for which they were proposed and accepted, and shall not be changed except with written approval of Owner.

1.3 BONDS

A. A bid bond equal to 5% of the original bid or 5% cash bond is required.

B. The Contractor, before the contract is finalized, shall provide a payment and performance bond issued by a surety licensed to do business in Arkansas for the full amount of the contract and any addenda. Bonds shall be valid and exchanged between all parties prior to the start of work.

1.4 INSURANCE

A. Contractor agrees to indemnify and hold harmless the Fayetteville Public Library (Library) and the Fayetteville Public Library Foundation (Foundation) from and against legal liability for all claims, losses, damages, and expenses to the extent such claims, losses, damages, or expenses are caused by Vendor’s conduct, acts, errors, or omissions.

B. Library agrees to indemnify and hold harmless Contractor from and against legal liability for all claims, losses, damages, and expenses to the extent such claims, losses, damages, or expenses are caused by the Library’s and/or Foundation’s conduct, acts, errors, or omissions. In the event such claims, losses, damages, or expenses are caused by the joint or concurrent
conduct, acts, errors, or omissions of Vendor and the Library/Foundation, they shall be borne by each party in proportion to its own conduct, acts, errors, or omissions.

C. The Contractor 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 Contractor 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.

D. Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than One Million ($1,000,000) each occurrence, two Million ($2,000,000) general aggregate, and One Million ($1,000,000) aggregate for products-complete 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; and,
   4. Bodily injury or property damage arising out of completed operations.

E. Automobile Liability covering vehicles owned by the Contractor and non-owned vehicles used by the Contractor, with policy limits of not less than One Million ($1,000,000) 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.

F. The Contractor 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, 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.

G. Workers' Compensation at statutory limits.

H. Employers' Liability with policy limits not less than One Million ($1,000,000 Combined Single Limit) and One Million ($1,000,000) policy limit.

I. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements 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 warranty period. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy.

J. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.
K. To the fullest extent permitted by law, the Contractor shall cause the commercial liability coverage required to include the Owner (Fayetteville Public Library and Fayetteville Public Library Foundation and the Architect, and the Architect's Consultants as additional insureds.

L. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, 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 Contractor.

1.5 PERMITS, FEES, AND LICENSING

A. Any permits, fees and local licensing required to complete the scope of work contained within these documents are the responsibility of the awarded Contractor to procure.

1.6 START OF CONSTRUCTION

A. Work shall not begin until Contractor has received written Notice to Proceed.
SECTION 2 – GENERAL CONDITIONS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. The General Conditions, Requirements, and Special Provisions, of any larger body of specifications, of which this Specification may be a part, are hereby made a part of this Specification. In the event that any clauses or provisions of the larger body of specification conflict with the letter or intent of this Specification, the Contractor shall immediately notify the Consultant for clarification and direction.

1.2 THE SPECIFICATION

A. The “Specification” is defined as the body of documentation provided to the Contractor with the Request for Quotation, as well as all addenda to said documentation. Throughout this document, words such as “herein” refer to the entire Specification, and not just this written document.

B. The Specification includes, but is not limited to:
   1. This written specification document.
   2. All drawings, as listed in the List of Drawings.
   3. Additions and/or modifications as detailed in written addenda.
   4. Additions and/or modifications as detailed in drawing additions or reissues.

C. The purpose of the Specification is to provide sufficient detail for the Bidder to understand the functional requirements of the systems, the installation and performance standards that must be met, and the required scope of work, in order to generate and submit a complete and accurate bid.

1.3 DEFINITION OF TERMS

A. Within this section of the specification, the following definitions shall apply:
   1. The term “Owner” is used to indicate Fayetteville Public Library.
   2. The term “Architect” is used to indicate MSR Design.
   3. The term “Consultant” is used to indicate: The Sextant Group, an NV5 Company, 700 Waterfront Dr., Suite 200, Pittsburgh, PA 15222.
   4. The term “Bidder” is used to indicate that entity generating the bid response.
   5. The term “Contractor” is used to indicate the successful Bidder to whom the Owner has awarded the contract.
   6. The term “Furnish” is used to indicate the responsibility to procure and ship or deliver the item to the job site, freight prepaid, for receipt, staging and installation by others.
   7. The term “Install” or “Installation” is used to indicate the responsibility of receiving the item at the job site, assuring adequate storage, unpacking or uncrating the item, physically securing the item, configuring and testing the item, or otherwise making ready the item for its intended use by following the instructions and approved methods of the manufacturer and any additional requirements described herein.
   8. The term “Provide” is used to indicate the responsibility to both “Furnish” and “Install.”
   9. The term “Provided by Others” shall refer to material and work, which is related to this contract, but has been provided by parties other than the AV Contractor. An example might
1.4 SCOPE OF WORK

A. The Contractor shall provide complete, turnkey audiovisual systems performing all of the services and functions as described herein, together with all other apparatus, cable, materials, labor, tools, transportation, and any other resources necessary to provide a complete system.

B. Specifically, the work shall include, but is not limited to:

1. Coordination
   a. Communicating and coordinating directly with the Consultant, Owner, Architect, and other trades complying with all requirements as defined under this Scope of Work and elsewhere, to fulfill all requirements of this specification.
   b. Scheduling installation operations in sequence required in order to obtain best completion results.
   c. Coordinating installation of different components to assure maximum accessibility for required maintenance, service, and repair.
   d. Verifying required cable lengths for all bulk cable or manufactured cable assemblies prior to ordering as outlined in 'Installation Practices'.
   e. Verifying the accuracy of Master Quote or other quotation numbers prior to ordering.
1. Where given, Master Quote numbers or other quotation numbers have been provided as a convenience to Bidders and are intended to be used for bidding purposes only.

2. Bidding Equipment List subsystem sections, where a Master Quote has been provided, may only show a small number of items to help convey the design intent of the subsystem. Refer to the Master Quote for the expanded list of subsystem components.

3. A Master Quote may not be inclusive of all components or accessory items necessary to provide for a complete, functioning and properly integrated subsystem. The Bidder shall include all miscellaneous materials that may be required to complete the subsystem.

4. Where discrepancies between a Master Quote and the Bidding Equipment List exist, the Master Quote shall rule.

2. Documentation
   a. Generating and submitting Shop Drawings as required for approvals and As-Built drawings as specified herein.
   b. Generating and Submitting “Progress Reports” as defined herein.
   c. Documenting the completed installed systems as defined herein.

3. Design Verification and Acceptance
   a. Verifying the accuracy of the system designs documented in the Specification and acceptance of responsibility. Any issues, discrepancies substitutions, or exceptions to the Specification by the Contractor shall be communicated to the Consultant prior to the purchase of any equipment or materials by way of the Shop Drawings Submittal process. Upon approval of the Contractor’s Shop Drawing Submittal by the Owner’s designated representative, or if the Contractor fails to submit Shop Drawings, the Contractor shall assume all responsibility for supplying such materials and taking such actions as to satisfy the full intentions of the Specification without claim for additional compensation. This shall include providing any incidental equipment, Installation Materials and labor needed in order to result in a complete and operable system, even if such equipment, materials, or labor are not listed in this Specification. Exceptions include Owner-requested changes, unexpected field issues due to work by other trades, or schedule changes initiated by others.

4. Cabling, Equipment, and Installation
   a. Providing all cable in conduits for the specified systems. Place pull string in all conduits after cable installation is complete to allow for future cable installation.
   b. Providing station cables for connection of IP-enabled audiovisual equipment to associated data network outlets, including but not limited to presenter’s computers, production computers, laptop connections, control system processors, codecs, and projectors. This applies to all equipment installed by the Contractor, including Owner-Furnished (OFC) items. Coordinate station cable requirements with the greater building-wide structured cabling system.
   c. Coordinating and providing cable labels as stipulated by the Owner and/or specified herein.
   d. Furnishing and/or installing all equipment as specified.
   e. Installing Owner furnished equipment as specified.
   f. Providing speakers as complete assemblies with back boxes, grilles, tile bridges, wall mounts, hanging hardware and other installation hardware as required.
g. Coordinating with the Architect and Owner on final color selection, and/or the painting of any exposed loudspeakers and any/all exposed system components to match the room's aesthetics and finishes.

h. Coordinating with local entities as necessary (manufacturer, Owner, SBE, FCC, etc.) to determine final channel selection for all wireless devices and resolve conflicts where they may occur.

i. Providing to the Owner, upon completion, all accessories and ancillary items included with the manufacturer's equipment but not used for the physical installation of the device. This shall include all user manuals, remote controls, batteries, tools, installation hardware, carrying cases, protective covers, loose cables, etc. Batteries shall be provided for all battery-operated devices, even if not included by the manufacturer.

j. Furnishing all lifts, ladders, scaffolding or other resources as needed for proper safe installation. Coordinating with other trades as needed.

k. Interconnecting all components, both internal and external to rack cabinets.

l. Ensuring that all cabling, equipment, and terminations are installed in accordance with accepted industry standards, approved Shop Drawings, manufacturer's recommendations and as stipulated herein.

m. Providing cable management hardware as required including that required internal to rack cabinets; that required between pieces of equipment not housed in rack cabinets; and that required to extend cabling from rack cabinets and equipment to the greater facility cabling infrastructure.

n. Providing equipment mounting hardware as required including that required for mounting equipment behind flat panel displays; that required to mount equipment within equipment racks; that required for other locations where equipment will be housed.

o. Providing custom cover plates, wall plates, I/O connection plates, floor box insert plates as required. Coordinate with the Architect and/or Owner on the final selection of finishes.

p. Ensuring that all equipment, with the exception of portable equipment, is firmly fastened or attached in place. A safety factor of at least four shall be utilized for all brackets, fasteners, and attachments. Provide safety retention cables for overhead equipment such as loudspeakers, projectors, etc.

q. Ensuring that all equipment mounting styles and locations comply with the 2010 ADA Standards for Accessible Design.

r. Providing all projector mounts, including guy wires, clamps, or support assemblies back to structural members. Obstructions vary from room to room; Contractor must pay close attention to this issue on a room-by-room basis.

s. Field verifying all projector locations and resolving any obstruction conflicts for optimal performance. The Contractor shall reference the infrastructure drawings for screen sizes and field verify measurements to confirm throw distances to determine the appropriate lens required prior to procurement.

t. Providing all projector lenses as required.

u. Mounting / aligning the projectors so that digital keystone correction is not required. Optical lens shift shall be employed, only if necessary, to align the image with the image area. Where possible all projectors mounted below the ceiling shall be mounted and adjusted to be perpendicular to the screen surface.

v. Coordinating with the General Contractor and/or Electrical Contractor on the audiovisual control system connection to the projection screens, as required.
w. Performing final adjustments to motorized projection screens provided by Others to include:
   1). Screen travel limits as required optimizing the amount of black drop in conjunction with projection system geometry, field conditions and manufacturer recommendations. Refer to the Drawings for specified dimensions.
   2). Tab-tension systems (where specified) to ensure a flat projection surface free of wrinkles, waves or other anomalies which might indicate that the tensioning cables require adjustment.

x. Providing any/all patching, caulking, fire stopping, and painting required to restore damaged finishes during installation.

5. Furniture
   a. Providing audiovisual lecterns and technical furniture as specified.
   b. Coordinating with the Consultant, Architect and Owner on the final selection of all technical furniture including design details (make/model), available options, dimensions, cable management needs, color, and finish.
   c. Coordinating with furniture manufacturer or others who are providing all necessary furniture/millwork modifications ("cut-outs" or other) as required allowing for a neat and professional installation of integrated technology system components. This includes but is not limited to integrated table/lectern "cubbies", table-top microphones, cable management grommets, etc., and providing manufacturers’ cutout templates to others when requested.
   d. Coordinating with the furniture manufacturer, Owner, and Architect on cable management, thermal management, and equipment installation requirements in all spaces so equipped and as outlined in ‘Installation Practices’. Providing manufacturer’s product cut sheets and/or equipment samples where they may be needed to assist in the design by Others towards integrating such equipment into furniture systems or architectural features.

6. Coordination with Owner’s Network
   a. Securing from Owner private IP addresses for use by Ethernet equipped audiovisual devices. No Ethernet equipped device shall be connected to Owner’s network without the express permission of Owner. This shall include but is not limited to configuration parameters such as DHCP, IP addresses, subnet information, VLAN setup and authorization.
   b. Confirming with the Consultant that coordination with the Owner regarding Ethernet equipped audiovisual devices as outlined in ‘Submittals – Software’.

7. Network Electronics for Audiovisual Systems
   a. Furnishing all network electronics supporting audiovisual devices including but not limited to network switches, SPF/QSFP modules and transceivers, stacking modules and cables, power supplies and cables, console cables, licensing for hardware, and support.
   b. Furnishing all copper patch panels with network switches including but not limited to rack mounted and wall mounted patch frames, keystone jacks, prefabricated patch cables, horizontal and vertical cable management hardware, and labeling.
   c. Furnishing all fiber patch panels with network switches including but not limited to rack mounted and wall mounted patch frames, fiber cassettes, prefabricated patch cables, horizontal and vertical cable management hardware, and labeling.
   d. Furnishing a DHCP server installed on an Owner Furnished computer/server as required.
e. Furnishing a DNS installed with fully qualified domain name (FQDN) server on an Owner Furnished computer/server as required.

f. Providing connection to Owner’s network and/or ISP, including any required coordination with Owner’s IT Department.

8. Programming and Software

a. Developing and installing all custom control programming code as required and/or as specified herein.

b. Providing Control System design submittals and two Control System design revisions as outlined in ‘Submittals – Software’.

c. Providing centralized media control systems including GUI (Graphical User Interface) and code development in order to satisfy the guidelines outlined herein.

d. Developing Control System help-desk and system administrator functionality as defined herein.

e. Coordinating with the Electrical Contractor and/or others on the control system interfaces to mechanical systems including motorized screens, as specified.

f. Coordinating with the Electrical Contractor and/or others on the low voltage control system interfaces to facility lighting where specified.

9. Testing, Training, Acceptance, and Warranty

a. Ensuring that all individual components function as intended by this Specification.

b. Ensuring that the entire audiovisual systems function as intended by this Specification.

c. Testing, adjusting, and fine-tuning the completed systems and components.

d. Coordinating and participating in a Systems Performance Verification review with the Owner and/or Consultant.

e. Coordinating and conducting an acceptance walk-through and sign-off session with the Owner and/or Consultant.

f. Providing “sign-off” documents for each space and/or space type as defined herein.

g. Conducting training in systems operation for the Owner’s designated representative(s).

h. Providing a warranty service contract as defined herein.

C. Work Excluded: Work not included under this contract shall be:

GENERAL CONDITIONS

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1. Providing conduit, power receptacles, junction boxes, cable raceways, electrical back-boxes, and floor boxes.
2. Providing lighting fixtures, lighting dimming systems, lighting controllers, and lighting system low voltage AV interfaces at the dimmer side.
3. Providing millwork except where otherwise specified herein.
4. Providing wall or ceiling mounted projection screens.
5. Providing recessed wall boxes for video cameras.
6. Providing blocking as required to support wall-mounted audiovisual components.
7. Providing window treatments and motorized shade system low voltage AV interfaces at the controller side.
8. Providing telecommunications structured cabling systems, including horizontal and backbone cabling and termination, voice and data face plates, associated racks and cabinets, raceway, and cable management.

1.5 SITE CONDITIONS

A. Conflicts: The Bidder shall be responsible for investigating any potential conflicts with site-related or union-related issues regarding use of personnel, scheduling, access to the site, storage of tools and equipment on-site, and other areas of potential conflict. If these issues impact the Bidder’s Bid Response, the impacts on cost and schedule should be clearly noted in the Bid Response.

B. Coordination: In the interest of a coordinated and professional project, the Contractor shall:
   1. Coordinate his/her work with that of other trades. The Contractor should anticipate attending project coordination meetings as required with the Owner, Architect, General Contractor, Consultant or other trades as required.
   2. Afford other trades reasonable opportunity for installation work and for storage of materials.
   3. Staff the job to keep pace with other Trades.

C. Equipment Delivery and Storage: Costs of all shipping to the site, and of all unusual storage requirements, shall be borne by the Contractor. It shall be the responsibility of the Contractor to make appropriate arrangements, and to coordinate with the authorized personnel at the site, for the proper acceptance, handling, protections, and storage of equipment so delivered.

D. Refuse / Cleaning Up:
   1. The Contractor shall keep the site and building free of all debris and clutter, to the satisfaction of the Owner or site manager. On a daily basis, the Contractor shall remove refuse and rubbish related to the specified work from the site and shall leave the relevant areas and equipment clean and in an operational state. The Contractor shall be responsible for repairing any damage caused to the premises by the Contractor’s installation activities, at no cost to the Owner.
   2. At completion of the Work, the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor’s tools, construction equipment, machinery and surplus materials.
   3. If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

E. Use of Site:
   1. Contractor shall adhere to the Owner’s instructions regarding non-smoking, noise, signs, advertisements, firearms and weapons, drugs, and fires.
2. The Contractor shall confine operations at the site to areas permitted by the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

F. Cutting and Patching:
1. The Contractor shall be responsible for cutting, fitting or patching as required to complete the Work or to make its parts fit together properly.
2. The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

G. Access to Work: The Contractor shall provide the Owner and Consultant access to the Work in preparation and progress wherever located.

1.6 JOB CONDITIONS

A. Space Conditions:
1. Architectural reference drawings provided to the Contractor for bidding purposes may not reflect construction site as-built conditions. It shall be the responsibility of the Contractor to field-verify all site conditions relevant to his/her work.
2. The Contractor shall verify dimensions of equipment, equipment arrangements, space availability (including any millwork or cabinetry provided by others) and provide systems that work within the constraints of the space available. The Contractor shall notify the Consultant of any situation where space constraints are a problem, prior to the submission of shop drawings or the ordering or purchase of equipment. The Contractor shall bear the expense of providing alternate equipment, which will work within the available space, if space availability problems are discovered after shop drawings are submitted and approved.
3. If new or changed space condition issues are identified by the Contractor or others after the approval of shop drawings, the Contractor shall provide a proposed solution for the identified issue. The proposed solution shall include any potential impact to cost and/or schedule. Proposed solutions will be reviewed and approved by the Owner, Architect and/or Consultant, or alternate solutions will be recommended.
4. Drawings indicate locations of equipment and components. Changes in the location, and offsets of same to accommodate building conditions, and coordination with the work of other trades shall be made prior to initial installation, without additional cost to the Owner.
5. The Contractor shall ensure during installation that access is provided to equipment and components requiring operation, service or maintenance within the life of the system.
6. It shall be the responsibility of the Contractor to identify any condition where the recommended environmental and/or electrical operating parameters for specified equipment/products cannot be assured. Should such condition exist, it shall further be the responsibility of the Contractor to notify the Architect and Consultant of any such condition.

1.7 POST-AWARD REQUEST FOR INFORMATION

A. All requests for information (RFIs) shall be communicated by way of the enclosed Request For Information Form (APPENDIX D). RFI forms shall be submitted to Owner at cmoody@faylib.org. All RFIs shall identify the issue and provide a proposed solution. The proposed solution shall include any potential impact to cost and/or schedule. Proposed solutions will be reviewed and
approved by the Owner, Architect and/or Consultant, or alternate solutions will be recommended.

B. The Contractor shall receive written response within 5 working days of receipt of the RFI by the Owner/Consultant.

1.8 LAWS AND REGULATIONS

A. All equipment, cabling, materials, and installation methodology shall conform to the requirements of the National Board of Fire Underwriters, the current published edition of the National Electrical Code, and all other applicable laws and regulations. The Contractor shall obtain and pay for any additional permits and inspections required by all legal authorities and agencies having jurisdiction over the Contractor’s work.

1.9 QUALITY ASSURANCE

A. Unless otherwise stated, all equipment for this installation will be new, less than one year from the date of manufacture, and without blemish or defect.

1. All electrical, electronic and optical equipment provided by the Contractor shall be a product of companies regularly engaged in the manufacture of electrical, electronic or optical equipment.

2. All equipment must be purchased from a manufacturer-approved distributor or reseller. Purchase of equipment from a non-approved reseller is prohibited.

3. The equipment shall be the latest model or type offered which meets the applicable specifications at the time of the submittal. Discontinued items replaced by newer models or versions are prohibited from use in the project. It shall be the Contractor’s responsibility to provide the Consultant with information regarding discontinued products listed in the specification. If a product listed is discontinued prior to installation, the Contractor shall submit a substitution request.

a. Request shall include name of material, product, or equipment to be substituted and a complete description of proposed substitution including drawings, performance and test data and other information necessary to demonstrate that the substitution will meet all intentions of this Specification or required for a complete evaluation.

b. Contractor shall assume and bear all responsibility for coordinating and/or performing related changes in the Work necessitated by such substitution. This includes, but is not limited to, changes to other related audiovisual components, Installation Materials, architectural integration details, software programming, and required infrastructure.

c. The Contractor shall receive written response within 5 working days of receipt of the Substitution Request by the Owner/Consultant.

