

**Murphy Conference Room**

Request for Proposal

April 21, 2017

Presented by:

**NYU Hospitals Center**

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# Introduction

NYU Hospitals Center (“NYUHC”) is one of the nation’s premier academic medical centers consisting of NYU Hospitals Center (the Owner for this project) and NYU School of Medicine. Our trifold mission to serve, teach, and discover is achieved daily through an integrated academic culture devoted to excellence in patient care, education, and research.

**Our Leadership, Campus Transformation, and Community Service Plan**

Located in the heart of Manhattan, with additional facilities throughout the New York City area, NYUHC operates three inpatient facilities – Tisch Hospital, NYU Hospital for Joint Diseases, and the NYU Lutheran Medical Center and numerous ambulatory facilities.

Additionally, our growing outpatient network brings our world-class medical services directly to the communities where our patients live and work. When care that is more complex is needed, we bridge the gap between our community-based practices and our hospitals to provide a seamless healthcare experience.

Our campus transformation program is reshaping NYUHC through construction, renovations, and expansions. Key to this transformation is the Murphy Conference Room.

**Project Overview**

NYUHC is conducting a Request for Proposal (RFP) for the design, furnishing of equipment, installation and support of the Murphy Conference Room, located at 550 First Avenue, New York, NY (the “Project”). NYUHC invites you (the “Proposer”) to submit a proposal in accordance with the requirements, terms, and conditions in this RFP.

The section below provides a general breakdown of the rooms and systems included in the Scope of Work. For system descriptions and functional narratives, refer to Section 15-1

**Typical AV Enabled Spaces –**

Specific functional narratives are included in Sections 15-1.

* Standard Typical Conference Rooms

This RFP process is an opportunity to demonstrate your strong commitment to collaborating with NYUHC and ensures highly competitive pricing with quality customer support services. Proposers will be evaluated on demonstrated innovation, and the ability to provide a system that combines world-class technology with a simple and intuitive clinician interface.

The RFP solicits a detailed offering that includes line item pricing as well as a detailed response regarding your services, initiatives and Contracting Terms/Payment Terms compliance.

# Milestone Calendar

The following calendar of events is based on planned NYUHC activities and anticipated Proposer delivery capabilities.

|  |  |  |  |
| --- | --- | --- | --- |
| *Milestones* | *Date* | *Time* |  |
|  |
| RFP Release Date | April 21, 2017 |  |  |
| Acknowledgement of Proposal and notification of intent to bid | April 28, 2017 | 5 PM |  |
| All inquiries submitted by Proposers | May 5, 2017 | 5 PM |  |
| NYUHC responses to inquiries sent out | May 12, 2017 | 5 PM |  |
| All proposals are due | May 19, 2017 | 1PM |  |
| Cabling / Rough in | 2nd Quarter 2017 |  |  |
| Installation and Commissioning | 2nd Quarter 2017 |  |  |
| Temporary Certificate of Occupancy | *N/A* |  |  |
| Substantial Construction Completion [General Contractor] | July 2017 |  |  |
| Go Live | July 2017 |  |  |

# Proposal Submission Requirements

All proposers who plan to submit a proposal shall notify NYUHC by email to ITSourcing@nyumc.org no later than 5PM Eastern, April 28, 2017.

## Proposals shall be made only on the forms provided and all blank and underlined spaces in the forms shall be fully completed.

## Proposals shall be submitted electronically to ITSourcing@nyumc.org no later than 1 p.m. on May 19, 2017.  Late proposals generally will not be considered.

##  If you choose not to submit a proposal please submit a declination letter to ITSourcing@nyumc.org.

Note to Proposers: All questions regarding interpretation or specifications must be submitted in writing to ITSourcing@nyumc.org only. **Under no circumstances will proposer contact any employee of NYUHC.** Any dialogue initiated by the Proposer not addressed to contacts above will result in immediate disqualification. Discussions on other business matters not related to this RFP are acceptable.

# Proprietary Information, Non-Disclosure

Proposer shall have no rights to this document or the information contained therein and shall not duplicate or disseminate said document or information outside the proposer's organization without the prior written consent of NYUHC.

# Costs Incurred

All costs incurred in the preparation of the Proposal must be borne by the Proposer. By submitting a Proposal, the Proposer agrees that the rejection of any Proposal, in whole or in part, will not render NYUHC liable for incurred costs and damages.

# RFP Proposal Terms

Proposals are to be based on the requirements contained in this RFP and referenced documents unless exceptions are taken by the Proposer as clearly redlined or annotated in the Proposal. NYUHC reserves the right to negotiate the final scope of work, and price before entering into a contract. Specifications, requirements or descriptions not clearly redlined or annotated in the Proposal shall be deemed accepted by the Proposer. Additionally, by submitting a proposal, the Proposer acknowledges that NYUHC reserves the right to incorporate any or all of the Proposer’s RFP responses into final contracts and NYUHC reserves the right to award all or any portion(s) of the Work to persons other than the Proposer.

Finally, NYUHC reserves the right to adjust the evaluation criteria after finalizing the scope and pricing requirements at any time and to award a contract to any Proposer as NYUHC determines in its sole discretion to in its best interests.

# NYUHC Reserves Right to Refuse Any and All Proposals

Nothing in this RFP shall create any binding obligation upon NYUHC. Moreover, NYUHC, at its sole discretion, reserves the right to reject any and all proposals as well as the right not to award any contract under this proposal process.