4. Where applicable, all equipment must have the manufacturer’s latest firmware version installed prior to Testing and Systems Performance Verification.

B. Quality of workmanship and fabrication of all equipment and components, which are custom fabricated shall be comparable to professional equipment produced by specialized manufacturers of the trade involved and shall be verified by observation. Only firms having 10 years’ experience in all aspects of the fabrication and installation of similar systems shall be allowed to perform the work.

C. The work specified herein, and in each of the allied sections, shall be accomplished by a single Audiovisual Contractor experienced in the design, fabrication, installation, checkout and warranty contract management of systems such as those described in each section.
1. The Audiovisual Contractor shall have complete responsibility for the systems described herein and shall be the single contract point for the Architect, the Consultant and/or the Owner with respect to all work specified herein.

2. The Contractor shall maintain the same project manager and field supervisor throughout the installation, and where practical, maintain the same installers.

D. The Contractor shall supply and install any incidental equipment needed in order to result in a complete and operable system without claim for additional payment, even if such equipment is not listed in this Specification.

E. All work related to this Specification shall be completed in a professional manner by fully qualified workers.

1.10 RELIABILITY

A. General: The systems are designed to provide professional quality operation over a period of several years without the need for continual maintenance. Equipment that has a high failure rate is not acceptable for installation as part of the systems.

B. Warranty: The Bidder shall make known, in writing, at time of Bid any exceptions that might exist between conditions described herein and Bidders policy of warranty. After acceptance of bid, all conditions and requirements of warranty described herein shall apply.

1. The Contractor shall guarantee all equipment, materials, and labor for a period of 1 year from the date of Substantial Completion.

2. Bidders shall maintain permanent fabrication, service and support facilities within two hundred and seventy-five (275) miles of the Project site during the Work and Warranty period.

3. During the warranty period, within 24 hours of notification, the Contractor shall answer all service calls and requests for information.

4. During the warranty period, within 96 hours of original notification, the Contractor shall provide emergency service to restore operation of the system, replacing defective materials, repairing faulty workmanship, making temporary repairs, and providing loaner equipment as necessary, all at no charge.

5. The Contractor shall notify the Owner before any service call whether such call is or is not covered under warranty. The Owner may be billed for non-warranty calls. The Contractor shall notify the Owner of any service call or work to be performed for which charges may be incurred before such work commences.

6. Improper functioning, for warranty purposes, means failure of the system to meet the intentions of the specification because of internal defects. It does not include Owner caused malfunctions such as re-adjustment of the controls, re-tuning of the system, or injury to the system beyond normal wear. Nor does the warranty cover paint, exterior finishes, fuses, lamps (including projection lamps) or associated labor, unless the damage or failure results from defective materials or workmanship covered by the warranty.

7. The Contractor shall take such actions at the time of installation to ensure that all equipment is installed in accordance with the manufacturer recommended environmental and electrical operating conditions and requirements. After installation, the Contractor shall be responsible for the repair or replacement of said equipment that the Contractor installs which fails due to environmental or electrical conditions, even if not covered by the manufacturer’s warranty. The Contractor shall not be held responsible for damages due to changes in environmental conditions, which occur after the date of Substantial Completion.
8. Unless otherwise directed, the Contractor shall activate all manufacturer warranties in the Owner's name. The start date of the warranties shall be the date of Substantial Completion.

9. If the Contractor has modified certain components, the manufacturer warranty may be void. In this case, the Contractor is responsible for providing warranty coverage equal to that of the manufacturer.

10. Certain subsystems and system components may require installation by authorized representatives in order for the complete manufacturer warranty to apply. If this pertains to any subsystem or component for this project, it is the Contractor's responsibility to make arrangements for the complete manufacturer warranty to apply. These arrangements are to be at no additional cost to the Owner.

11. As part of the Bid Response, the Contractor shall provide the Owner with a proposal to extend the Warranty to cover Year 2, Year 3, and Year 4 of operation. These offerings are to include all parts and all labor; all conditions and restrictions listed above apply.

1.11 PROTECTION OF PERSONS AND PROPERTY

A. Safety Precautions and Programs: The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. This requirement applies continuously 24 hours per day during construction of the Project.

B. Safety of Persons and Property: The Contractor 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 equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors and vendors.

C. Mandatory Safety Training

1.12 OFF-SITE STORED MATERIALS

A. Summary: This Section specifies administrative and procedural requirements for handling requests for approval of partial payments for certain materials stored off-site.

B. Prior Approval: Contractor shall obtain Owner's approval before making any arrangements to obtain a Certificate for Payment for Materials stored off-site. Materials shall be suitable for storage and be properly packaged as necessary.

C. Storage Site: Contractor shall furnish and maintain a suitable storage site, approved in advance by Owner.

D. Storage Conditions:
   1. Material shall be stored above grade, properly protected at all times against weather, hot, cold, moisture, and other hazards as material may require. All protection shall be provided by Contractor, at his/her own expense, and maintained throughout storage period.
   2. Material shall not be commingled with other similar material, but be stored by itself and plainly labeled: "Property of Fayetteville Public Library".

E. Bill of Sale:
1. Request for Certification for Partial Payment for materials stored off-site under approved conditions shall be accompanied by a Bill of Sale, properly identifying material and transferring ownership of materials to Owner.

2. Bill of Sale shall be accompanied with:
   a. Inventory of stored material.
   b. Description of storage site by street number and city, or by a legal description of the premises.

F. Insurance: Contractor shall take out and maintain fire, all perils, theft, vandalism and extended coverage insurance on off-site stored material and in-transit materials, in amount of 100% of value thereof, under same conditions as for material stored on site of the project. Owner shall be named beneficiary under the policy, as trustee for all concerned.

G. Responsibility:
   1. Contractor agrees that, in accepting partial payment for off-site stored materials, he is in no way relieved of responsibility for safe storage of material and its safe transportation to, and installation in, the Work, or for furnishing and installing materials in strict accordance with Contract Documents.
   2. Contractor agrees that acceptance by Owner of a Bill of Sale for Material does not imply acceptance or rejection up until time Contractor's work is completed and finally accepted.
   3. Contractor agrees that usual guarantees covering his/her work under Contract Documents are in no way impaired as a result of partial payment and acceptance of the Bill of Sale.

1.13 DELAY IN COMPLETION AGREEMENT

A. The Owner and the Contractor agree that it would be impossible to accurately fix the actual damages sustained by the Owner due to the Contractor's failure to place the systems into service by the Substantial Completion Date or as otherwise amended by mutual agreement of the parties. Therefore, in the event that the systems are not substantially installed and available for use by such Substantial Completion Date, liquidated damages of Five Hundred Dollars ($500) per day shall be owed by the Contractor to the Owner for each day of delay caused solely by the Contractor, excluding any delay caused by the Owner, or an event beyond the Contractor's control.

1.14 LIMITATION OF LIABILITY

A. The Contractor's entire liability under the Delay In Completion Agreement, including liability arising out of the Products purchased or services performed shall be limited to the total value of the Agreement. Regardless of the legal or equitable basis of any claim or of actual notice, neither the Contractor nor the Contractor's suppliers shall be liable for indirect, special, consequential, or incidental damages. Any claim by the Owner shall be brought within one year of the date of the circumstance of event giving rise to the claim. If the Contractor's performance under this Agreement, or of any obligation here under, is interfered with by reason of any circumstances beyond the Contractor's reasonable control, including, without limitation, fire, explosion, power failure, acts of God, war, revolution, civil commotion, or acts of public enemies, any law, order, regulation, ordinance, or requirement of any government or legal body or any representative of any government or legal body; labor unrest, including, without limitation, strikes, slowdowns, picketing or boycotts; then the, Contractor shall be excused from its performance on a day-for-day basis to the extent of such interference.
1.15 SUBMISSION FOR PUBLICATION

A. Prior written consent from the Owner is required before submitting any information about this project for publication or award. This shall include, but not be limited to, photographs, descriptions, drawings, renderings, equipment lists, or any other information regarding the project. If written consent is provided by the Owner, any submission for publication or award must properly credit the Owner, Architect, and Consultant.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION 2
SECTION 3 – DESIGN AND PERFORMANCE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT OVERVIEW

A. Fayetteville Public Library is currently constructing the new New Library Addition adjacent to the existing main branch. The building will contain technology enabled spaces supporting library functions for Children Story Time, Teen Space, Art and Movement, Fabrication/Maker Space, Innovation Studios, and general meeting and public spaces such as café and lobby/pre-function spaces. Additionally, a very technologically advanced Multipurpose Room that will provide support for multimedia and live professional music and theatrical events as well as city and Library events is included. Technology in the program spaces includes live streaming and archiving, web-conferencing, gaming, audio and video production spaces, production intercom, AV over IP, digital media content services, event recording, professional touring support and back-line systems.

B. Fayetteville Public Library is seeking a turn-key job to be provided by one vendor to supply equipment, labor, installation materials, programming, testing, training, and follow-up support for the audiovisual systems as described in this Specification. This bid has been divided into a Base Bid and four Deducts.

C. The Bid shall include itemized responses to each Deduct. The Owner will use the Deducts combined with the Base Bid to select the proposal that best meets the functional and budgetary requirements of the project. The Owner, at its sole discretion, may select any, all, or none of the proposed deducts and reserves the right to add any additional deducts to the scope of work within 90 days of contract execution, at the original bid price.

D. All video projection screens, motorized projector lifts, junction boxes, floor boxes, conduit, power receptacles and network outlets (for connection to Owner’s network) have been provided by Others during the project construction phase unless otherwise noted.

1.2 SYSTEMS DESCRIPTIONS – BASE BID

A. SY01- Multi-Purpose Space (AV Room Rm #180, Follow Spot Rm #275 and Rm #279, Machine Room Rm #278, Multi-Purpose Rm #176, Edit Suite Rm #277): The first floor Multi-Purpose Space will support meetings, presentations, and other events for Fayetteville Library as well as serve as a performance and concert space for outside user and city groups. The flat-floor space will allow for numerous seating configurations and there is expanding tiered seating for more traditional concert and lecture seating. The space will be enhanced by audiovisual presentation technologies, and include the following:

1. The primary display surface will be a motorized front projection screen sized to accommodate a single widescreen aspect ratio images. The projection screen has been provided by others under the base building construction contract and will be installed in the stage house.

2. The projector will be a high 27,000 lumen projector with an optional SDI cart and 2.4 – 4.7:1 zoom lens. The lens will need to be field verified prior to ordering to confirm field conditions.

3. Sources will include, laptop, presenter BYOD, auxiliary AV equipment, stage box connected to live audio mixer, remote sources located at Front of House location, remote sources located in AV Room #180, remote sources located on both the Dante and library network, a digital cable TV tuner.
4. Primary audio reinforcement will be provided by a AES enabled network speaker system consisting of two line arrays flanking the stage controlled by a digital mixing console.
5. A eight channel wireless microphone package will be provided.
6. FM based hearing wireless assistance system with appropriate number of receivers will be installed to meet ADA requirements
7. A four channel production intercom will allow communication between the AV Room, Follow Spot, Machine Room, Front of House location, several onstage and backstage locations, the Green Room, and the Dressing Room
8. A multi-camera production video system with remote video controller to allow capture, recording, and streaming will be installed and connect to a SDI based routing system
9. A general audiovisual control system that shares the common building platform and a tabletop touch panel will be installed and programmed
10. A video graphics package for the video production system for the Multipurpose Room will be provided.
11. Racks, the graphics generator, power conditioning equipment, and overall panels, connectors, and miscellaneous equipment required to provide a complete installed system per the equipment list in Appendix E will be provided and installed in the Machine Room Rm #278
12. Additional equipment per the equipment list in Appendix E will provide a distribution of live streaming to other spaces within the library and out to the public via the web and/or production trucks will be installed in Edit Suite Rm #277.

B. SY02- Dressing Room Rm #164: A multi-person unisex dressing room is located backstage. This space will provide performers and groups a location to prepare for the show or event and allow for timed entrances as needed. The following are the installed components:
   1. The primary display surface will be flat panel display connected to the network to allow live video feed of the stage as well as other program material as needed.
   2. Audio will be provided through a ceiling speaker with a volume control
   3. Auxiliary devices can be connected via a wall plate with source input and Bluetooth connectivity.
   4. A connection to production intercom will be located within the space.

C. SY03- B.O.H. Corridor Rm #160: This location will allow performers waiting to go on stage to view the live camera feed of the stage or other content as needed.
   1. The primary display surface will be wall mounted flat panel display
   2. A production intercom connection will also be located near the flat panel

D. SY04- Green Room Rm #163: A green room for either a single or small group of people is located backstage. This space will provide event and show participants and/or VIP a location to prepare for the show or event and allow for timed entrances as needed. The following are the installed components:
   1. The primary display surface will be flat panel display connected to the network to allow live video feed of the stage as well as other program material as needed.
   2. Audio will be provided through a ceiling speaker with a volume control
   3. Auxiliary devices can be connected via a wall plate with source input and Bluetooth connectivity.
   4. A connection to production intercom will be located within the space.
E. SY05- Pre-Function Rm #174: The pre-function space will provide a location for pre and post-performance receptions, intermission activities, registration for events, break out space, and for event late-comers to wait until an appropriate time to enter the multi-purpose room. The space will be enhanced by audiovisual presentation technologies, and include the following:
1. The primary display surface will be a wall mounted flat panel display connected to the network to allow a live video feed from the multi-purpose room, content from the digital signage system, and other program material as needed.
2. Audio will be provided through a distributed ceiling speaker with audio from the multi-purpose room, local audio source, background music from the audio network.

F. SY06- Reception Rm #172: This space is an enhanced space located in the Pre-function zone that can be used for private meet and greets with VIP artists or performers as well as a small meeting space/break out space. The space will be enhanced by audiovisual presentation technologies, and include the following:
1. The primary display surface will be a wall mounted flat panel display.
2. Connectivity to the flat panel will be via a HDMI wall plate with connectivity for a laptop or other auxiliary audiovisual equipment, a Blu-Ray DVD/Media Player, the audiovisual network, and to the general network.
3. Cameras will allow small events held in the room to be captured and streamed.
4. Audio will be provided by ceiling speakers
5. A dedicated hand-held wireless microphone system will be provided.
6. There will be two control panel locations that connect back to the overall audiovisual control system

G. SY07- Deli Seating Rm #155: The Deli Seating has two purposes. Generally, the system will function as background music for the day to day operations of the Deli. During special events or for events where the expected audience is larger than the seating capacity of the Multi-purpose room, this area can be configured for over-flow seating with portable audiovisual equipment brought in to support this function.

H. SY08- Plaza and Loading Dock Rm #163: Provide remote truck and production connections as outlined in the equipment list in Appendix E. Field verify locations with the Owner before beginning installation.

I. SY09- Audio Studio (Studio Rm #124, Control Room #121, Iso Booth #123) This system is designed to function as an advanced recording facility with a studio, a control room, and a vocal iso-booth. The system is also designed to work in conjunction with the adjacent Video Studio. The scope for this bid is the infrastructure and transport for the Owner Furnished and Owner Installed recording equipment. Therefore, careful coordination with the Owner will be critical during the installation of this space. The space will include the following:
1. A desk mounted video display in the control room
2. Patch points for Owner Equipment, wall plates in the Studio Room and connectivity to adjacent the Video Control Room
3. Four channel production intercoms

J. SY10- Video Studio (Video Capture Studio Rm #126, Video Control Room Rm #125): This system is designed to function as an advanced video production facility with a studio and a control room. The system is also designed to work in conjunction with the adjacent Audio Studio. The scope for this bid is the infrastructure and transport for the Owner Furnished and Owner Installed recording equipment. Therefore, careful coordination with the Owner will be critical during the installation of this space. The space will include the following:
1. Patch points for Owner Equipment in the control room, wall plates in the Studio Room and connectivity to adjacent the Audio Control Room
2. Four channel production intercom

K. SY11- Fab Lab Rm #128: This space is designed for general instructional presentations.
   1. The primary display surface will be a wall mounted flat panel display.
   2. Connectivity to the flat panel will be via a HDMI wall plate with connectivity for a laptop or other auxiliary audiovisual equipment, a Blu-Ray DVD/Media Player located in the equipment rack, the audiovisual network, and to the general network.
   3. Audio will be provided by ceiling speakers
   4. There will be a control system touch panel located on a local lectern.
   5. There will be a patch point to allow portable hearing assistance for this space.

L. SY12- Story Time Rm #142: The space is a very flexible system that allows for multiple type events and functions to be held including a streaming and capture of children’s story time, playback of children/family movies, puppet shows, children dance and movement classes. The system is designed for both “one button” operation of the capture and streaming as well as tech assisted productions. The space will be enhanced by audiovisual presentation technologies, and include the following:
   1. The primary display surface will be a motorized front projection screen sized to accommodate a single widescreen aspect ratio images. The projection screen has been provided by others under the base building construction contract. A laser projector is planned for this space.
   2. Sources include a Blu-Ray/Media player, connectivity to the projector for laptops, lectern, and other auxiliary audiovisual equipment via wall plates, the building network, and feeds from the audiovisual network.
   3. Audio will be provided via a distributed ceiling speakers.
   4. Wireless handheld and lavalier microphone systems will be included as well as connectivity for wired microphones.
   5. A station for connection to the building production intercom system will be located within the room.
   6. An installed hearing assistance system will be provided.
   7. Cameras will be installed for capture and streaming capabilities.
   8. There are three audiovisual control system touch panels planned.
   9. A local AV rack will be located in Room 142.2 and contain a Rack, a monitor to preview camera feeds and other video material being sent to Story Time and overall panels, connectors, and miscellaneous equipment required to provide a complete installed system per the equipment list in Appendix E.

M. SY13- Study Room (Rm #144 – 147): These spaces are designed for simple connectivity of a laptop to a flat panel display for one or two person use.
   1. The primary display surface will be a wall mounted flat panel display
   2. Connectivity to the flat panel will be via a HDMI wall plate.

N. SY14- Meeting Room Rm #208: This space is designed for simple connectivity of a laptop to a flat panel display for general meeting use.
   1. The primary display surface will be a wall mounted flat panel display
   2. Connectivity to the flat panel will be via a HDMI wall.
O. SY15- Meeting Room Rm #246: This space is designed for simple connectivity of a laptop to a flat panel display for general meeting use.
   1. The primary display surface will be a wall mounted flat panel display
   2. Connectivity to the flat panel will be via a HDMI wall plate

P. SY16- Meeting Room Rm #226: This space is planned to be a more advanced meeting room/conference room. The space will be enhanced by audiovisual presentation technologies, and include the following:
   1. The primary display surface will be a large wall mounted flat panel
   2. A local equipment rack will house a Blu-Ray DVD/Media player and connectivity to floor boxes located at the table as well as the building and audiovisual system networks.
   3. Laptop computers and other audiovisual sources can be connected at integrated table connections.
   4. Audio will be provided by distributed ceiling speakers
   5. A patch point for a portable hearing assistance system will be provided.
   6. An audiovisual control touch panel will be located at the table.

Q. SY17- Art/Movement Studio #249: This space is a very flexible system that allows for multiple type events and functions to be held including an art classes, movement and dance classes, mid-sized events and meetings with streaming and capture of certain events. The system is designed for both "one button" operation of the capture and streaming as well as tech assisted events. The space will be enhanced by audiovisual presentation technologies, and include the following:
   1. The primary display surface will be a wall mounted flat panel display
   2. Sources include a Blu-Ray/Media player, connectivity to the projector for laptops, lectern, and other auxiliary audiovisual equipment via wall plates, the building network, and feeds from the audiovisual network.
   3. Audio will be provided via a distributed ceiling speakers.
   4. Wireless handheld and lavalier microphone systems will be included as well as connectivity for wired microphones.
   5. A station for connection to the building production intercom system will be located within the room.
   6. An installed hearing assistance system will be provided.
   7. Cameras will be installed for capture and streaming capabilities.
   8. There are two audiovisual control system touch panels planned.
   9. A local AV rack will be located in Storage Room 250 and contain a Rack, a monitor to preview camera feeds and other video material being sent to Story Time and overall panels, connectors, and miscellaneous equipment required to provide a complete installed system per the equipment list in Appendix E.

R. SY18- Study Room (Rm #259 – 261, Rm #270): These spaces are designed for simple connectivity of a laptop to a flat panel display for one or two person use.
   1. The primary display surface will be a wall mounted flat panel display
   2. Connectivity to the flat panel will be via a HDMI wall

S. SY19- Teen Project Room Rm #267: This space is planned to be a more advanced presentation and hang-out space for the Teen Library. The space will be enhanced by audiovisual presentation technologies, and include the following:
1. The primary display surface will be a large wall mounted flat panel
2. A local equipment rack will house a Blu-Ray DVD/Media player, Bluetooth connectivity for BYOD devices and connectivity to a wall plate for laptops or other audiovisual equipment as well as the building and audiovisual system networks.
3. Audio will be provided by distributed ceiling speakers
4. A patch point for a portable hearing assistance system will be provided.
5. An audiovisual control touch panel will be located at the wall.

T. SY20- Gaming Rm# 272: A multi-player gaming system will be installed and provide the following:
1. The primary display surface will be a large wall mounted flat panel.
2. Sources will be three Owner Furnished/Contractor Installed gaming systems connected to the flat panel via a presentation switcher
3. Audio will be provided by a sound bar installed under the flat panel display
4. There will be a small local multi-button controller for source switching and power on/off
5. All equipment will be located in a local cabinet provided by others.

U. SY21 – Teen Lounge Rm# 274: This space is designed for simple connectivity of a laptop to a flat panel display for general meeting use.
1. The primary display surface will be a wall mounted flat panel display
2. Connectivity to the flat panel will be via a HDMI wall plate

V. SY22 – Stair Rm#11, Corridor Rm# 150, Lobby Rm#233, Self-Service Rm#262, : These are locations for general digital signage consisting of a wall mounted flat panel and an Owner Furnished/Contractor Installed digital signage player. Content will be by Owner.

W. SY23- Meeting Room Rm #021: This space is designed for simple connectivity of a laptop to a flat panel display for general meeting use.
1. The primary display surface will be a wall mounted flat panel display
2. Connectivity to the flat panel will be via a HDMI wall plate

X. Portable Equipment: This will be a pool of equipment that can be used anywhere within the library. See Appendix E for specific equipment.

1.3 SYSTEMS DESCRIPTIONS – DEDUCTS
A. Deduct #1 – SY01: Remove video graphics package to Multi-Purpose video production system.
B. Deduct #2 – SY06: Removes equipment to Reception room to enhance functionality: Removes the DVD player, handheld wireless microphone system and touch panel for control per equipment list
C. Deduct #3 – Portable Equipment: Remove the self-powered loudspeakers
D. Deduct #4 – Portable Equipment: Remove the portable camera set up

1.4 SUBMITTALS
A. General:
1. The Consultant shall review the Submittals and Shop Drawings listed below. Submittal and Shop Drawing approval shall be based on conformance to the Specification and adherence
to the design intent of the Specification. The Consultant’s approval of the Contractor’s Submission shall not constitute a certification of accuracy or completeness in regard to equipment, quantities, installation techniques and details, software programming, equipment interoperability, safety factors, scheduling, coordination with other trades, or any other aspects of the work which are the responsibility of the Contractor. The Consultant shall perform no more than two reviews per submittal listed below. The Contractor shall be responsible for providing any incidental equipment, Installation Materials and labor needed in order to result in complete and operable systems, even if such equipment, materials or labor are not listed in this Specification.

2. The Contractor shall maintain a Master Set of this entire Specification, including all drawings and addenda, at the site at all times during the installation. Any deviations from the Specification made during the installation shall be marked on this Master Set. The Master Set along with all relevant support documentation shall be provided as part of the As Built submittal in the format outlined under Final Documentation.

B. Submittal Format:
1. All documents, configuration files and drawings shall be submitted in the following format:
   a. Electronically in PDF format.
   b. Executable configuration file (where applicable).
   c. Other formats may be acceptable upon prior approval by the Consultant and/or Owner.
   d. All .PDF files shall be submitted at the documents’ native scale. For example, a PDF created from a drawing whose native format was standard ‘E’ size (42”x30”) shall be created at 42”x30” (full size) to ensure that there is no loss of resolution should the file be viewed or printed at a later date by the Owner.

C. Schedule:
1. The Contractor shall obtain from the Owner, Architect, or Consultant a project master timeline schedule showing projected dates when the relevant areas will be available to the Contractor for the on-site installation.
2. Within 15 days of notification of contract award, the Contractor shall provide a schedule of major project milestones to the Owner, Architect, or Consultant. The schedule shall show the following milestones, but may include others as required for overall site-work coordination:
   a. Shop Drawings and Submittals
   b. Order and receipt of materials
   c. In-shop testing to validate software functionality prior to on-site installation.
   d. Delivery of materials to the work site for installation by Others
   e. Delivery of major system components to the work site
   f. Receipt of Owner furnished equipment for installation by the Contractor
   g. Control systems GUI requirements meeting with Owner
   h. Development and submittal of control system GUI submittals
   i. Control System Control Surfaces / GUI Prototype Submittal review meeting with Owner
   j. Development and submittal of DSP submittals
   k. 50% completion of work by area
   l. 95% completion of work by area
   m. Installation of control system code
n. 100% completion of work by area
o. Testing and debugging on-site
p. Final punch list
q. Submittal of Final Documentation
r. Training

3. If the Contractor feels that he will have any problems with meeting the scheduled project milestone deadlines, he must inform the Owner, Architect, and Consultant at the earliest possible opportunity.

D. Progress Reports:
1. Contractor shall submit a brief Progress Report via e-mail to the Consultant. The Progress Reports should be concise, utilizing bullet points or other efficient format.
2. The reports shall be submitted by 5:00 pm on Fridays to Owner at cmoody@faylib.org, at the following intervals:
   a. After contract award, while working off-site: every two weeks
   b. While working on-site: every week.
3. Progress Reports shall list the following information in three sections:
   a. Progress: List the tasks accomplished since the previous report. This is to include both completed tasks and work-in-progress.
   b. Work Planned: List the tasks scheduled for the time period extending until the next report. This section should also include both completed tasks and work-in-progress.
   c. Issues. List any factors that are delaying progress or have the potential to delay progress that involve the Owner, Architect and/or Consultant.
      1). Provide a proposed solution for each issue listed. The proposed solution shall include any potential impact to cost and/or schedule. Proposed solutions will be reviewed and approved by the Owner, Architect and/or Consultant, or alternate solutions will be recommended.
      2). For equipment related issues, include a manufacturer’s service ticket number, service log number, or similar means of documenting communications between the Contractor and manufacturer.

E. Shop Drawings:
1. The Contractor must receive written approval from the Owner or an authorized representative of the Owner, in writing, prior to purchasing, fabricating or installing any equipment or materials. Approval to proceed will be given based upon Shop Drawings.
2. The Shop Drawings shall indicate complete details of work to be performed.
3. The Contractor shall provide one electronic copy (two copies, if printed) of the Shop Drawings each to the Owner and to the Consultant for review and approval.
   a. Drawings shall include a title block naming the Project, Consultant, and Contractor, shall include a drawing title, drawing number, revision number if applicable and date.
   b. Unless otherwise agreed to in writing, Contractor shall meet with the Owner and Owner’s designated representative to review the Shop Drawing submittal. The Contractor shall be prepared to review the functional capabilities and characteristics of the systems for compliance with Owner requirements.
4. The Shop Drawings listed below are required of the Contractor. Submit all Shop Drawings complete as a single submission. Isolated items will not be accepted, except with prior approval.
a. System Signal Flow – Complete functional system signal flow drawings of all systems described herein and meeting the functions indicated in the Specification. System Signal Flow drawings to illustrate and identify each major component indicating signal flow; signal type and equipment interconnectivity; all used and unused input/output connections for all devices; connector types; specific manufacturer and model number labels for each component; device host name labels for each component connecting to any IP network; physical location callout indicating the component’s physical location (i.e. equipment rack #, lectern, wall mounted, etc.); cable fan-outs; wire/cable tags; 70 volt loudspeaker tap settings; amplifier/loudspeaker zone assignments; and all other details as needed to accurately document the signal interconnectivity of the systems.

b. Cabling Schedule – Document complete wire run information, including the cable type, cable marker identifier, and origination and destination location and connector types for each cable. Wire run information shall be conveyed:
   1). Within the System Signal Flow drawings, and/or
   2). A separate list containing all wire run information

c. Examples representative of the Contractor’s final cable marking technique for each cable type.

d. Loudspeaker Layouts – Scaled ceiling and/or floor plan drawings showing loudspeaker locations, including coverage patterns for ceiling-mounted loudspeakers. Loudspeaker zone groups shall be identified such that they are relatable to the System Signal Flow drawings.

e. Loudspeaker Mounting Details – Scaled drawings of complete loudspeaker mounting details, hardware, and support surfaces, including details on all load requirements, safety factors, safety cables and structural materials.

f. Projector Mounting Details – Scaled drawings of complete projector mounting details, hardware, and support surfaces, including details on all load requirements, safety factors, structural materials, and any required safety cables.

g. Structural Anchorage – If required by the Authority Having Jurisdiction, provide structural calculations, drawings, and details for the anchorage of equipment racks, loudspeaker rigging hardware, and all other mounts or hardware that attach to structure. The design shall be reviewed and approved by a Structural Engineer registered in the state in which the installation work is performed.

h. Optical Systems – The Contractor shall be responsible for field verification of the on-site conditions and submit scaled drawings to verify that the proposed projection devices, lenses, and related optical systems will provide the desired image size without distortion, vignetting or any other image aberrations.

i. Panels – Scaled drawings of interconnect panels, control surfaces, and other custom interfaces.

j. Peripheral Equipment – Scaled drawings of mounting arrangements of any peripheral equipment, which may be included in this Specification.

k. Equipment Rack Layouts – Fully detailed rack drawings indicating equipment orientation within the equipment rack.

l. Technical Furniture – Scaled drawings of all technical furniture indicating the furniture dimensions, materials, finishes, equipment locations and orientation within the furniture, cable management accommodations, and all other details necessary to convey the physical and functional aspects of the furniture as it will be installed in each individual room space.

m. Others, as may be required by the Architect, Consultant or Owner.
1. Inquire with the Architect and Consultant whether submissions of finishes/materials which will be visible to the public are required and submit accordingly.

2. Typical sample items of interest include receptacles and controls with associated trim plate and each type of loudspeaker baffle and/or grille.

5. Approval: The Contractor shall receive written response indicating approval to proceed, or changes required to the Shop Drawings submittal, within 10 working days of receipt of the submittal by the Owner/Consultant.

6. Modifications: The Contractor shall be responsible for updating the Shop Drawing package throughout the course of the project to document any Owner-requested changes, approved product changes, changes due to field conditions, or any other changes to the approved Shop Drawing package. Drawing modifications may be reviewed by the Consultant as required, and the Contractor shall make current Shop Drawings available to the Consultant within seven calendar days of request.

F. Bill of Materials
   1. The Contractor shall submit a comprehensive Bill of Materials concurrently with the Shop Drawing submittal.
   2. The Bill of Materials shall be submitted electronically in Microsoft Excel format, unless an alternate format is approved in writing by the Consultant, Architect, or Owner.
   3. The Bill of Materials shall be organized by room or system type, with a separate spreadsheet tab for each.
   4. The Bill of Materials submittal shall contain at a minimum the following fields for each item: Quantity, Make, Model, Description, Color/Finish (if applicable). Items that are Owner Furnished should be identified as such. Additional columns may be added for notes or other supplemental information as needed.

G. Product Cut Sheets: Unless otherwise agreed to in writing, the Contractor shall prepare a package of product cut sheets for review with the Owner at the time of the Shop Drawings review meeting. The package shall include manufacturer’s cut sheets for all user interfaces, all exposed items not mounted in equipment racks, and all items requiring color or finish selection. The Product Cut Sheets package is not a formal submittal to be reviewed by the Consultant, and is not a means for proposing product substitutions. Requested substitutions shall be submitted via a ‘Substitution Request Form’ (Appendix D) including drawings, performance and test data, and other information necessary to demonstrate that the substitution will meet all intentions of the Specification.

H. Cabling: The Contractor shall submit specifications for each cable type to be used for the project. The Contractor shall receive written approval from the Owner or an authorized representative of the Owner, in writing, prior to purchasing or installing any cabling.

I. Wireless Frequency Table: The Contractor shall submit a table of wireless devices including wireless microphones and intercom transceivers. Each device shall be listed individually along with the manufacturer recommended frequency setting per the location of the installation.

J. Equipment Rack Digital Photographs: The Contractor shall submit digital photographs of completed equipment racks for approval prior to delivering the racks to the project site.
   1. All photographs must be properly exposed and focused, clearly showing the rear and front of each equipment rack. The rear photos must clearly show internal rack cabling, terminations, and cable management such as lacing bars and support brackets. Front photos must show equipment front-panels, labels, vent panels, blank panels, drawers, etc.
2. Subject areas must be free from glare as a result of flashes or other ambient lighting. Subject areas shall fill the image frame in a suitable manner. For large equipment racks, multiple exposures may be required, each indicating a separate portion of the rack.

3. All digital images shall be submitted in JPEG file format unless an alternate format is approved in writing by the Consultant, Architect, or Owner.

K. Network Coordination

1. As indicated, the Contractor shall connect required AV components to the existing building LAN.

2. The Contractor shall work with the Owner’s IT department to identify all PoE, VLAN, firewall and other networking requirements to provide a fully functioning AV system. The Contractor shall generate a schedule of all AV components that will be connected to the building LAN and submit it to the Owner’s IT department for implementation.

3. The Contractor shall, as required, obtain from the Owner’s IT department blocks of static IP addresses sufficient for current system implementation as well as future system growth.

4. The Contractor shall develop a device host naming scheme in coordination with the Owner’s IT department to be assigned to each IP enabled device.

5. The IP Addressing schedule shall list, at minimum, for each connected device:
   a. Product make and model
   b. LAN port connection location
   c. VLAN Assignment – If applicable
   d. Assigned Static or DHCP Reserved IP address
   e. Product MAC address
   f. Device Host Name

6. The IP Addressing schedule shall be submitted electronically in Microsoft Excel .xls format, compatible with Windows 7 or newer operating systems, unless an alternate format is approved in writing by the Consultant or Owner.

7. Approval: The Contractor shall receive written response indicating approval to proceed, or changes required to the IP Addressing Schedule, within 10 working days of receipt of the submittal by the Owner/Consultant.

L. Software: The Contractor shall secure from the Owner or Owner’s Representative, in writing, approval for all customized software applications prior to installation, including but not limited to:

1. Control System Control Surfaces / GUI Prototype submittal
   a. The intent of the Control System Control Surfaces / GUI Prototype Submittal is to create a base level collaboration process whereby the Programmer can solicit direction from the Owner and Consultant towards a mutually agreeable design. Unless otherwise agreed to in writing the Contractor shall meet with the Owner and Owner’s designated representative to review the Control System Control Surfaces / GUI Prototype Submittal. The Contractor shall be prepared to review the functional capabilities as well as the aesthetic characteristics of the control surfaces for compliance with Owner preferences and standards.
   b. Where Owner control surface or GUI standards are lacking, the Contractor shall provide:
      1). Preliminary control surface layouts for all pushbutton panels, touch sensitive panels, PC based controllers or other control surfaces. The Programmer should make the preliminary layouts with a monochrome, basic, wireframe style to clearly demonstrate the functionality of control surface. The layouts should illustrate all
pushbuttons, labels, bar graphs, timers, video windows, etc. for each control panel and each system page. The Programmer should include suggestions for color schemes and graphic styles where applicable. The touch panel control surface submittal shall be created utilizing a collaborative, browser based application allowing for live review and comment by the Owner and Consultant, such as InVision or Moqups (UX design software).

2. JPEG images (or PDF format file) of the finished look of all interface elements including but not limited to menu bars, buttons, down/up states of buttons, labels, bar graphs, timers, video windows, etc.

3. A sample touch panel page as a separate file, or in a PDF format so that all parties understand the finished aesthetic.

c. Where Owner control surface or GUI standards are made available, the Contractor shall provide:

1. Preliminary control surface layouts for all pushbutton panels, touch sensitive panels, PC based controllers or other control surfaces. The Programmer shall develop the preliminary layouts utilizing the Owner’s standards. The layouts should illustrate all pushbuttons, labels, bar graphs, timers, video windows, etc. for each control panel and each system page. The touch panel control surface submittal shall be created utilizing UX design software for live review and comment by the Owner and Consultant.

d. The Contractor shall receive written response indicating approval to proceed, or changes required to the control surfaces layouts, within 10 working days of receipt of the submittal by the Owner/Consultant.

2. Control System Control Surfaces/GUI Submittal

a. The Contractor shall generate a revised control surfaces layout submittal to include the additions, changes or revisions generated by the prototype submittal review as well as to integrate the graphic style into the design. The form and quantity of the submittal shall be as complete as possible and ready to be programmed unless otherwise directed. The touch panel control surface submittal shall be created utilizing UX design software for live review and comment by the Owner and Consultant.

b. If the revised control surfaces submittal reflects those additions, changes or revisions called for in the prototype submittal review, the Contractor shall receive written approval to proceed within 10 working days of receipt of the submittal by the Owner/Consultant.

3. Post-Integration Control Surfaces Adjustments

a. If so requested by the Owner or Owner’s representative, and within 90 days of Substantial Completion, the Contractor shall be prepared to make one visit to the site to make final minor adjustments to the control system code or programming without additional compensation. This could include, but may not be limited to, renaming, or changing the size or location of buttons, page flip calls, or adjustments to code to provide a fully functioning system. If engraved control system panels require modification at a cost to the Owner, such cost information must be submitted to the Owner for approval prior to any work being performed.

b. The Contractor shall be responsible for ensuring that any changes to the control system or control surfaces that are made post integration are appended to the Final System Documentation.

M. Cable Testing
1. The Contractor shall secure from the Owner or Owner’s Representative, in writing, approval for all cable test reports prior to Final Testing and System Performance Verification. Test reports shall include testing of all systems cabling and shall include:
   a. Loudspeaker line testing:
      1) Low impedance loudspeaker lines:
         a). Impedance at 1000Hz.
         b). Polarity of installed loudspeakers.
      2) 70 volt loudspeaker lines:
         a). Watts load at 1000Hz.
         b). Polarity of installed loudspeakers.
   b. Analog audio microphone and line level cable testing:
      1). Continuity of each conductor.
      2). Signal loss.
      3). Signal polarity.
      4). Shielding.
   c. UTP, STP, F/UTP and S/FTP cable testing:
      1). Category 5, 5e and 5e+ cables:
         a). ANSI/TIA-568.2-D Category 5e Permalink test.
         b). ANSI/TIA-568.2-D Category 5e Channel test.
      2). Category 6 and 6+cables:
         b). ANSI/TIA-568.2-D Category 6 Channel test.
      3). Category 6a and 7a cables:
         a). ANSI/TIA-568.2-D Category 6a Permalink test.
         b). ANSI/TIA-568.2-D Category 6a Channel test.
      4). Shield test (required for shielded cables only).
      5). Nominal Velocity of Propagation test.
      6). Testing to be performed using a Fluke DSX-5000, or equal.
   d. Fiber Optic cable testing:
      1). All fiber optic installed and patch cables shall be tested to meet loss and polarity standards:
         a). ANSI/TIA-568-C.3 Cable Link test.
         b). ANSI/TIA-568-C.3 Cable Channel test.
   e. 2K HDMI and Digital Signal cable testing:
      1). Wire test function.
      2). Testing to be performed using a Quantum Data 780a, or equal.
   f. 4K HDMI and Digital Signal cable testing:
      1). Wire test function.
      2). Testing to be performed using a Quantum Data 780b, or equal.
   g. Digital video coaxial cable testing:
      1). EDH, CRC & Jitter tests
      2). Eye pattern measurement
N. Preliminary As-Built Drawing Submittal
   1. Upon completion of the work, and prior to Final Testing and System Performance Verification, the Contractor shall condense the Master Set along with any Shop Drawings into a single “As Built” drawing set. Any markings or deviations, which cannot be made clear on drawings, shall be accompanied by attached documentation, photos, or written addenda.

O. Final Documentation Submittals
   1. Within 30 calendar days following Substantial Completion, the Contractor shall prepare and submit a Final Documentation set to the Consultant. The Final Documentation Submittal shall include any and all adjustments or changes identified during the Preliminary As-Built Drawing Submittal review. All documentation shall list the Owner, Project Name, Consultant, and Contractor. Any documentation appended and reissued during the Warranty period shall also include this information.

2. Format: All documents and drawings shall be submitted in the following format:
   a. Electronically in PDF format, submitted on indexed and searchable CDROMs.
   b. Other formats may be acceptable upon prior approval by the Consultant and/or Owner.
   c. All .PDF files shall be submitted at the documents’ native scale. For example, a PDF created from a drawing whose native format was standard ‘E’ size (42”x30”) shall be created at 42”x30” (full size) to ensure that there is no loss of resolution should the file be viewed or printed at a later date by the Owner.

3. Printed submittals
   a. If requested, provide (2) printed copies of all documents and drawings. The documentation shall be bound in three ring binders with covers and spines listing the Owner, Project Name, Consultant, and Contractor.

4. Documentation: The Final Documentation Submittal shall include:
   a. As-Built Drawings: The as-built drawings must reflect all changes to the system(s) made after the original bid documentation.
      1). The size of the as-built drawings shall be identical to the original drawings provided to Contractor.
      2). As-Built drawings shall conform to all of the requirements listed under “Submittals / Shop Drawings” listed above.
      3). Any markings or deviations, which cannot be made clear on drawings, shall be accompanied by attached documentation, photos, or written addenda.
      4). The Contractor shall include any additional drawings which are necessary to properly document the as-built systems, but not included in the bid documents, including:
         a). Rack elevations
         b). Custom panel details
         c). Patch bay layouts
         d). Cable pull lists
      5). Submission of digital As-Built drawings files, which are generated by the Contractor based on drawing files provided by the Consultant under separate agreement, shall be subject to submission by the Contractor as defined under said agreement.
   b. A schedule of IP and MAC Addresses for all Ethernet enabled AV devices, organized by room name and number.
c. A complete cable testing schedule.

d. A listing of each supplied item with manufacturer, model number and serial number, organized by room name and number.

e. Operator's manuals for each piece of equipment supplied by the Contractor.

f. Software
   1). Where custom software is developed by the Contractor as part of this project, the system source code, passwords, and any associated related files, referenced files, and development software (and all relevant documentation and license) used to compile, develop, and build, etc. the executable code must be provided. The source code should be well documented in accordance with industry software engineering practices.

   2). The software developer shall retain intellectual property rights; the Owner shall have a license for perpetuity for use as it applies solely to this project, including the right to modify/enhance. The software code may not be sold or used, in part or in whole, in any other project or application other than that intended by this specification, in part or in whole, by the Owner or any other party.

   3). If a Subcontractor is used to write the software, the Contractor shall include, as part of the Final Documentation submittal, a signed letter on Subcontractor letterhead, granting the Owner ownership, use, and modification rights of the code and documentation as defined herein. The software shall be provided to the Owner on CD-ROM, inserted into a plastic sleeve appropriate for each media type, and included in the binders.

   4). The Owner may supply the Contractor or allow the Contractor to use certain proprietary information, including service marks, logos, graphics, software, documents, and business information and plans that have been authored or pre-owned by the Owner. All such intellectual property shall remain the exclusive property of the Owner and shall not be used by the Contractor for any purposes other than those associated with delivery of the systems specified herein.

   g. Warranty Statement: A statement on the Contractor’s letterhead listing the official start and end dates for the Contractor's warranty on all equipment, materials, and labor used in the project. The start date shall correspond with the established Substantial Completion date, and the end date shall be based on the timeframe of warranty coverage purchased by the Owner as part of the contract.

5. Delivery
   a. If the Final Documentation submittal is determined by the Consultant to be complete and accurate, the Consultant will approve the submittal and forward the Final Documentation package to the Owner.

   b. If the Final Documentation Submittal is determined by the Consultant to not be complete and/or inaccurate, the Consultant will return the package to the Contractor with a written listing of the required modifications. Upon completion of all of the required modifications, the Contractor shall resubmit the Final Documentation to the Consultant for approval. The Final Documentation Submittal, and therefore the project, shall not be considered to be complete until all required documentation modifications have been made and approved by the Consultant on behalf of the Owner.

1.5 TESTING AND SYSTEMS PERFORMANCE VERIFICATION

A. Final Tests
   1. System Performance Verification Scheduling
a. Upon approval of the Contractor’s test report and receipt of the “Systems Performance Verification Request” form, the Contractor shall assist the Consultant in final system tests. The Contractor shall allow three (3) days to perform the tests at a time that is mutually acceptable to the Contractor and Consultant. The Contractor’s representatives assisting in the performance of these tests shall be thoroughly familiar with the details of the system and shall include the field supervisor responsible for installing, testing, programming, and commissioning the system.

2. System Performance Verification
   a. All control system, DSP and device programming shall be completed and in working order prior to the System Performance Verification.
   b. A physical inventory shall be taken of all equipment on site and justified against the Contractor’s Bill of Materials submittal and the original Bidding Equipment Lists.
   c. The Consultant shall require tests completed by the Contractor which demonstrate the operation of all system components and to determine that the systems meet the criteria as outlined in ‘Performance Standards’.
   d. The Contractor shall supply test equipment to be used during the System Performance Verification. The test equipment shall be present, in working order and connected prior to the System Performance Verification.

1). Video Test Equipment
   a). Computer video signal generator(s) capable of outputting all signal types included in the system design. (Extron VTG 400DVI & Marshall Electronics V-SG4K-HDI or equivalent)
   b). HD-SDI and SD-SDI Generator/Monitor capable of outputting all signal types included in the system design and capable of embedded audio. (Harris HD-STAR or equivalent)
   c). Digital discs including both program content and test signals. DVD and Blu-Ray discs are both required.
   d). Adapters and interconnect cabling as necessary to complete testing.

2). Audio Test Equipment
   a). Analog Audio Signal Generator, Impedance Meter and Line Analyzer: NTi MR-PRO (or equivalent).
   b). Condenser microphone: Shure SM86 (or equivalent).
   c). Active speaker: Fostex 6301NE (or equivalent).
   d). Digital Audio Signal Analyzer: NTi DL1 (or equivalent).
   e). Hardware-based Acoustic Analyzer: NTi AL1 or NTi XL2 (or equivalent).
   f). Software-based Acoustic Analyzer: Smaart with reference microphones and all necessary accessories (or equivalent).
   g). Compact Discs (CD’s) including both program content and test signals.
   h). Media as necessary to test all playback and recording functions of the system. I.E. compact flash card, MP3 Player, USB media.
   i). Adapters and interconnect cabling as necessary to complete testing.

3). Video and Audio Teleconferencing:
   a). Contractor shall coordinate a test call with a far-end site scheduled for the time the Consultant is performing the Systems Performance Verification.
   e). Contractor shall have tools available on the day of the System Performance Verification for system inspection and adjustments.
f. Contractor shall coordinate with Owner so that all spaces are unlocked and available for inspection.
g. Preliminary As-Built documentation shall be available for reference and inspection.

3. Punch List Report and Correction
   a. Following the completion of the Systems Performance Verification, the Owner and/or Consultant will issue a punch list report to the Contractor, identifying omissions, adjustments, and corrections to the work necessary to meet the requirements of the Specification.
   b. The Contractor shall correct all punch list items resulting in fully functional systems that meet all requirements of the Specification and can be utilized by the Owner as-intended.

1.6 SUBSTANTIAL COMPLETION
   A. The project shall be deemed substantially complete by the Consultant and/or Owner at the stage in the progress of the work where the systems are sufficiently complete in accordance with the Specification so that the Owner can utilize the systems for their intended use.

1.7 TRAINING
   A. The Contractor shall provide a total of nine (9) hours of on-site training for the Owner’s staff at a time that is mutually agreeable for the Owner and Contractor.
      1. The Contractor should anticipate six sessions of 45-minutes each.
      2. The Owner may choose to have the sessions spread out over a maximum of three (3) different days.
      3. Address in the training the general configuration of the system, basic functionality, correct operation procedures, routine maintenance and upkeep.
      4. If desired by the Owner, a maximum of four (4) sessions shall be video/audio recorded at high quality by the Contractor. The Contractor shall provide the Owner with full copies of the training sessions on DVD, with duplication permissions.

1.8 EVENT TECHNICAL SERVICE
   A. In addition to the training listed above, the Contractor shall provide a total of twenty-four (24) hours of on-site technical assistance for an Owner-defined event.
      1. One of these events will be Grand Opening Weekend.
         a. Any remaining hours will be used at Owner discretion within the one year warranty period.
            1). Owner agrees to notify Contractor a minimum of one (1) week ahead of event.

1.9 FINAL ACCEPTANCE
   A. Final Acceptance shall be granted by the Owner based on the successful completion of the following activities:
      1. All items required to obtain Substantial Completion have been achieved.
      2. Any punch list corrections not required to obtain Substantial Completion have been completed by the Contractor and accepted by the Owner and/or Consultant.
      3. The Contractor’s Final Documentation Submittals have been reviewed by the Consultant and deemed to be complete and have been delivered to the Owner.
4. The Contractor has provided all required training for the Owner as defined herein.
5. Any remaining items required by the Specification, but not listed above, have been completed by the Contractor.

PART 2 - PRODUCTS

2.1 APPROVED CABLES

A. The following table lists cabling products and types that have been pre-approved for use. This is not an all-inclusive list of the cabling products and types required to complete this project. The Contractor shall reference the cabling products in this table as a baseline of performance for each cable category. The Bidder or Contractor may submit cable part numbers, models and manufacturer's product other than those listed in this table for consideration and approval per the substitution procedures defined in this Specification.

<table>
<thead>
<tr>
<th>Type/Application</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Model No.</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microphone or Line Level Audio</td>
<td>22 AWG STP</td>
<td>Belden</td>
<td>9451/9451P (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Audio Line – Digital Ready – Single Pair</td>
<td>24 AWG STP</td>
<td>Belden</td>
<td>1800B/1801B (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Digital Audio – CAT6</td>
<td>23 AWG UTP</td>
<td>Belden</td>
<td>4812/4813 (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Loudspeaker or LV Power Supply, 10 AWG</td>
<td>10 AWG UTP</td>
<td>Belden</td>
<td>5T00UP/6T00UP (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Loudspeaker or LV Power Supply, 12 AWG</td>
<td>12 AWG UTP</td>
<td>Belden</td>
<td>5000UE/6000UE (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Loudspeaker or LV Power Supply, 14 AWG</td>
<td>14 AWG UTP</td>
<td>Belden</td>
<td>5100UE/6100UE (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Loudspeaker or LV Power Supply, 16 AWG</td>
<td>16 AWG UTP</td>
<td>Belden</td>
<td>5200UE/6200UE (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Digital Video (Up to 12GHz)</td>
<td>18 AWG Coax</td>
<td>Belden</td>
<td>4794R</td>
<td>or equal</td>
</tr>
<tr>
<td>HDBaseT Shielded CAT5e+</td>
<td>4-Pair CAT5e+ U/UTP 350 MHz</td>
<td>Belden</td>
<td>1212F/1213F (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>HDBaseT Unshielded CAT6A</td>
<td>4-Pair CAT6A U/UTP 625 MHz</td>
<td>Belden</td>
<td>10GX12/10GX13 (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>4K Ultra-High-Definition Media Cable, Shielded</td>
<td>4-Pair F/UTP 600 MHz</td>
<td>Belden</td>
<td>2183R/2183P (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>USB Extension Shielded CAT5e+</td>
<td>4-Pair CAT5e+ F/UTP 350 MHz</td>
<td>Belden</td>
<td>1212F/1213F (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Control (RS-232/422)</td>
<td>2-Pair 24 AWG Stranded TC</td>
<td>Belden</td>
<td>8102/82502 (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Control (RS-232/422)</td>
<td>3-Pair 24 AWG Stranded TC</td>
<td>Belden</td>
<td>8103/82503 (Plenum)</td>
<td>or equal</td>
</tr>
</tbody>
</table>
### Type/Application

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
<th>Model No.</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (RS-232/422)</td>
<td>Belden</td>
<td>8104 / 82504 (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Ethernet Control Unshielded CAT5e</td>
<td>Belden</td>
<td>1583A / 1585A (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Fiber Optic Cable, Multimode</td>
<td>Belden</td>
<td>Fl4D006R9 or equal</td>
<td></td>
</tr>
<tr>
<td>Fiber Optic Cable, Multimode</td>
<td>Belden</td>
<td>Fl4D012R9 or equal</td>
<td></td>
</tr>
<tr>
<td>Fiber Optic Cable, Multimode</td>
<td>Belden</td>
<td>Fl4D002P9 or equal</td>
<td></td>
</tr>
<tr>
<td>Fiber Optic Cable, Multimode</td>
<td>Belden</td>
<td>Fl4D012P9 or equal</td>
<td></td>
</tr>
<tr>
<td>SMPT 311M HDTV Cable</td>
<td>Belden</td>
<td>7804R / 7804P (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>SMPT 311M HDTV Cable</td>
<td>Belden</td>
<td>7824R / 7824P (Plenum)</td>
<td>or equal</td>
</tr>
<tr>
<td>Extron XTP/DTP Shielded CAT6+</td>
<td>Extron</td>
<td>XTP DTP 24 / XTP DTP 24P (Plenum)</td>
<td>No Known Equal</td>
</tr>
<tr>
<td>Wireless Microphone Antenna Extension</td>
<td>Belden</td>
<td>8267</td>
<td>or equal</td>
</tr>
</tbody>
</table>

B. All connections between mobile equipment and connection panels must be prefabricated, stage-grade cabling.

### 2.2 EQUIPMENT

A. Bidding Equipment List

1. Bidding Equipment Lists are provided to the Contractor for use in preparing the bid response. These lists include major system components and peripherals, but should not be considered to be all inclusive. The complete equipment package bid response will take into account this document, all drawings, written addenda, any or all drawing additions or reissues, as well as implied system operability.

2. Bidding Equipment Lists are included as an Appendix in this specification.

B. Connectors, Adapters and Assemblies

1. Field terminated connectors shall be compatible and approved for use for a specific cable type and application by the cable and equipment manufacturer.

2. Connectors shall be manufactured by Neutrik, Switchcraft, AMP, Amphenol, Kings, Canare, Crestron, Extron, or equal.

3. Manufacturer constructed cable adapters and assemblies shall be provided by Crestron or Extron, or be of equal quality and durability.

C. Panels, Plates and Keypads
1. The Contractor shall provide a cover panel for all junction boxes which comprise the audiovisual infrastructure (wall, floor and ceiling). This includes pull boxes, splice boxes and unused or abandoned junction box locations.

2. Custom Fabricated Panels and Plates
   a. Submit custom panel designs per Submittal requirements prior to fabrication or purchase.
   b. Custom panels and plates shall be machined aluminum, nominal thickness 0.125”, with beveled edges and a brushed, anodized finish. Confirm with the Architect required finish color for each panel location. Use of the pull-box manufacturer's construction cover shall not be permitted.
   c. All panel connectors shall be labeled with engraved lettering, minimum 0.10” letter height, and provided with contrasting paint fill.
   d. Panels and plates for non-gang pull boxes shall extend past the height and width of the pull box by a minimum of one-half inch on each side.
   e. Cable access holes in cover plates shall not capture the cables and shall have a protective grommet to prevent cable damage.

3. Manufactured I/O Panels, Control Panels, Keypads and Plates
   a. Submit proposed panel designs per Submittal requirements prior to purchase.
   b. Panel functionality shall be as defined in the Specification.
   c. Coordinate color and style with the Architect and/or Consultant.

4. Abandonment Cover Plates at Future Use, Unused or Abandoned Audiovisual Junction Box Locations
   a. Submit proposed abandonment plate selections per Submittal requirements prior to fabrication or purchase.
   b. Contractor shall coordinate with the Architect and/or Consultant regarding the style, finish, and paint color of abandonment cover plates.
   c. Cover plates for standard gang junction boxes shall match the manufacturer style and color of architectural cover plates used elsewhere on the project.
   d. For non-standard gang junction box locations provide the box manufacturer’s paintable abandonment finish plate.
   e. At non-standard gang sized junction box locations where a manufacturer’s abandonment finish plate is not available, a custom, paintable abandonment plate shall be provided. Custom abandonment plates shall be sized to extend past the height and width of the box by a minimum of one-half inch on each side to mask any gap between the box edge and wallboard.

D. AV Rack Accessories
   1. Provide manufacturers’ rack mount adapters where available.
   2. Where manufacturers' rack mount adapters are not available, provide Middle Atlantic Products RSH4S-series custom rack shelf adapters, with –C clamping option as appropriate, or equal.
   3. Blank rack panels: Flanged steel with black textured powder coat finish, Middle Atlantic Products, SB-series, or equal.
   4. Vented rack panels: Middle Atlantic Products black powder coat finish VT-series, or equal.
   5. Rack screws, lacer bars and accessories: Middle Atlantic Products, or equal.
   6. Rack Drawers: Middle Atlantic Products, black textured powder coat finish, TD-series, or equal.
7. Rack ID Panel: Include single space (1 RU) rack ID panel, Panelcrafters, Inc. Part# SEXTG-26000-RJ-RevG at the top of each equipment rack, or group of racks per the Bidding Equipment Lists. Panel shall be digitally printed with logo and contact information for Consultant and Contractor.

8. Confirm with the Owner any requirements for security-type rack rail screws, prior to rack fabrication and assembly. Rack rail security screws shall be Middle Atlantic Products, approved style and installation/removal tool type, or equal.

9. Where locking doors are provided, confirm with the Owner any requirements for keying and, if requested, provide locks keyed alike at no additional cost, if available.

E. AV Rack Power Distribution Equipment

1. Where the Technical Power supply to the rack is IG (isolated ground), provide a power distribution system within the rack that maintains the integrity of the IG system.

2. Where 20A power is specified, ensure that all power distribution products are rated for 20A.

3. Vertical power strips: Middle Atlantic Products PDT-series, or equal.

4. Rack rail power strips: Middle Atlantic Products PD-series, or equal.

5. Provide a sufficient number of AC convenience outlets to accommodate all installed equipment plus an extra 20% spare capacity.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. General

1. All equipment shall be installed in accordance with this Specification, approved Shop Drawings, and manufacturer’s recommendations.

2. All equipment with the exception of portable equipment shall be firmly fastened or attached in place. A safety factor of at least five shall be utilized for all brackets, fasteners and attachments. Provide safety retention cables for overhead equipment such as loudspeakers, projectors, etc.

3. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.

4. The Contractor shall ensure that all equipment is installed such that proper cooling and ventilation is provided.

5. All equipment shall be installed in a manner, which prevents hum, RF/EMI/EMF interference, and mechanical vibration based noises (e.g. fan mounts, etc.)

6. Projectors, lenses, and mirrors shall be solidly mounted and braced so that there will be no observable movement in the image induced by motor vibration or other mechanical operations.

7. All equipment that includes keyed locks shall be keyed alike, per equipment category. This includes, but is not limited to equipment racks, lecterns, other technical furniture, security mechanisms, etc. The Contractor shall coordinate with the Owner on keying preferences before ordering equipment.

8. All equipment shall be protected from construction dust and debris until the date of Substantial Completion.

9. All equipment shall be protected from theft, damage, or vandalism until the date of Substantial Completion.
10. Any equipment designed for use by end-users in the facilities must be installed with theft
deterrence/protection mountings and fasteners. Any tools required to mount/un-mount this
equipment must be furnished to the Owner at the date of Final Acceptance.

B. Furniture
1. The Contractor shall ensure that equipment or mounting hardware is compatible with and
suitable for installation in furniture specified by the Architect, Consultant, or Furniture
Supplier. It shall further be the Contractor's responsibility to ensure that such coordination
with the Architect, Consultant, or Furniture Supplier occurs. The Contractor shall exchange
with and follow such Shop Drawings as to ensure that dimensions and structural supports
are adequate for the installation of specified equipment. In addition, the Contractor shall
confirm that the furniture accommodates the audiovisual equipment’s environmental and
electrical operating parameters. It is the Contractor’s responsibility that the request and
delivery of such critical coordination information is satisfactorily executed. In as much as
the Contractor has control over the delivery of such information, he shall deliver it as
requested by the Architect, Consultant, or Furniture Supplier.

C. Equipment Racks and Equipment Rack Cable Management
1. Racks shall be installed in such a way so as to permit access to all equipment for service.
2. Racks are considered complete components and should be completely assembled and
tested at the Contractor's facility prior to onsite installation.
3. All equipment in racks shall be fitted with vent panels and/or fans as required to provide
ventilation and cooling according to equipment manufacturer’s recommendations.
4. Unused front facing rack spaces shall be fitted with blank rack panels.
5. Adjacent racks shall be bolted together with appropriate ganging hardware.
6. Use rear and mid rails for intermediate terminations. Maintain accessibility to the rear of the
equipment.
7. Mid rails must be used to support equipment weighing more than 50 pounds.
8. As a general practice, all power cables, control cables, and high-level cables shall be
dressed to the left rear of an equipment rack. Audio and video cables shall be dressed to the
right rear of the rack. Audio, video and control cables shall be bundled separately and
spaced not less than three (3) inches apart.
9. Internal equipment rack cabling shall be supported by lacing strips, support brackets, or
other cable management systems as required to ensure that all cabling is supported in both
the vertical and horizontal planes within the rack.
10. With the exception of ganged equipment rack assemblies, cabling routed between
equipment racks or pieces of equipment exterior to equipment racks, or extending to the
greater facility cabling infrastructure, shall be completely protected, end-to-end, by a
raceway, wire-way, or duct appropriately sized for the cable run.
11. Cabling between rolling pieces of equipment not housed in rack cabinets or a rolling
equipment rack and any device to which it is connected, shall be protected by a split-loom
corrugated tubing wrap or other such flexible cable management system appropriately
sized for the cable run.
12. Any controls not to be adjusted by the user and accessible from the front of the equipment
rack must be furnished with security panels.
13. Devices installed behind flat panel displays shall be mounted near the edge of the displays
for easy physical access and for easy visual verification of indicator lights.

D. Video Displays
1. All permanently mounted projectors shall be installed with the center line of the projector perpendicular to the projection screen. All projected images shall be squarely converged to the projection screen. Keystone or geometric correction shall not be employed without the written consent of the Consultant.

2. Turn off or disable all eco, green or energy saving modes on all flat panel and projector displays where displays are to be controlled by an external control system.

3. Video settings should be adjusted on all flat panel displays to optimize color and contrast. Settings should be identical between multiple displays within the same room, area, or room type. Any dynamic contrast modes within flat panel displays shall be disabled.

E. Video Cameras

1. Configure all video cameras with proper output resolution, network settings, physical positioning and white balancing. White balancing of cameras shall occur after the camera is installed, the room finishing is complete with the room lighting and shades properly set.

2. Program no less than four presets for all PTZ cameras.

3. Prior to installation, the Contractor shall work in close coordination with the Owner to determine the optimal locations for all video cameras to ensure that the camera positions meet the requirements of the Owner for the field of view.

F. Cabling

1. All cabling and termination shall be executed in adherence to standard industry practices and as outlined in:

2. Cable Length Verification: Cable lengths where given in the Specification, for bulk or manufactured cable assemblies, have been provided to assist the Contractor in the bidding process. Cable run lengths, where specified, are end-point-to-end-point estimates and include consideration for tails. Estimates may be based upon cable tray systems; raceways, conduit runs, and furniture layouts indicated on construction drawings and may vary from the actual installed cable pathways. It is responsibility of the Contractor to field verify required cable lengths for bulk cable or manufactured cable assemblies prior to ordering.

3. Cable Installation
   a. Non-contiguous cable support mechanisms such as hangers, rings, and hooks shall not be spaced farther than four (4) feet apart. All manufactured raceways used for cables shall be installed according to the raceway manufacturer’s specifications.
   b. Cable runs shall be supported with devices designed for this purpose and are to be installed independent of any other structural component.
   c. Cables routed vertically up walls, or between floors as vertical riser, shall be supported with clamps or other mechanisms. These supports shall occur at least three times per floor.
   d. The Contractor shall maintain, or where not already existing, provide through penetration fire stop systems to prevent the spread of fire through openings made in fire-rated walls or floors to accommodate penetrating items such as conduit, cables or other pathway. Fire stop shall restore floor and wall to the original fire rated integrity. The fire stop systems and products shall have been tested in accordance with the

DESIGN AND PERFORMANCE REQUIREMENTS  Section 3 - 23
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procedures of U.L. and material shall be U.L. classified as materials for use in through-penetration fire stops.

e. The fire stop system shall comply with the NEC and with NFPA 101-Life Safety Code (latest edition) and shall be made available for inspection by the local inspection authorities prior to cable system acceptance. The Contractor shall be responsible for verifying the fire rating of all walls and floors affected by his/her work.

f. Cables shall not be exposed to paint, paint remover, water, or any liquids which may degrade the performance of the cable, void the manufacturer’s warranty, alter the flame and/or smoke characteristics of the cable, or obscure the flame rating designations printed on the jacket. Cables exposed to paint, paint remover, water, or any liquid shall be replaced by the Contractor.

g. Cable pulling tension may not exceed manufacturer recommendations. Where cable-pulling lubricant is used, the lubricant must be compatible (non-damaging) with the conduit and cable sleeve materials and must not harden over time to prevent future pulls.

h. Cable stapling of any recognized media type shall not be permitted.

i. Cables shall be dressed in conveniently sized bundles and either laced or banded. Lacing or banding shall not be so tight as to deform cable bundles.

j. Cabling installed with a bend radius less than that recommended by the cabling manufacturer is not acceptable.

k. Cables and bundles terminating at equipment or connector panels shall be supported so as not to put strain on connections or connectors.

l. All cabling between mobile equipment and connection panels must be prefabricated, tactical cabling.

m. All cabling between network ports, jacks, patch panels and equipment must utilize prefabricated CAT6a, or better as required by the application, patch cables of appropriate length.

n. All cables, with the exception of video or pulse cables, which must be cut to an electrical length, shall be cut to the length dictated by the run. No splices shall be permitted in any pull boxes without prior approval of the Consultant.

o. Cabling for equipment mounted in drawers or on slides shall be provided with a service loop of appropriate length. A cable management support for the service loop shall be provided to prevent the service loop travel from interfering with the operation of the drawer or slide or snagging on adjacent cabling.

p. Microphone level, line level, loudspeaker level, and video lines shall be run in separate conduits, trough, raceway divider, and cable bundles. Low voltage DC and control may be run along with any but microphone or line level audio runs.

4. Termination

a. All termination components must meet or exceed all specifications for given media type and application as described in this document and system drawings.

b. Crimp on connectors shall be installed only on the appropriate size cable using the manufacturer recommended crimp tool and die set.

c. Connections to electronic devices providing screw terminals shall be terminated using the appropriate gauge insulated spade or ring crimp terminal connector and crimp tool.

d. All mechanical solder-on connectors shall be attached to cable ends using rosin core solder.

e. Audio signal cable shields shall be protected with the appropriate gauge Teflon or heat-shrinkable tubing. The jacket end of each audio cable shall be fitted with the
appropriate gauge heat shrinkable tubing to provide additional protection to the base of the shield or shield foil. This also applies to the inside of mechanical connectors and cables that terminate at partitioned barrier strips.

5. Analog Audio Microphone and Line Level Systems
   a. General
      1. All analog audio microphone and line level cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer’s specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. The cabling system shall be tested, verified, and documented.
   b. Test for continuity of each conductor, polarity, signal loss and proper shield grounding and integrity.
   c. Testing to be performed using an NTi MR-PRO Audio Generator and Impedance Meter, or equal.

6. Analog Audio Loudspeaker Line Level Systems
   a. General
      1. All analog audio loudspeaker line level cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer’s specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. The cabling system shall be tested, verified, and documented.
      2. Test for continuity, polarity, impedance, signal loss and (if required) proper shield grounding and integrity.
   b. Test for continuity, polarity, impedance, signal loss and (if required) proper shield grounding and integrity.
   c. Testing to be performed using an NTi MR-PRO Audio Generator and Impedance Meter, or equal.

7. Category Cabling and Connectors for AV Systems
   a. General
      1. All category cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer’s specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. Cables shall be bundled in groups of 24 cables maximum. The category cabling system shall be tested, verified, and documented to meet the ANSI/TIA-568.2-D Standard, including all applicable Addenda.
   b. Digital Media Distribution Systems
      1. AV Contractor provided signal distribution equipment that requires RJ-45 style connectors at room boundary wall panel or floor box panel connections, with the
exception of those connecting a piece of AV equipment to the Owner’s LAN, shall be color-coded Neutrik EtherCON CatX rated shielded panel connectors and DM compliant shielded CatX rated inline connectors in the appropriate color-coded Neutrik EtherCON connector carrier and specified to keep the CatX rating of the signal cable. Manufacturer approved RJ45 cable connectors shall be used at all manufacturer equipment connections. All wires within the cable must be connected and shielded.

2). Each digital AV over RJ-45 receptacle, permanently installed cable, equipment cord, patch cord and patch panel will be of a color or have markings that are non-standard with the voice/data system and be plainly and permanently labeled “AV ONLY”.

c. Category Cabling Systems Installation and Testing

1). Where indicated, the Contractor will be required to provide a dedicated system of category cabling to support the transmission of digital AV signals. Depending upon the application, the cabling system topology may be point-to-point or be comprised of a system of work area outlets terminated at patch panels.

2). The Contractor shall test, verify and document the length, wire map and transmission performance of each Channel Link (Permanent Link + Station Cables) using a Fluke DSX-5000 Cable Analyzer System, including DSX-5000 Versiv Mainframe and Remote, LinkWare PC Software, CAT 6A/Class EA Permanent Link Adaptors and CAT 6A/Class EA Channel Adapters. This tester shall be used during testing of this project. Included features shall include the ability to integrate with labeling and cable management software, which yields downloadable 606-A cable IDs, ensuring data accuracy. Channel tests are the only acceptable test format for testing Category cabling. Link tests will not be sufficient.

3). All category cable Channel and Permanent Links shall be tested to prove compliance with the current industry standard, ANSI/TIA-568.2-D, and any subsequent addenda. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-C including applicable Technical Service Bulletins and amendments. The appropriate level III tester shall be used to verify each individual type of category cabling systems.

4). Category 5, 5e and 5e+ testing of channel, permanent link and twisted pair cables shall be performed using the recommended test equipment specifically designed to test cables for all ANSI/TIA-568.2-D Category 5e parameters from 1 – 100 MHz. Testers shall be loaded with the most recent test values per the above referenced standard. The Contractor may be required to provide documentation (or demonstration) that the testers used are properly programmed as described above.

5). Category 6 and 6+ testing of channel, permanent link and twisted pair cables shall be performed using the recommended test equipment specifically designed to test cables for all ANSI/TIA-568.2-D Category 6 parameters from 1 – 250 MHz. Testers shall be loaded with the most recent test values per the above referenced standard. The Contractor may be required to provide documentation (or demonstration) that the testers used are properly programmed as described above.

6). Category 6A and 7a testing of channel, permanent link and twisted pair cables shall be performed using the recommended test equipment specifically designed to test cables for all ANSI/TIA-568.2-D Category 6A parameters from 1 – 500 MHz. Testers shall be loaded with the most recent test values per the above referenced standard. The Contractor may be required to provide documentation
8. Optical Fiber Cabling and Connectors for AV Systems
   a. General
      1). All optical fiber cabling installed by the Contractor to support AV Systems
          connectivity shall meet the equipment manufacturer’s specifications for cable and
          connector types, installation methods and routing, separation distance from
          adjacent services, maximum number of disconnect points and maximum overall
          cable run lengths required to meet the systems design performance criteria. The
          optical fiber cabling system shall be tested, verified, and documented to meet the
          ANSI/TIA-568-C.3 Standard, including all applicable Addenda.
   b. Digital Media Distribution Systems
      1). AV Contractor provided signal distribution equipment that requires optical fiber
          connectors at room boundary wall panel or floor box panel connections, with the
          exception of those connecting a piece of AV equipment to the Owner’s LAN, shall
          be color-coded Neutrik opticalCON panel connectors and Neutrik opticalCON
          inline connectors in the appropriate color-coded Neutrik opticalCON connector
          carrier. Manufacturer approved optical fiber cable connectors shall be used at all
          manufacturer equipment connections.
      2). Each digital AV over optical fiber receptacle, permanently installed cable,
          equipment cord, patch cord and patch panel will be of a color or have markings
          that are non-standard with the voice/data system and be plainly and permanently
          labeled “AV ONLY”.
   c. Optical Fiber Cabling Systems Installation and Testing
      1). Where indicated, the Contractor will be required to provide a dedicated system of
          fiber optic cabling to support the transmission of digital AV signals. Depending
          upon the application, the cabling system topology may be point-to-point or be
          comprised of a system of work area outlets terminated at patch panels.
      2). Testing shall be carried out in accordance with this document. This includes
          testing the attenuation and polarity of the installed cable plant with an optical loss
          test set (OLTS) and the installed condition of the cabling system and its
          components with an optical time domain reflectometer (OTDR). The condition of
          the fiber end faces shall also be verified.
      3). Testing shall be performed on each cabling link (connector to connector).
      4). Testing shall be performed on each cabling channel (equipment to equipment)
          that is identified by the Owner.
      5). Testing shall not include any active devices or passive devices within the link or
          channel other than cable, connectors, and splices, i.e. link attenuation does not
          include such devices as optical bypass switches, couplers, repeaters, or optical
          amplifiers.
      6). All tests shall be documented including OLTS dual wavelength attenuation
          measurements for multimode and single mode links and channels and OTDR
          traces and event tables for multimode and single mode links and channels.
      7). All testing procedures and field-test instruments shall comply with applicable
          requirements of:
                Utilizing Laser Diode And LED Sources
             b). ANSI/EIA/TIA-455 50B, Light Launch Conditions For Long-Length Graded-
                Index Optical Fiber Spectral Attenuation Measurements
d). ANSI/TIA/EIA-455 60A, Measurement of Fiber or Cable Length Using an OTDR.
e). ANSI/TIA/EIA-455 61A, Measurement of Fiber or Cable Attenuation Using an OTDR.
g). ANSI/TIA/EIA-526 14 A, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.
j). ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.
8). Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
a). Manufacturer of the fiber optic cable and/or the fiber optic connectors.
b). Manufacturer of the test equipment used for the field certification.
c). Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas)

9. Digital Video Cable Installation and Testing:
   a. General
      1). All digital video cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer’s specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. The cabling system shall be tested, verified, and documented.
      2). When issues (such as cable length) compromise specifications or the integrity of the AV system, active cable equalization, twisted pair extenders, or fiber-optic extenders shall be employed as appropriate.
      3). When using twisted pair extenders, the type of cable used and its shielding must comply with the extender manufacturer’s recommendations for optimum performance.
      4). When using products that draw power from the +5V line, the system must be configured to ensure that source power is not overdrawn.
   b. When issues (such as cable length) compromise specifications or the integrity of the AV system, active cable equalization, twisted pair extenders, or fiber-optic extenders shall be employed as appropriate.
      1). When using twisted pair extenders, the type of cable used and its shielding must comply with the extender manufacturer’s recommendations for optimum performance.
      2). When using products that draw power from the +5V line, the system must be configured to ensure that source power is not overdrawn.
   c. The bend radius of each cable shall not be less than the minimum recommended by the cable manufacturer.
      1). System interconnects shall not exceed the minimum required for system functionality.
      2). Cable splices, joiners, and gender changers shall not be used.
   d. Test for continuity of each conductor, signal loss and proper shield grounding and integrity.
e. Perform EDH, CRC & Jitter tests.
f. Perform Eye Pattern Measurement test.
g. Testing to be performed using a Phabrix SxE, or equal.

G. Labels / Wire Markers
1. For cable labeling, reference ANSI/INFOCOMM Standard F501.01:2015, Cable Labeling for Audiovisual Systems (CLAS)
2. Except where otherwise indicated, all rack-mounted equipment, switches, controls, and interface panels shall be clearly labeled.
   a. Panels and plates shall be a minimum 1/8” thick anodized aluminum etched and epoxy filled unless otherwise specified.
   b. Rack mounted equipment shall be labeled with engraved and filled plastic laminate. Where appropriate, the function of, or the input, output, or loudspeaker(s), served by each device shall be indicated. Other methods of labeling rack mounted equipment may be accepted pending prior approval by the Consultant and/or Owner.
   c. All cables shall be permanently identified at each end by machine printed cable markers.
      1). Every cable shall have a unique tag number identifier for each cable. The Contractor shall include this unique tag number on the As-Built signal flow documentation.
      2). Cable markers shall be placed two (2) inches from where the cable exits the strain relief of the connector, but never within a cable bundle.
      3). Each cable marker shall include, in addition to the unique tag number identifier, the device host name of the origination and destination equipment termination at each cable end (see example below).

   ![Example Cable Markers]

H. Technical Power
1. Separate electrical power for media systems has been provided at this site and is designated as “technical power.” The technical power grid incorporates a grounding system utilizing a dedicated insulated ground cable for each receptacle, each of which is connected to the main technical power distribution panel. The Contractor shall be responsible for verifying that all media systems electronics, racks, and components derive their power from technical power receptacles only.
   a. All AC power distribution within equipment racks shall utilize a star grounding topology and isolated ground receptacles.
   b. Equipment rack power distribution systems shall be grounded by way of the 3-conductor AC line cord(s) provided with such equipment.

I. Grounding
1. To avoid system noise, data errors, safety hazards, and equipment damage, all devices and cabling shall be installed using a consistent grounding scheme. This section offers guidelines for grounding and shielding methodology. Grounding and shielding methodology may need to be augmented or modified for certain pieces of equipment or interconnections in order to meet the requirements of other sections of this specification. The Contractor
shall be responsible for making necessary alterations in accordance with industry practices and such that the Performance Standards detailed in ‘Performance Standards’ are met.

a. Grounding and shielding systems shall be executed in adherence to standard industry practices and as outlined in:


b. Ground conductors referred to in this section shall be 10AWG insulated solid copper cable. Ground conductors shall be terminated using a closed ring lug, of proper size for each application, which shall be connected to system electronic components and the equipment rack master bus using nuts, bolts, and lock washers.

c. Under no circumstances shall an AC neutral conductor be used to ground equipment.

d. Power Distribution within Equipment Racks

1). A “master ground bus” shall be established in the equipment rack(s) serving each area. The master ground bus shall consist of a copper bus bar, which shall be electrically bonded to the equipment rack, and of sufficient size to accommodate all attached ground conductors.

2). For installations with multiple ganged equipment racks, each equipment rack chassis shall be connected to the master ground bus bar via an electrically bonded jumper.

3). Active components having a grounded AC line cord shall be grounded using the supplied AC line cord connected to the equipment rack power distribution system. Removing the ground pin from a 3-conductor equipment power cord, or the use of ground defeat plugs is prohibited.

4). For active components that do not have a grounded AC line cord, the component’s chassis shall be connected to the master ground bus bar using a ground conductor.

5). For passive signal carrying components, which have no AC line cord, the component’s chassis shall be connected to the master ground bus bar using a ground conductor.

e. Patch Fields

a). Unless otherwise specified, all patch fields shall be configured such that device outputs appear on the top row connectors of the patch field, and device inputs appear on the bottom row. Any exceptions to this rule require the prior approval of the Consultant.

b). All connectors used on patch fields shall be of such design that they are electrically isolated from the patch field panel.

f. Interconnection

1). All audio interconnections with cable lengths greater than 10 feet shall use balanced (differential) signaling.

2). All connectors used on system I/O panels shall be electrically isolated from the panel and provide a pass through (uninterrupted) ground connection.

3). All audio signal cable shields shall be grounded only at the output connection of each device. Signal cable shields, both connected to devices and floating, shall be protected by the appropriate gauge heat shrinkable tubing. Cable shields at the
input connector end of the cable shall be folded back over the cable jacket and covered with heat-shrinkable tubing. Do not cut off unused shields.

4). Microphone cable shields shall be connected at both ends.

5). Coaxial video and RF shields shall be connected at both ends.

J. Pull Strings
   1. A nylon pull string shall be left in every conduit. In the event additional cables are pulled in after the initial cable pull, a nylon pull string shall be pulled with the added cable.

3.2 CONTROL SYSTEM SOFTWARE DESIGN & DEVELOPMENT

A. Control System Overview
   1. Extron control system processors shall provide local audiovisual systems and supplemental architectural device control for each of the controlled spaces.
   2. Extron touch panels, button panels and software applications shall be provided as the human interface devices for each of the control systems.

B. Graphical User Interface / Touch Panels
   1. General
      a. The following guidelines are not intended to limit the creativity of the Programmer when designing the software nor are they all-inclusive. Rather, they are concepts and guidelines to ensure that a fully functional, easy to operate control system for the Owner is provided.
      b. The Control System shall employ an easy to use, intuitive, touch panel graphical user interface. Touch panel control shall be icon based and utilize graphical representations that mimic the actual device for all devices under control. In every case where the device under control offers feedback, the Control System shall provide indication on the touch panel(s) of individual component control state conditions.
      c. A “Quit”, “System Shutdown” or similar button shall be available from the Main Menu. When the User has selected this button, a confirmation screen indicating that the shutdown sequence has been selected, and a message will pop-up reminding the User to remove all media such as DVD or Blu-Ray discs. A second button press shall be required to initiate the power down sequence. If a lamp-based component such as a video projector has a significant cool down and warm-up time between its on and off state, the warning should indicate that this particular device will be unavailable for a specified period of time. This might be done using a graphical representation of a clock, a countdown timer, bar graph, etc.
      d. All pages shall maintain a consistent graphical “look and feel.”
      e. The opening page should have, at a minimum, an Owner logo, a large button to start the system, and the ability to control the lighting system (and motorized shades if so equipped) without powering up the entire system.
      f. After system start-up, the primary page or main menu in each presentation space shall display (at a minimum) a room identifier; all relevant input sources grouped together, all environmental controls grouped together, a quit option, a date icon displaying the current date, and a clock indicating current local time.
      g. The AV Contractor will determine with the Owner those control panels requiring passwords and limited access.
      h. Each touch panel shall provide a method for service personnel to access detailed system information and configuration menus. This information might be accessed by service personnel via a hidden button and/or by entering a password. Configuration...
menus should include lowering projector lifts to the service position, projector zoom and focus, and other control functions useful to service personnel.

i. The information page should include the following: “System Designed by The Sextant Group, Inc. ph.(412)-323-8580 http://www.thesextantgroup.com”; “System Installed by __________, ph. (xxx) xxx-xxxx, and website address; “Programming Supplied by __________” “Program Name”; “Compiler Version X.0”; “Panel File #” ; and other relevant system software information.

2. Audio Control
   a. A volume control icon shall be available to the User at any time there is an audio enabled system.
   b. Program audio: provide both level up/down and mute controls.
   c. Speech audio: provide both level up/down and mute controls separate from the Program audio.
   d. Microphone levels: when multiple microphone level control is required, provide a separate gain and mute control for each microphone in the mix. Microphone mix controls shall be on a separate, password protected setup page.
   e. A clearly visible mute button with positive feedback to an on/off indicator on the touch panel shall also be included.
   f. The AV Contractor shall set the system’s master gain control such that the user has a reasonable range of audio level, but the maximum level is set below that which could allow the user to inadvertently cause harm to system components or cause feedback in the system.
   g. The control system shall automatically reset the audio levels to an indexed preset level each time the system is shut down or restarted.
   h. Pressing a video source device button followed by pressing a ‘display’ (or similarly labeled) button will route the source’s video signal to the primary display. The source device’s audio will be simultaneously routed to the room’s sound reinforcement system (audio follow).
   i. In systems with multiple assignable video displays:
     1). The video preview window shall include a button, or buttons, representing each assignable video display connected to the system. Where touch panel size permits, this should take the form of a graphical representation of the room with a display assignment button showing the relative location of each display.
     2). Pressing a video source device button followed by pressing a display assignment button will route the source’s video signal to that display. This process can be repeated to assign a single video source to multiple displays.
   j. In systems with multiple assignable video displays and a single sound reinforcement system:
     1). A method shall be provided by which users may select which video source’s audio signal is to be routed to the room’s sound reinforcement system (audio break away).
   k. In systems with multiple assignable video displays and multiple sound reinforcement systems:
     1). A method shall be provided by which users may select which video source’s audio signal is to be routed to each sound reinforcement system (audio break away). An example might be a room with a projection screen that also contains multiple collaboration pods served by flat panel displays with integral loudspeakers.

3. Lighting Control
a. Touch panel layouts will include lighting preset recalls in each room. A minimum of eight scene presets should be provided. For lighting zones where a dimming system is employed, the touch panel shall include “Brighter” and “Dimmer” or “Plus” and “Minus” buttons allowing the User to increase or decrease the level of lighting for any given preset.

b. If so requested by the Owner, an Auto-Lights feature may also be provided for all or select spaces. The Auto-Lights feature, when enabled, would recall a specific lighting preset when, for instance, projection or video conferencing is called for.

C. Controlled Devices

1. Where specified components permit, the Control System shall provide positive feedback of individual component control-state conditions to the touch panel. For example, the touch panel page to control a Blu-Ray or DVD player shall have a status window indicating the status of the device (such as “Play Mode”) or the absence of media (such as “No Disc”). If environmental controls are triggered with a particular device, the trigger for that environmental control should be feedback from the device rather than a simple button push. For example, if the control system is to automatically lower the lights when the DVD player is placed in “Play” mode, the control system should not directly trigger the lighting preset from the “Play” button press, but rather by first confirming that a disc is present in the player and that the player is in fact in “Play” mode.

2. Where specified, the AV Contractor shall provide a Control System interface to mechanical or electronic devices such as screens, window shades, or room lighting. Wherever such operation is available at the mechanical device under control, a stop or halt button shall always be provided in addition to buttons to drive normal equipment operation.

3. Remote power relays, when employed, shall be used to switch AC power to those devices whose power on/off function is otherwise not controllable. When such devices are audio power amplifiers, the Contractor shall program system control such that the audio power amplifiers are the last components to turn on during power up, and the first devices to turn off during power down.

4. If so requested by the Owner, all or select control system processors shall be programmed with an Auto Shutdown feature. Auto Shutdown will automatically power down a system at a given time unless overridden by the local User or System Administrator. The Auto Shutdown feature shall function as follows: For any given room, when Auto Shutdown is set to “On”, the system will power down at a time specified by the Owner, 10:00 PM for example. Ten minutes prior to the specified time, the touch panel shall display a warning message and beep indicating that the system will shut down unless the local defeat button on the panel is pressed within the ten-minute time limit. Pressing the local defeat button will delay the Auto Shutdown sequence by one-hour, or other set length of time as requested by the Owner. Fifty minutes after the one-hour delay button has been pressed, the warning message and beep indicating that the system will shut down unless the local defeat button on the panel is pressed within the ten-minute time limit will appear. This sequence shall continue so long as the operator continues to press the delay button.

5. Resident PCs should be connected to constant power sources, not switched power, and should never be powered down from the control system.

6. As previously mentioned, each media playback device shall have its transport controls duplicated on the touch panel video preview page, or in the case of an audio-only device, a dedicated control page. The control functionality for each device shall closely mimic the control functions on the device itself. For example, a Blu-Ray player, DVD player, VCR, or cassette deck shall have, at minimum, the five basic transport functions, play, stop, fast-forward, rewind, and pause. The Play and Stop buttons should be prominent. All transport buttons should change state when active.
7. For a Blu-Ray or DVD player, the Programmer should provide the five basic transport functions plus chapter skip forward, chapter skip reverse, and where available, a button to access a sub-page providing more advanced control. The advanced controls sub-page might have, for example, buttons and tools, which would allow the user to navigate the menu structure of a DVD or Blu-Ray disc.

8. If a device can play multiple types of media, has bi-directional communication with the control system, and its API permits, the system shall read the media type and adjust the screen options as appropriate for the playback option selected. For example, if a particular DVD player is able to play both DVDs and CDs and has RS-232 control, the system shall display different options when a DVD is detected by the unit versus when a CD is detected by the unit (such as a video preview window and the ability to route the signal to a display device versus just audio playback transport controls). In this example, “graying out” the inappropriate buttons for options is acceptable.

9. For a video projector with an automatic set-up, auto image adjust or similar button, control of this feature should be provided on every logical page, such as VGA analog input pages.

10. For a tuner with RS-232 control, a dialing-style keypad that will mimic a telephone keypad display to allow selection from the touch panel. Provide a display above the keypad to display the selected channel. This should be similar to a desktop telephone with a small LCD screen above the keypad, which indicates the key-presses of the selected channel. The display above the keypad should indicate the current Function (AM, FM or TV) and channel. Provide Up and Down arrow buttons to allow scrolling through channels. If the Owner so desires, provide up to 8 channel preset recall buttons corresponding to the proprietary cable system.

11. For systems involving a video projector or similar lamp-based device, control the power to these devices separately. Users should be able to operate audio only playback devices, or control lighting or room dimming systems without automatically powering the projectors. If the system is initially started without projection, and the user subsequently attempts to project a source, the system should then ask if the user would like to power-up the projector(s) and if selected, display a progress bar during the warm-up process and then return to the current touch panel page.

D. Video Conferencers and Cameras

1. The AV Contractor shall establish 4-6 go-to camera presets and provide a simple scheme whereby the User may easily recall these presets during a presentation. The Contractor shall determine all camera presets in coordination with the Owner. The setup of the camera presets shall be on a password protected technician’s page, with provisions for naming each preset with variable text. This will allow the Owner to use descriptive text for preset labeling rather than simple numbering.

2. Manual camera control functions shall include zoom, pan and tilt. For camera zoom, indicate the lens control with a “Plus/Minus” or similar graphical icon based labels. For pan and tilt functions, use left, right, up, and down directional arrows mimicking the manufacturer handheld remote.

3.3 PERFORMANCE STANDARDS

A. Audio

1. Speech Signal
   a. The system shall provide a speech signal in the audience seating area that meets or exceeds the following requirements:
      1). Frequency response within ±3 dB from 500 Hz to 15,000 Hz.
      2). Overall SPL variance of ±3 dB.
3. Measured A-weighted of 10% or lower.
4. Minimum average SPL of 87 dB Z-weighted (flat), with 10 dB of undistorted headroom available.

2. Music Signal
   a. The system shall provide a music signal in the audience seating area that meets or exceeds the following requirements:
      1. Frequency response within ±3 dB from 200 Hz to 17,000 Hz.
      2. Overall SPL variance of ±3 dB.
      3. Minimum average SPL of 93 dB Z-weighted (flat), with 10 dB of undistorted headroom available.

B. Video
   1. Digital Video
      a. Based on the connectivity requirements provided by the AV systems design, the Contractor shall test the digital video system to ensure that it meets the following standards, as applicable:
         1. CEA-861-F
         2. Single-link DVI
         3. Dual-link DVI
         4. HDMI 1.4b
         5. DisplayPort 1.2
         6. Thunderbolt v1.2
         7. Mini DisplayPort v1.2
      
   2. Serial Digital Video Signals
      a. At the points of interconnection, the input and output impedance of each link shall be unbalanced to ground, nominally 75 Ohms ±0.5% resistive.
      b. The Contractor shall test the video system to ensure that it meets the Engineering Standards of the appropriate SMPTE standards including:
         1. SMPTE 259M for Standard Definition systems (SD-SDI).
         2. SMPTE 292M for High Definition systems (HD-SDI)
         3. SMPTE 424M for 3 Gigabit/second High Definition systems (3G-SDI)
         5. SMPTE 2082-1 for 12 Gigabit/second 12G Ultra High Definition systems (12G-UHDTV)
      c. A SMPTE Color Bars test signal shall be utilized for confirming proper video levels throughout the signal system.
      d. A SDI Check Field (pathological signal) test signal shall be utilized for stress testing the signal system.
         1. Test signal format shall be selected based on video standard to be used in the normal operation of the system under test. Examples of the formats are 525i/29.97, 1080i/59.94, 720p/59.94, or 1080p/59.94.
         2. The eye pattern of the test signal at the injection point in the system shall meet the specifications of the appropriate SMPTE specification as outlined in the following table:
3. High-Definition Multimedia Interface (HDMI)
   a. The Contractor shall test the video system to ensure that it meets the Engineering Standards of the most recent HDMI Specification as administered by HDMI Licensing, LLC.
   b. At the points of interconnection, the input and output impedance of each link shall be balanced to ground, nominally 100 ohms ± 10 ohms.
   c. The proper shape of the digital video’s RGB channels, or “eye pattern”, as it appears on an oscilloscope, must be maintained. Refer to the HDMI Specification by HDMI Licensing, LLC for required eye opening values and minimum standards for signal integrity.

4. Display Port
   a. The Contractor shall test the video system to ensure that it meets the Engineering Standards of the most recent DisplayPort Standards as administered by the Video Electronics Standards Association (VESA).
   b. At the points of interconnection, the input and output impedance of each link shall be balanced to ground, nominally 100 ohms ± 10 ohms.
   c. System shall support up to and including:
      1). 10.8 Gbps data rate
2). 2560x1600 @60Hz resolution
3). 60Hz vertical frequency
d. The proper shape of the digital video’s RGB channels, or “eye pattern”, as it appears on an oscilloscope, must be maintained. Refer to the DisplayPort Standards by VESA for required eye opening values and minimum standards for signal integrity.

5. High-Bandwidth Digital Content Protection (HDCP)
   a. All digital video sources, sinks, and repeaters shall comply with the most recent Digital Content Protection LLC specifications.
   b. All digital video sources, sinks, and repeaters shall scan for the presence of HDCP and if present, perform all HDCP stages according to the HDCP specification, with no more than 5 seconds total time delay between source selection or input and video appearing:
      1). Authentication and Key Exchange – Keys are exchanged and verified. The hardware will store / cache the Key Selection Vector (KSV) $k_m$ to speed up video switching.
      2). If receiver is a repeater, data about downstream devices is sent to transmitter.
      3). Information is sent to transmitter every two seconds during entire HDCP session to ensure encryption is in sync between all transmitter/receiver pairs in the tree.
   c. The distribution system shall authenticate all cached KSVs with each source up to the source’s KSV limit, so that authentication does not need to be re-started each time content is routed to a new output.
   d. The distribution system shall not send a source more KSVs than it supports.

6. Extended Display Identification Data (EDID)
   a. All system components generating or accepting certain digital video signals shall provide the following information within the EDID transmission.
      1). Product make, model, and serial number
      2). Current EDID version and revision
      3). Maximum image size
      4). A table of supported input/output resolutions and timings
      5). 3D support status for each input/output
      6). Supported color formats
      7). Supported audio formats for each input/output

7. Serial Bus Communications
   a. Based on the connectivity requirements provided by the AV systems design, the Contractor shall test all serial bus communications links to ensure that they meet the following standards, as applicable:
      1). USB 2.0 and 3.0
      2). IEEE-1394b
      3). Thunderbolt v1.2

8. Digital AV Over Category Cabling Systems:
   a. UTP, STP, F/UTP and S/FTP cables installed for digital AV systems shall meet the following performance standards:
      1). Category 5, 5e and 5e+ cables:
         b). ANSI/TIA-568.2-D Category 5e Channel Specifications.
2). Category 6 and 6+cables:
   b). ANSI/TIA-568.2-D Category 6 Channel Specifications.
3). Category 6a and 7a cables:
   b). ANSI/TIA-568.2-D Category 6A Channel Specifications
b. Cable performance definitions
1). NEXT: Near-End Crosstalk
2). PSNEXT: Powersum Near-End Crosstalk
3). ACRF: Attenuation to Crosstalk Ratio, Far-End
4). PSACRF: Powersum Alien Crosstalk Ratio, Far-End
5). ELFEXT: Equal-Level Far-End Crosstalk
6). PSELFEXT: Powersum Equal-Level Far-End Crosstalk
7). PSANEXT: Powersum Alien Near-End Crosstalk
8). PSAACRF: Powersum Insertion Loss to Alien Crosstalk Ratio, Far-End
c. Test Results
1). Submission: Prior to Final Testing and Systems Performance Verification, the Contractor shall submit a copy of all applicable test results to the Owner/Technology Consultant in both electronic (file) and paper form.
2). Category cables: The test results submitted for category cables shall include the following:
3). Graphical/numerical data: Both graphical data plots and numerical data are required for the test parameters listed above.
4). The Category Cable Certification reports shall have complete testing of Permanent Links and Channel Links at frequency increments up to 500MHz as indicated in ANSI/TIA-568.2-D and shall include the following:
   a). Cable/Faceplate Number -- matching faceplate numbers on patch panels
   b). Test Date
   c). Cable Length
d). Wire-Map
   e). Return Loss
   f). Insertion Loss
g). NEXT Loss
   h). PSNEXT Loss
   i). ACRF
   j). PSACRF
   k). Propagation Delay Skew
   l). PSANEXT (Category 6A only)
m). PSAACRF (Category 6A only)
5). Provide Category Cable Certification report and include as a minimum the following information:
   a). Test equipment make and model number.
   b). Test equipment calibration date.
C. Fiber Optic Cable

a. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in compliance with the ANSI/TIA-568-C.3 standards and the following test limits:

1). Optical loss testing
a). Multimode and Single mode links

2). The link attenuation shall be calculated by the following formulas as specified in ANSI/TIA-568-C.0.
   a). Link Attenuation (dB) = Cable Attn (dB) + Connector Attn (dB) + Splice Attn (dB)
   b). Cable Attn (dB) = Attenuation Coefficient (dB/km) * Length (Km)
   c). Connector Attn (dB) = number of connector pairs * connector loss (dB)
   d). Maximum allowable connector loss = 0.75 dB
   e). Splice Attn (dB) = number of splices * splice loss (dB)
   f). Maximum allowable splice loss = 0.3 dB
   g). The values for the Attenuation Coefficient (dB/km) are listed in the table below:

<table>
<thead>
<tr>
<th>Type of Optical Fiber</th>
<th>Wavelength (nm)</th>
<th>Attenuation coefficient (dB/km)</th>
<th>Wavelength (nm)</th>
<th>Attenuation coefficient (dB/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimode 62.5/125 µm</td>
<td>850</td>
<td>3.5</td>
<td>1300</td>
<td>1.5</td>
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<tr>
<td>Multimode 50/125 µm</td>
<td>850</td>
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<td>1300</td>
<td>1.5</td>
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<tr>
<td>Single-mode (Inside plant)</td>
<td>1310</td>
<td>1.0</td>
<td>1550</td>
<td>1.0</td>
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<tr>
<td>Single-mode (Outside plant)</td>
<td>1310</td>
<td>0.5</td>
<td>1550</td>
<td>0.5</td>
</tr>
</tbody>
</table>

3). OTDR testing
a). Reflective events (connections) shall not exceed 0.75 dB.
b). Non-reflective events (splices) shall not exceed 0.3 dB.
c). Magnified end face inspection
d). Fiber connections shall be visually inspected for end face quality.
e). Scratched, pitted or dirty connectors shall be diagnosed and corrected.
f). Note: High Bandwidth applications such as 1000BASE-SX, 10GBASE-S, and FC1200 impose stringent channel loss limits. Where practical, certification should consider loss length limits that meet maximum channel (transmitter to receiver) loss.

4). Performance specification for MM fiber at 850 nm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Bandwidth (µm)</th>
<th>1000BASE-SX</th>
<th>10GBASE-SR</th>
<th>FibreChannel 1200-MX-SN-I</th>
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<tr>
<td></td>
<td>MHz (Km)</td>
<td>Length (m)</td>
<td>Loss (dB)</td>
<td>Length (m)</td>
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<td>OM1</td>
<td>62.5</td>
<td>200</td>
<td>275</td>
<td>2.38</td>
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</tbody>
</table>
5). The optical fiber cable field-test instrument shall be within the calibration period recommended by the manufacturer.

6). Optical loss test set (OLTS)
   a). Multimode optical fiber light source
   b). Provide dual LED light sources with central wavelengths of 850 nm (±30 nm) and 1300 nm (±20 nm)
   c). Output power of –20 dBm minimum.
   d). The light source shall meet the launch requirements of ANSI/EIA/TIA 455 50B, Method A. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap (as described in clause E.7 of ANSI/TIA-568-C.0) with a Category 1 light source.
   e). Acceptable manufacturers: Fluke Networks or Noyes Fiber Products, a division of AFL Telecommunications

7). Single mode optical fiber light source
   a). Provide dual laser light sources with central wavelengths of 1310 nm (±20 nm) and 1550 nm (±20 nm).
   b). Output power of –10 dBm minimum.
   c). Acceptable manufacturers: Fluke Networks or Noyes Fiber Products, a division of AFL Telecommunications

8). Power Meter
   a). Provide 850 nm, 1300/1310 nm, and 1550 nm wavelength test capability.
   b). Power measurement uncertainty of ±0.25 dB.
   c). Store reference power measurement.
   d). Save at least 100 results in internal memory.
   e). PC interface (serial or USB)
   f). Acceptable manufacturers: Fluke Networks or Noyes Fiber Products, a division of AFL Telecommunications

9). Optical Time Domain Reflectometer (OTDR)
   a). Shall have a bright, color transmissive LCD display with backlight.
   b). Shall have rechargeable Li-Ion battery for 8 hours of normal operation.
   c). Weight with battery and module of not more than 4.5 lb. and volume of not more 200 in³.
   d). Internal non-volatile memory and removable memory device with at least 16 MB capacity for results storage.
   e). Serial and USB ports to transfer data to a PC.
   f). Multimode OTDR
   g). Wavelengths of 850 nm (± 20 nm) and 1300 nm (± 20 nm).
   h). Event dead zones of 3.7 m maximum at 850 nm and 1300 nm.
   i). Attenuation dead zones of 10 m maximum at 850 nm and 13 m maximum at 1300 nm.
   j). Distance range not less than 2000 m.
k). Dynamic range at least 10 dB at 850 nm and 1300 nm
l). Acceptable manufacturers: Fluke Networks or Noyes Fiber Products, a division of AFL Telecommunications

10). Single mode OTDR
   a). Wavelengths of 1310 nm (±20 nm) and 1550 nm (±20 nm).
   b). Event dead zones of 3.5 m maximum at 1310 nm and 1550 nm.
   c). Attenuation dead zones of 10 m maximum at 1310 nm and 12 m maximum at 1550 nm.
   d). Distance range not less than 10000 m.
   e). Dynamic range at least 10 dB at 1310 nm and 1550 nm
   f). Acceptable manufacturers: Fluke Networks or Noyes Fiber Products, a division of AFL Telecommunications

11). Administration of the documentation shall include test results of each fiber link and channel.
   a). The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.
   b). The test result records saved within the field-test instrument shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of these test records.

12). All tests performed on optical fiber cabling that use a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.

13). All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

b. Optical Fiber Cable Testing
   1). Field-test instruments shall have the latest software and firmware installed.
   2). Link and channel test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.
   3). Fiber end faces shall be inspected at 200X or 400X magnification. 200X magnification is suitable for inspecting multimode and single mode fibers. 400X magnification may be used for detailed examination of single mode fibers. Scratched, pitted or dirty connectors shall be diagnosed and corrected.
      a). It is preferable that the end face images be recorded in the memory of the test instrument for subsequent uploading to a PC and reporting.
   4). Testing shall be performed on each cabling segment (connector to connector).
   5). Testing shall be performed on each cabling channel (equipment to equipment) that is planned for use per the Owner’s instructions.
   6). Testing of the cabling shall be performed using high-quality test cords of the same fiber type as the cabling under test. The test cords for OLTS testing shall be between 1 m and 5 m in length. The test cords for OTDR testing shall be approximately 100 m for the launch cable and at least 25 m for the receive cable.
   7). OTDR Testing
      a). Fiber links shall be tested at the appropriate operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss: Multimode: 850 nm and 1300 nm. Single mode: 1310 nm and 1550 nm. Each fiber link and channel shall be tested in both directions.
launch cable shall be installed between the OTDR and the first link connection. A receive cable shall be installed after the last link connection.

8). Length Measurement: The length of each fiber shall be recorded. It is preferable that the optical length be measured using an OLTS or OTDR.

9). Polarity Testing: Paired duplex fibers in multi-fiber cables shall be tested to verify polarity in accordance with Clause E.5.3 of ANSI/TIA 568 C.0. The polarity of the paired duplex fibers shall be verified using an OLTS.

c. The detailed test results documentation data is to be provided in an electronic test report for each tested optical fiber and shall contain the following information

1). The fiber identification number

2). The length for each optical fiber: Optionally the index of refraction used for length calculation when using a length capable OLTS

3). Test results to include OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (difference between the measured attenuation and the test limit value).

4). Test results to include OTDR link and channel traces and event tables at the appropriate wavelength(s).

5). The length for each optical fiber as calculated by the OTDR.

6). The overall Pass/Fail evaluation of the link-under-test for OLTS and OTDR measurements

7). Optional: A picture or image of each fiber end-face, or a pass/fail status of the end-face based upon visual inspection.

D. Optical Systems


2. All video projection systems shall meet the following performance standards:
   a. The total averaged light output from a video projector, in ANSI lumens, shall be tested by the Contractor and certified to be within ±15% of that specified by the projector manufacturer.

3.4 SYSTEM SETUP, TUNING AND TESTING

A. The Contractor shall install, configure, adjust, program, and calibrate all components in order to optimize the performance of all individual subsystems and the system as a whole

B. The Contractor shall engage Allen Heath to perform commissioning and final setup of Allen Heath’s DLive products in conjunction with the Owner and Consultant preferences.

C. The Contractor shall engage Ross Video to perform commissioning and final setup of the Ross Video products in conjunction with the Owner and Consultant preferences.

D. The Contractor shall engage Clear-Com to perform commissioning and final setup of the Clear-Com products in conjunction with the Owner and Consultant preferences.

E. The Contractor shall engage L-Acoustics to perform commissioning and final setup of the L-Acoustics products in conjunction with the Owner and Consultant preferences.

F. Once the system is installed, the Contractor shall complete the following preliminary tests.
   1. Equipment Racks
a. Unless otherwise agreed in writing, equipment rack(s) shall be completely assembled, tested, and programmed in the Audiovisual Contractor's shop. No rack assembly shall be performed at the project site. After the equipment racks are tested the Audiovisual Contractor shall notify the Owner's Representative in writing that the equipment rack assemblies are ready for observation and approval. Allow adequate time for any modifications necessary to satisfy the contract drawings and specifications.

2. Device Configuration
a. Configure all devices as necessary for a complete and working system and as directed by the Owner or Consultant.
b. Apply User and Admin security settings, user name and passwords as directed by the Owner or Consultant.
c. Configure all networked devices in coordination with the Owner and/or Consultant including the assignment of IP address, subnet, gateway, VLAN, security settings, and host names.
d. Apply host name for all devices within each device’s setup utility.
e. Verify all networked devices are configured and registered to their respective network and free of any device to device communication errors and are reachable from the necessary devices.
f. Verify all networked devices are registered to each manufacturers’ respective software or web-based configuration tool.
g. Set EDID settings, color space and output resolution settings per the project designated video image resolution.

3. Network Configuration
a. Coordinate with the Owner’s IT Department to provide required Firewall coordination, Internet services, VoIP phone provisioning, Email and Calendar credentials. DHCP Server, DNS Server, and/or Fully Qualified Domain Name (FQDN) as required to support the system functions indicated within the Specification.
b. Coordinate with the Owner’s IT Department to ensure proper configuration of the network to support the system functions indicated within the Specification. Verify available network bandwidth within the Owner’s network switches, switch stacks and uplinks. Verify proper network settings per device manufacturers requirements including IGMP, Designated Querier, VLAN, PoE, and QoS.

4. Audio
a. Prior to the termination of audio amplifiers to speakers, the Contractor shall measure the resistance of the speaker line with reference to ground to determine that no short circuits or paths to ground exist in the line. The Contractor shall connect the speaker to the cable and measure the impedance of each speaker line using a 1,000Hz signal applied to the line. The Contractor shall submit a list, to the Consultant, by cable number, of the impedance of each speaker line. This test shall be performed with the amplifier disconnected from the speaker line and the speaker connected to the speaker line.
b. Verify all loudspeakers are working.
c. Verify that the system meets all Performance Standards as outlined in ‘Performance Standards’.
d. Verify that all equipment, panels, and cables are labeled correctly.
e. Verify each item of equipment is functioning as intended.
f. Verify the installation is the same as specified.
g. Loudspeaker Installation:
1. Verify the aiming and positioning of all loudspeakers with the Consultant.
2. If the Consultant has developed an EASE software model, obtain the coverage plots from the Consultant, and confirm the performance of the loudspeaker system meets or exceeds the coverage indicated in such model.

h. Microphone Installation:
   1. Verify proper positioning of all ceiling and table mounted microphones.
   2. Configure steerable microphone array lobes to provide uniform and even coverage of all areas designated as participant seating areas or presentation areas while avoiding areas susceptible to noise transmission such as HVAC registers, glass walls, doorways, and divisible walls as required.

5. Additional Audio System Processing Adjustments
   a. Where applicable, the Contractor shall program the DSP system to include filters adjusted such that the loudspeaker zone(s) affected by same are measured to exhibit uniform (flat) frequency response (less than +/- 3 dB) at the listening location for the frequencies the transducer is designed/intended to address. The exception to this rule shall be in speech reinforcement systems where additional adjustments shall be made to ensure maximum gain with minimum feedback.
   b. Measurements utilized for determining filter adjustments shall be made on axis with respect to a single transducer (representative of the zone) in its intended field of coverage. Loudspeaker cross-over filters shall be provided first for all actively crossed transducers per loudspeaker manufacturer’s instructions. Additional filters will still be required to achieve uniform frequency response measured at the various listening locations.
   c. For loudspeaker zones of small transducers, utilize high-pass filters first and foremost and then utilize parametric EQ filters to flatten the measured response.
   d. For the Multi-purpose Room loudspeaker zones of large transducers, where other transducers in the system will address higher frequencies, utilize low-pass filters first and foremost and then utilize parametric EQ filters to flatten the measured response.
   e. The Contractor shall program the DSP system to include delay settings adjusted so that the direct sound from the main loudspeaker clusters and the delay zone transducers in question arrives simultaneously at the listening plane served by the delay zone transducers.
   f. The Consultant may request additional filters and delay (as required) to address 'tuning preferences', but such 'tuning preferences' shall not be considered as part of the base line requirements for determining substantial completion of the audio system. Flat frequency response and time alignment of the direct sound from the loudspeakers will be considered a base line requirement for determining substantial completion of the audio system.
   g. Dante Audio Network
      1. Configure Dante network within Dante Controller or if specified within the project, Dante Domain Manager labeling all devices as their product host names and labeling all utilized audio channels. All unused channels shall retain their respective channel number.
      2. Properly designate and configure a master clock source and latency settings.
      3. Route audio as required.

6. Computer Configuration – OFCI (Owner Furnished Contractor Installed)
   a. The Contractor shall be responsible for coordinating with the Owner regarding the specific requirements of Owner furnished computers and/or servers as applicable to meet the functional requirements of the audiovisual systems as specified.
b. Coordination shall ensure that the computers and/or servers meet the recommended hardware configuration required by the Audiovisual Systems as well as for all software applications, including any software provided as part of this Specification, Owner furnished software integral to the functionality of the audiovisual system, and custom software that is developed through a 3rd-party for use within the audiovisual system.

c. Contractor coordination with the Owner on the requirements of OFCI computers shall include but may not be limited to:
   1). Form factor
   2). Firmware
   3). Operating System (OS)
   4). Memory
   5). Hardware versus firmware, versus OS, versus software compatibility
   6). Video output quantity and type
   7). Audio output quantity and type
   8). Network connection(s) quantity and type
   9). USB port quantity and type
  10). Power supply(s)
  11). Display type, resolution, size, and quantity
  12). Peripherals, including but not limited to:
   a). Keyboard
   b). Mouse
   c). Cameras
   d). Microphones
   e). USB enabled devices
   f). Others as specified

d. The Contractor shall further coordinate with the Owner’s IT department to:
   1). Install and configure the furnished computer hardware to function within the audiovisual system as intended by this Specification. This includes but is not limited to the configuration of the following:
      a). Display Settings
      b). Audio settings
      c). Network settings
      d). USB devices and drivers
      e). Others as specified
   2). Install and configure any software provided as part of this Specification.
   3). Configure any Owner provided software that is integral to the functionality of the audiovisual system.

e. The Contractor shall provide to the Owner a date by which all computers must be available to the Contractor for final installation and configuration.

7. Computer Configuration - Utility and Administrative Computers
   a. The Contractor shall be responsible for the configuration of the Owner or Contractor provided computer(s) specified to provide utility and administrative functions of the audiovisual systems. The Contractor shall load and configure software and install peripherals that are necessary for those computers to function per the Specification. This includes but is not limited to the configuration of the following:
1). Display Settings
2). Audio settings
3). Network settings
4). USB peripherals
5). Any software required to configure and/or service any specified audiovisual components
6). Owner furnished software that is integral to the functionality of the audiovisual system
7). Configuration of the computer’s web browser with bookmarked addresses of any system devices which have available web portals for configuration and operation.
8). Other adjustments that may be necessary to ensure that the computers, software, and peripherals function together and as part of the larger AV System as required by the Specification.

8. Serial Digital Video
   a. During all testing, twenty meters (20M) of the same type cable used in the system under test shall be added at the input of the waveform monitor to establish a signal system headroom margin.
   b. The Contractor shall perform stress testing on every signal path within the facility. For purposes of this section, signal path shall be defined as:
      1). From the cable connecting to the output of the source device to the cable connecting to the input of the final destination device in the system.
      2). From the cable connecting to the output of the source device to the cable connecting to the input of the first destination device in the system that re-clocks the SDI signal. In this case, the next signal path shall be defined as starting at the output of the re-clocking device.
      3). For tielines or other cable paths not connected to active outputs, the signal path shall be the cable from the points of operation connection at each end of the path.
   c. Stress testing shall be performed on each signal path by injecting the test signal at the output cable of the source device and connecting the waveform monitor to the input cable at the destination device.
      1). The Contractor may choose to test individual cable segments within the system however stress testing shall be conducted on each signal path as defined earlier in this section.
   d. The Contractor shall verify proper system operation by observing the video signal on a high-quality video monitor and an appropriate waveform monitor. Contractor shall verify:
      1). No CRC errors present as analyzed by an appropriate waveform monitor.
      2). Proper video levels as analyzed by an appropriate waveform monitor.
      3). No observable artifacts such as macro-blocking or sparkling in the video signal as observed on the video monitor.

9. DVI, HDMI, DisplayPort, Mini DisplayPort, and Thunderbolt Digital Video
   a. To establish that the facility cabling and terminations meet the specifications defined in 'Performance Standards', a video test signal shall be applied to each input cable and passed through the system switching and distribution networks with test patterns observed at each system display.
   b. Test signals shall be generated using a Quantum Data 780 (or equal).
   c. Execute at a minimum, the following functional sink tests:
1). HDCP verification  
2). EDID emulation  
3). Video pattern testing. The following test patterns (at a minimum) shall be observed:  
   a). Circles – no visible deviation from image geometry and linearity  
   b). Safe area – no visible horizontal or vertical over or under scan  
   c). Focus – proper image delineation in all areas  
   d). Coarse Crosshatch – no vertical or horizontal bowing  
   e). Fine Crosshatch – no vertical or horizontal bowing  
   f). PLUGE – properly set black level (brightness) and display gain (contrast)  
   g). 32-Level Split Grayscale – even transition from black to white, no color shift  
   h). SMPTE Color Bars with PLUGE pattern – no color or pattern deviations  
   i). Flat Field – uniform white field with no color, hot or dark spotting  
   j). Hum Bar Detect – no visible hum bars  

4. Execute at a minimum, the following functional source tests:  
   1). Status bar showing HDMI In  
   2). View incoming video  
   3). Monitor incoming audio  
   4). EDID emulation  

10. High-Bandwidth Digital Content Protection (HDCP)  
   a. Use a Quantum Data QD-882EA video test generator or similar to verify a “Pass” test  
      that HDCP is performing to specification for source tests using a sink emulator and/or  
      protocol analyzer; and sink devices using source emulators or protocol generators  
      including the following parameters:  
      1). Protocol adherence  
      2). Audio/Video Format Switching  
      3). Media Switching  
      4). Force AVMUTE  
      5). Link Integrity (Pj) Check Repeat Rate  
      6). Pj Mismatch Response  
      7). Number of Keys (source test with sink emulator)  

11. Extended Display Identification Data (EDID)  
   a. The Contractor shall ensure that all devices capable of generating or accepting EDID  
      information have been updated with the latest version of the EDID standard.  
   b. The Contractor shall modify all EDID tables to ensure that the highest common  
      resolution is used by each device within a given system.  
   c. The Contractor shall modify the EDID tables to include the most common  
      computer/laptop resolutions used within the facility. Coordination with the Owner shall  
      be required.  
   d. The Contractor shall ensure that EDID information is maintained thought the signal  
      chain and that intermediary devices that pass or modify the EDID information conform  
      to the other requirements stated within this Specification.  

12. Computer / Video Display Devices
a. The Contractor shall optimize projection equipment for the following minimum standard scan rates and resolutions:
   1). NTSC / 480p
   2). HDTV: 720p/60, 1080i/60 and 1080p/60
   3). XGA: 1024 x 768, 60 Hz, 70 Hz, 72 Hz and 75 Hz.
   4). WXGA: 1280 x 800 / 1360 x 768 / 1366 x 768, 60 Hz.
   5). WXGA+: 1440 x 900, 60 Hz.
   6). SXGA: 1280 x 1024, 60 Hz.
   7). SXGA+: 1400 x 1050, 60 Hz.
   8). WSXGA+: 1680 x 1050, 60 Hz.
   9). UXGA: 1600 x 1200, 60 Hz and 75 Hz.
   10). WUXGA: 1920 x 1200, 60 Hz.
   11). UHD: 3840 X 2160, 60 Hz.
   12). 4K: 4096 X 2160, 60 Hz.

13. Control
   a. Upon completion of installation, the Contractor shall test each function of each control station, push-button panel, touch screen panel, computer control interface, and all components connected to or interfaced to the Control System to verify proper operation and that each switch and indicator operates as intended.

14. Systems Overview
   a. In addition, the Contractor shall:
      1). Verify each item of equipment is functioning as intended.
      2). Verify the installation is the same as specified.

END OF SECTION 3
**SECTION 4 – APPENDICES**

**PART 1 - APPENDIX A**

1.1 **LIST OF DRAWINGS**

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVS00</td>
<td>AUDIOVISUAL SYSTEMS COVER SHEET</td>
</tr>
<tr>
<td>AVS01</td>
<td>AUDIOVISUAL SYSTEMS SY01.0</td>
</tr>
<tr>
<td>AVS02</td>
<td>AUDIOVISUAL SYSTEMS SY01.1</td>
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<td>AUDIOVISUAL SYSTEMS SY01.2</td>
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<tr>
<td>AVS16</td>
<td>AUDIOVISUAL SYSTEMS SY21 – SY23</td>
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1.2 **REFERENCE DRAWINGS**

A. The following drawings have been included for the Bidders reference in bidding the work called for by the Contract Documents. Reference drawings may not reflect as-built conditions. It shall be the responsibility of the Contractor to field verify all site conditions.
<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>T001</td>
<td>TECHNOLOGY INFRASTRUCTURE LEGENDS AND SYMBOLS</td>
</tr>
<tr>
<td>T002</td>
<td>TECHNOLOGY INFRASTRUCTURE SCHEDULES AND NOTES</td>
</tr>
<tr>
<td>T100</td>
<td>LEVEL 0 TECHNOLOGY INFRASTRUCTURE PLAN - C</td>
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### PART 2 - APPENDIX B

#### 2.1 SUMMARY OF AUDIOVISUAL SYSTEMS SUBMITTALS

<table>
<thead>
<tr>
<th>Description</th>
<th>Deadline</th>
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<tbody>
<tr>
<td>Contractor Qualifications</td>
<td>Per Section 1</td>
</tr>
<tr>
<td>Request for Information (Pre-Bid)</td>
<td>Per Section 1</td>
</tr>
<tr>
<td>Substitution Requests</td>
<td>Per Section 1</td>
</tr>
<tr>
<td>Line item pricing</td>
<td>Per Section 1</td>
</tr>
<tr>
<td>Bonds</td>
<td>Per Section 1</td>
</tr>
<tr>
<td>Schedule</td>
<td>Within 15 days of notification of contract award</td>
</tr>
<tr>
<td>Progress Reports</td>
<td>While working off-site: every two weeks</td>
</tr>
<tr>
<td></td>
<td>While working on-site: every week.</td>
</tr>
<tr>
<td>Shop Drawings</td>
<td>Prior to equipment and materials purchase, fabrication, or installation</td>
</tr>
<tr>
<td>Bill of Materials</td>
<td>Prior to equipment and materials purchase, fabrication, or installation</td>
</tr>
<tr>
<td>Audio Digital Signal Processing (DSP)</td>
<td>Per Contractor's published schedule</td>
</tr>
<tr>
<td>Control System Control Surfaces / GUI</td>
<td>Per Contractor's published schedule</td>
</tr>
<tr>
<td>Prototype submittal</td>
<td>Per Contractor's published schedule</td>
</tr>
<tr>
<td>Control System Control Surfaces/GUI Submittal</td>
<td>Per Contractor's published schedule</td>
</tr>
<tr>
<td>Preliminary As-Built Drawing Submittal</td>
<td>Prior to Final Testing and System Performance Verification</td>
</tr>
<tr>
<td>Final Documentation</td>
<td>Within 30 days of Substantial Completion</td>
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<tr>
<td>Post-Integration Control Surfaces Adjustments</td>
<td>Within 90 days of Substantial Completion</td>
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PART 3 - APPENDIX C: PRE-BID FORMS

3.1 CONTRACTOR QUALIFICATIONS REQUIREMENTS

**Corporate Profile**

<table>
<thead>
<tr>
<th>Location of Corporate Headquarters</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Number of Offices &amp; Locations</td>
<td></td>
</tr>
<tr>
<td>Location of Office Assigned to this Project</td>
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</table>

**Corporate History**

<table>
<thead>
<tr>
<th>Number of Years in Business</th>
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<tbody>
<tr>
<td>Any Former Names of the Organization</td>
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<tr>
<td>Date(s) of Incorporation</td>
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<tr>
<td>State of Incorporation</td>
<td></td>
</tr>
<tr>
<td>Officer Names &amp; Addresses</td>
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## Litigation Experiences (Last 5 Years)

<table>
<thead>
<tr>
<th>Nature of Litigation</th>
<th>Plaintiff or Defendant</th>
<th>Outcome</th>
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<tr>
<td>Project Related</td>
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<tr>
<td>Non-Project Related</td>
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</table>

<table>
<thead>
<tr>
<th>Nature of Litigation</th>
<th>Plaintiff or Defendant</th>
<th>Outcome</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nature of Litigation</th>
<th>Plaintiff or Defendant</th>
<th>Outcome</th>
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</table>
## Financial

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<td>Trade &amp; Bank References (List 3)</td>
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<td>Dunn &amp; Bradstreet Ranking</td>
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<td>Insurance Limits</td>
</tr>
<tr>
<td>Name of Bonding Company</td>
</tr>
<tr>
<td>Name &amp; Address of Agent</td>
</tr>
<tr>
<td>Maximum Bonding Capacity</td>
</tr>
<tr>
<td>Current Bonding Capacity</td>
</tr>
<tr>
<td>Performance Bond Ever Exercised?</td>
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### Staffing

<table>
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<tbody>
<tr>
<td>Number of Design Staff</td>
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<tr>
<td>Number of Installation Staff</td>
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<tr>
<td>Number of Project Management Staff</td>
<td></td>
</tr>
<tr>
<td>Number of Software Programming Staff</td>
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### Project Key Personnel

<table>
<thead>
<tr>
<th>Project Executive</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td></td>
</tr>
<tr>
<td>Systems Engineer/Designer</td>
<td></td>
</tr>
<tr>
<td>Lead Installer</td>
<td></td>
</tr>
<tr>
<td>Control Systems Programmer</td>
<td></td>
</tr>
<tr>
<td>Audio DSP Programmer</td>
<td></td>
</tr>
<tr>
<td>Commissioning Agent</td>
<td></td>
</tr>
<tr>
<td>Trainer</td>
<td></td>
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</table>
## Project Executive Resume

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Location</td>
<td></td>
</tr>
<tr>
<td>Percentage of Individual’s Time Allocated to this Project</td>
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</tbody>
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### Work History

<p>| |</p>
<table>
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<tr>
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### Previous Project Experience

<p>| |</p>
<table>
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### Length of Employment

<table>
<thead>
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<td>☐ RCDD</td>
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<tr>
<td>☐ PMP</td>
<td></td>
</tr>
<tr>
<td>☐ Certified Control System Programmer</td>
<td></td>
</tr>
<tr>
<td>☐ Certified DSP Programmer</td>
<td></td>
</tr>
<tr>
<td>☐ Others</td>
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</tr>
</tbody>
</table>
# Project Manager Resume

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Office Location</td>
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<tr>
<td>Percentage of Individual’s Time Allocated to this Project</td>
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## Work History

<table>
<thead>
<tr>
<th>Previous Project Experience*</th>
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## Length of Employment

<table>
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<td>□ CTS-I</td>
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<tr>
<td>□ RCDD</td>
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<tr>
<td>□ PMP</td>
<td></td>
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<tr>
<td>□ Certified Control System Programmer</td>
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</tr>
<tr>
<td>□ Certified DSP Programmer</td>
<td></td>
</tr>
<tr>
<td>□ Others</td>
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</table>

*The assigned Project Manager shall have at least 5 years experience with audiovisual projects of similar scope & scale.*
# Systems Engineer/Designer Resume

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Office Location</td>
<td></td>
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<tr>
<td>Percentage of Individual’s Time Allocated to this Project</td>
<td></td>
</tr>
<tr>
<td>Work History</td>
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<tr>
<td>Previous Project Experience*</td>
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<tr>
<td>Length of Employment</td>
<td></td>
</tr>
<tr>
<td>Certifications</td>
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</tr>
<tr>
<td>□ CTS</td>
<td></td>
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<tr>
<td>□ Certified Control System Programmer</td>
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<tr>
<td>□ Certified DSP Programmer</td>
<td></td>
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<tr>
<td>□ Others</td>
<td></td>
</tr>
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</table>

Any Extron certifications including number and expiration date

*The assigned Systems Engineer/Designer shall have at least 5 years experience with audiovisual projects of similar scope & scale.*
# Lead Installer Resume

<table>
<thead>
<tr>
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</thead>
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<tr>
<td>Office Location</td>
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<td>Percentage of Individual’s Time Allocated to this Project</td>
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## Work History

## Previous Project Experience*

## Length of Employment

<table>
<thead>
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<td>[ ] Certified DSP Programmer</td>
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<td>[ ] Others</td>
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<tr>
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<table>
<thead>
<tr>
<th>Extron XTP Systems Technician or XTP Systems Design Engineer certification number and expiration date</th>
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| Extron NAVS Systems certification number and expiration date |  |

---

*The assigned Lead Installer shall have at least 5 years experience with audiovisual projects of similar scope & scale.*
# Control Systems Programmer Resume

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
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<td>Office Location</td>
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<td>Percentage of Individual’s Time Allocated to this Project</td>
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<tr>
<td>Work History</td>
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<tr>
<td>Previous Project Experience*</td>
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<td>Length of Employment</td>
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<td>□ CTS</td>
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<td>□ CTS-D</td>
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<td>□ CTS-I</td>
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<tr>
<td>□ RCDD</td>
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</tr>
<tr>
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<tr>
<td>□ Certified DSP Programmer</td>
<td></td>
</tr>
<tr>
<td>□ Others</td>
<td></td>
</tr>
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</table>

Extron Certified Control Specialist certification number and expiration date

*The assigned Control System Programmer shall have at least 3 years experience with audiovisual projects of similar scope & scale.*
### Audio DSP Programmer Resume

<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Location</td>
</tr>
<tr>
<td>Percentage of Individual’s Time Allocated to this Project</td>
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</tbody>
</table>

#### Work History

#### Previous Project Experience*

#### Length of Employment

- [ ] CTS
- [ ] CTS-D
- [ ] CTS-I
- [ ] RCDD
- [ ] PMP
- [ ] Certified Control System Programmer
- [ ] Certified DSP Programmer
- [ ] Others

* The assigned Audio DSP Programmer shall have at least 3 years experience with audiovisual projects of similar scope & scale.
## Commissioning Agent Resume

<table>
<thead>
<tr>
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<tbody>
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<td>Percentage of Individual’s Time Allocated to this Project</td>
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### Work History

<table>
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<tr>
<th>Previous Project Experience</th>
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### Length of Employment

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<th>Certifications</th>
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<td>CTS</td>
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<td>PMP</td>
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<tr>
<td>Certified DSP Programmer</td>
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<tr>
<td>Others</td>
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*The assigned Commissioning Agent shall have at least 3 years experience with audiovisual projects of similar scope & scale.*
## Trainer Resume

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<td>Percentage of Individual’s</td>
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</tr>
<tr>
<td>Time Allocated to this</td>
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<tr>
<td>Project</td>
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## Work History

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## Length of Employment

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<td>□ PMP</td>
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<td>□ Certified DSP Programmer</td>
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## Resources

<table>
<thead>
<tr>
<th>Resource Description</th>
<th>Required Action</th>
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<tbody>
<tr>
<td>Manufacturers’ Line Card for products Company is an authorized distributor or dealer. Include authorization date</td>
<td>Provide this as an attachment</td>
</tr>
<tr>
<td>List of Manufacturers’ Technical Certifications or Designations</td>
<td></td>
</tr>
<tr>
<td>List of Manufacturers’ for Whom the Company is an Authorized Service Center</td>
<td>Provide this as an attachment</td>
</tr>
<tr>
<td>List of Computer Software and/or Systems that Will Be Used on the Project</td>
<td></td>
</tr>
<tr>
<td>List of Contractor Owned Test Equipment. Include Manufacturer, Model, and Software Version</td>
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## References – Three Projects

1. Project Reference 1:

<table>
<thead>
<tr>
<th>Institute and Project Name</th>
<th>Contact Name</th>
<th>Phone Number</th>
<th>E-Mail Address</th>
<th>Similar Scope &amp; Scale</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Similar Technology Application</th>
<th>Project Costs</th>
</tr>
</thead>
</table>

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2. Project Reference 2:

<table>
<thead>
<tr>
<th>Institute and Project Name</th>
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<tbody>
<tr>
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<td>Phone Number</td>
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<td>E-Mail Address</td>
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<tr>
<td>Similar Scope &amp; Scale</td>
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</table>

<table>
<thead>
<tr>
<th>Similar Technology Application</th>
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</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Project Costs</th>
<th></th>
</tr>
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</table>
3. Project Reference 3:

<table>
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<td>E-Mail Address</td>
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<tr>
<td>Similar Scope &amp; Scale</td>
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</tr>
</tbody>
</table>

| Similar Technology Application |  |

<p>| Project Costs |  |</p>
<table>
<thead>
<tr>
<th>List Any Previous Projects with Fayetteville Public Library, The Sextant Group, Inc., MSR Design, or Crossland Construction Company</th>
<th></th>
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</thead>
</table>
3.2 REQUEST FOR INFORMATION FORM

A. Bidders requesting information shall utilize this process and form. No verbal questions or phone communications shall be permitted during bid process.

B. All requests for information shall be submitted to the Owner at cmoody@faylib.org.

Bidder ________________________________________________________________

Name / Title _____________________________________________________________

Date______________________________________________________________

E-mail Address_________________________________________________________

Phone / Fax ____________________________________________________________

Spec Section/Article # _________________________________________________

Drawing # _____________________________________________________________

Detailed question:
3.3 SUBSTITUTION REQUEST FORM

A. Bidders proposing product substitutions shall utilize this form. No verbal requests or phone communications shall be permitted during bid process.

B. All substitution requests shall adhere to the procedures and policies defined herein.

C. In addition to this form, all requests shall include drawings, performance and test data, and other information necessary to demonstrate that the substitution will meet all intentions of the Specification or required for a complete evaluation.

D. Submit form via email to Owner at cmoody@faylib.org

Bidder ____________________________________________ ______________________
Name / Title ______________________________________ ________________________
Date_______________________________________________ ______________________
E-mail Address_____________________________________ ________________________
Phone _____________________________________________ ______________________
Drawing # _________________________________________ _________________________
System Type/Item #___ _____________________________ _________________________
Originally Specified item: ________________________ ______________________________
Requested Substitution: ___________________________ ___________________________
Description:
3.4 BID RESPONSE FORM

A. The Bidder shall complete and return this form. This document, as well as all submittals outlined herein, shall be considered to be the bid.

B. The Bidder shall provide line item pricing for all equipment as an attachment. All pricing is to be inclusive of any applicable taxes, shipping, handling, expenses, insurance, or other miscellaneous charges.

<table>
<thead>
<tr>
<th>Bid Form</th>
<th>Fayetteville Public Library - New Library Addition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Totals</td>
</tr>
<tr>
<td><strong>BASE BID</strong></td>
<td></td>
</tr>
<tr>
<td>Equipment and Materials</td>
<td>$</td>
</tr>
<tr>
<td>Shop Drawings and Submittals</td>
<td>$</td>
</tr>
<tr>
<td>In-Shop Fabrication Labor</td>
<td>$</td>
</tr>
<tr>
<td>On-Site Installation Labor</td>
<td>$</td>
</tr>
<tr>
<td>Software Development</td>
<td>$</td>
</tr>
<tr>
<td>Final Testing and Systems Performance Verification</td>
<td>$</td>
</tr>
<tr>
<td>Training and Closeout Documentation</td>
<td>$</td>
</tr>
<tr>
<td>Project Management and Coordination</td>
<td>$</td>
</tr>
<tr>
<td>Freight &amp; General Administration</td>
<td>$</td>
</tr>
<tr>
<td>Year One Warranty</td>
<td>$</td>
</tr>
<tr>
<td><strong>SUBTOTAL:</strong></td>
<td>$</td>
</tr>
<tr>
<td>Applicable Taxes</td>
<td>$</td>
</tr>
<tr>
<td><strong>BASE BID TOTAL:</strong></td>
<td>$</td>
</tr>
<tr>
<td><strong>DEDUCT 1</strong></td>
<td></td>
</tr>
<tr>
<td>Total Equipment and Materials</td>
<td>$</td>
</tr>
<tr>
<td>Total Additional Labor, Freight, G &amp; A, Warranty</td>
<td>$</td>
</tr>
<tr>
<td>Total Additional Taxes</td>
<td>$</td>
</tr>
<tr>
<td><strong>TOTAL DEDUCT 1</strong></td>
<td>$</td>
</tr>
<tr>
<td><strong>DEDUCT 2</strong></td>
<td></td>
</tr>
<tr>
<td>Total Equipment and Materials</td>
<td>$</td>
</tr>
<tr>
<td>Total Additional Labor, Freight, G &amp; A, Warranty</td>
<td>$</td>
</tr>
<tr>
<td>Bid Form</td>
<td>Fayetteville Public Library - New Library Addition</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Total Additional Taxes</td>
<td>$</td>
</tr>
<tr>
<td>TOTAL DEDUCT 2</td>
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</tbody>
</table>

**DEDUCT 3**

| Total Equipment and Materials | $ |
| Total Additional Labor, Freight, G & A, Warranty | $ |
| Total Additional Taxes | $ |
| TOTAL DEDUCT 3 | $ |

**DEDUCT 4**

| Total Equipment and Materials | $ |
| Total Additional Labor, Freight, G & A, Warranty | $ |
| Total Additional Taxes | $ |
| TOTAL DEDUCT 4 | $ |

**Additional Warranties**

| Year Two Warranty | $ |
| Year Three Warranty | $ |
| Year Four Warranty | $ |

**Hourly Rates for Additional Work**

<table>
<thead>
<tr>
<th>Per Hour Rates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Engineer/Designer</td>
<td>$</td>
</tr>
<tr>
<td>Project Manager</td>
<td>$</td>
</tr>
<tr>
<td>Technician</td>
<td>$</td>
</tr>
<tr>
<td>Programmer</td>
<td>$</td>
</tr>
<tr>
<td>Trainer</td>
<td>$</td>
</tr>
</tbody>
</table>

Bidder Company Name: ________________________________________________________
**Bid Form**

**Fayetteville Public Library - New Library Addition**

<table>
<thead>
<tr>
<th>Authorized Signature:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Print Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.5 STATE OF ARKANSAS GR-21 TAX CODE AND INFORMATION
PART 4 - APPENDIX D: POST-AWARD FORMS:

4.1 REQUEST FOR INFORMATION FORM: SUBMIT TO OWNER AT CMOODY@FAYLIB.ORG

<table>
<thead>
<tr>
<th>RFI #:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>To:</td>
<td>From:</td>
</tr>
</tbody>
</table>

**Specification**

<table>
<thead>
<tr>
<th>Section / Article:</th>
<th>Drawing # / Detail:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>System Type:</th>
<th>Room name / #:</th>
</tr>
</thead>
</table>

Request:

Response by: | Date: |
|--------------|-------|

Response:
SUBSTITUTION REQUEST FORM

A. Post-award substitution requests shall utilize this form.

B. In addition to this form, all requests shall include drawings, performance and test data, and other information necessary to demonstrate that the substitution will meet all intentions of the Specification or required for a complete evaluation.

C. All substitution requests shall be submitted to Owner at cmoody@faylib.org

Date_______________________________________________ ______________________________

Drawing # _________________________________________ _______________________________

System Type/Item #_________________________________ ______________________________

Originally Specified item: ________________________ _____________________________________

Requested Substitution: ___________________________ __________________________________

Cost impact/Credit to Owner: ___________________________ __________________________________

Description/reason for post-award substitution request:
### 4.2 PROGRESS REPORT FORM: SUBMIT TO OWNER BY 5PM ON FRIDAY

CMOODY@FAYLIB.ORG

<table>
<thead>
<tr>
<th>Project Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td></td>
</tr>
<tr>
<td>From:</td>
<td></td>
</tr>
</tbody>
</table>

**Progress** (Tasks accomplished since the previous report; both completed tasks and work-in-progress.)

<p>| |</p>
<table>
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</table>

**Work Planned** (Tasks scheduled for the time period extending until the next report)

<p>| |</p>
<table>
<thead>
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</thead>
</table>

**Issues** (Factors delaying progress or have the potential to delay progress involving the Owner, Architect and/or Consultant.)

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
</table>
SYSTEMS PERFORMANCE VERIFICATION REQUEST FORM

<table>
<thead>
<tr>
<th>Contractor:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project:</td>
<td></td>
</tr>
</tbody>
</table>

The Contractor requests a Systems Performance Verification appointment by completing this form and returning it to The Sextant Group, an NV5 Company. By signing below, the Contractor indicates that

1. The work on this contract, as defined in the Audiovisual Systems Specification, is complete and ready for the Consultant’s final Systems Performance Verification.
2. All required field tests have been performed and project documentation is on-site.
3. A computer/video signal generator or generators, capable of outputting all signal types included in the system designs, will be available onsite at the time of Systems Performance Verification.
4. Physical media (DVD, Blu-Ray disc, etc.) will be available onsite to verify the performance of all applicable source devices.
5. Request form shall be submitted to Owner at cmoody@faylib.org

Any incomplete items, deviations, or exceptions to the requirements of the Audiovisual Systems Specification shall be listed by the Contractor below, or provided as an attachment:

If the Contractor’s work is found to be incomplete, and subsequent visits to the site by the Consultant are required by the Owner, the Owner may elect to have the Consultant’s travel costs, billable time, and all other related travel expenses be deducted from the Contractor’s final payment.

By signing below, Contractor verifies that the job site is ready for final Systems Performance Verification and accepts the conditions of this agreement.

Signature: _________________________________ Print Name: _______________________________
Title: _____________________________________ Date: ________________________________
PART 5 - APPENDIX E: BIDDING EQUIPMENT LISTS

5.1 BIDDING EQUIPMENT LISTS

A. Bidding Equipment Lists can be found on the following pages.

B. Bidding Equipment Lists show quantities per room. The quantity of rooms for each system type is listed at the top of each page.

C. Bidding Equipment Lists include manufacturers and model numbers where appropriate. Additional identification or ordering information may vary according to supplier, and the Bidder shall cross-reference with an individual supplier if required.

5.2 MASTER QUOTE NUMBERS

A. As a convenience to the Contractor in preparing the bid response, Master Quote numbers have been provided for several equipment groups. Where given, Master Quote numbers or other quotation numbers have been provided for bidding purposes only. It shall be the responsibility of the Contractor to verify that they have received the latest versions of the Master Quotes prior to bidding, and to establish the accuracy of the quotes prior to ordering.

1. Extron – Master Quote # 9731308
2. L-Acoustics – Master Quote “US AR Fayetteville Library System”
3. Allen&Heath – Master Quote "Fayetteville Public Library AV System"
4. Clear-Com – Master Quote # 200212 2-WE
5. Ross Video – Master Quote # Q-00036691-1

5.3 LIST OF BRAND SPECIFIC PRODUCTS

A. Some manufacturer's names and product descriptions used in this specification are product specific with no substitutions allowed. The items listed as "Brand Specific" in this specification must be the manufacturer and type specified. These specific products are required for compatibility with the Owner's existing systems and to maintain continuity of support. The Brand Specific Products specified for this project include those by:

1. Allen Heath
2. L'Acoustics
3. Extron
4. Ross Video
5. Shure
6. Panasonic
7. Clear-Com
8. AJA

5.4 KEYED BIDDING NOTES

A - OFCI (Owner Furnished Contractor Installed)
B - OFOI (Owner Furnished Owner Installed, or Provided by Others)
C - Included with above package
D - Coordinate stock color/finish with architect
E - Custom painted. Coordinate with architect
F - Field verify prior to submittals
G - Special or noteworthy installation requirements – Refer to System Description for details
H - Reference manufacturer’s Master Quote

END OF SECTION 4