# Effective Period of Prices

All pricing Proposals by Proposer will remain fixed and firm through November 30, 2022.

# Software and Licensing

All software, firmware and licenses necessary to achieve full functionality must be included.

All software update software services must be included in support or maintenance services proposal, including firmware updates and any other software related to the solution.

# Pricing

A proposal submission form is included for the Proposer to provide both services and equipment breakdown and the total lump sum price. For services, a rate card must also be submitted.

# Description of Company

All Proposers must have provided privileged access services and solutions to the public for a minimum of three (3) years. The Proposer will offer a comprehensive package for storage services as specified in this RFP to all NYUHC facilities. All questions in this RFP document must be answered.

All Proposers are required to fill out the Contractor qualification questionnaire provided as an attachment to this RFP as well as to indicate your compliance with and document any exceptions to each of the following requirements to demonstrate overall firm history of integrity, safety and financial stability.

In addition, please provide:

1. The company’s full name, address, main telephone and appropriate contact information including e-mail address.
2. A brief historical perspective on your company (years in the business, growth via mergers and acquisitions, key industry innovations.)
3. What are your company values?
4. Describe your corporate culture. Explain how you differentiate yourself from your competition.
5. Describe the full range of services your company offers and the corresponding rates. Include all services that will be available and all expenses that we would incur under this agreement.
6. List office locations and specific responsibilities of each area.
7. Please provide an overview of your company’s growth over the past five years.
8. Provide audited financial statement for the two fiscal years immediately prior to this one.
9. What percentage of your business is in healthcare?
10. Company description: including ownership, number of years in business, strategic direction, mission, history, acknowledgements or awards.
11. Recent financial results.
12. Partner relationships.
13. Description of selection criteria for contractor or co-implementation partners
14. Work force distribution by country, city, state, etc.
15. Total number of employees: Include number of project managers, implementation specialists, development engineers, % full time versus contracted, etc.
16. Average number of years of application and implementation experience and business process definition for consultants and managers.

# Past Performance and References

1. Provide at least three (3) references of past deployments in a hospital or enterprise environment setting of similar size and scope of NYUHC. NYUHC may arrange site visits to review the deployments implemented by the proposer.

For each reference, please include the following:

1. Organization name, contact name, title, address and telephone number.
2. Describe the relationship and services provided.
3. Provide current and past account information, of similar size and configuration. Include:
	1. A current, long-term customer.
	2. A current customer implemented in the past 18 months.
	3. A former customer terminated within the past 18 months and reasoning for termination other than consolidation.
4. If you cannot provide at least one reference of a similar size and scope of NYUHC, please explain and indicate the largest installation you have performed.

Failure to provide suitable references to NYUHC will result in the immediate disqualification of proposer’s proposal without further consideration.

# Evaluation Criteria

NYUHC plans to evaluate the Proposer’s response based on the following criteria. All Proposers shall be evaluated on their demonstration of moral, financial and technical responsibility.

# Technical Evaluation Criteria

NYUMC plans to evaluate the Proposer’s response based on the following criteria. All Proposers shall be evaluated on their ability to perform all the technical procedures necessary for this type of project.

1. Approach to the Work

2. Functional Requirements

3. Proposed Project Team

4. Prior Project Experience

5. Overall Firm Background

6. Understanding of NYUHC

7. Willingness to Accommodate Contracting Terms

# Price Evaluation Criteria

Proposed pricing for both the initial design and installation and for ongoing maintenance, licensing, and any other support costs.

# Proposal Submission Form

Proposers shall fill out the Proposal submission form on the following page and return with their Proposal in accordance with the instruction in Section 3 Proposal Submission Requirements.

**PROPOSAL SUBMISSION FORM**

**COMPANY NAME: *(To be completed by Proposer)***

**PROJECT: NYU Hospitals Center, Murphy Conference Room**

**LOCATION: 550 1st Avenue, New York , NY**

**SUBSTANTIAL COMPLETION DATE: *(To be completed by Proposer)***

**TOTAL LUMP SUM PRICE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The undersigned has carefully examined all RFP materials and exhibits, the form of Contract, and special provisions and addenda, if any, and that the undersigned has inspected the actual location of the work, and is satisfied as to all circumstances and conditions, including customer requirements and the installation environment, and proposes to furnish all services, equipment, materials, supplies, tools, and labor to design, install complete and support all the Work required in conformity with the plans, specifications and the form of Contract subject only to the express exceptions, clarifications, alternates, allowances and options set forth in the Proposal.

The undersigned hereby agrees to engage in good faith efforts to finalize and execute the form of Contract included with the RFP as may be directed by NYUHC within a reasonable time following acceptance of this Proposal, if any, and further agrees to complete the entire work covered by this Proposal within the number of consecutive calendar days as indicated in the Proposal from the date of NYUHC’s written Notice to Proceed with the Work.

SIGNATURE OF PROPOSER**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Name Title

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Printed Name Date

Notary Seal

Business address of Proposer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contact phone \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

E-mail address \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Scope of Work

**Audiovisual systems and equipment**

#

# Part 1 Functional Narratives

Murphy Command Center Functionality Summary (chairs around a fixed table)

The existing AV equipment in this room uses analog video technology which no longer meets current collaborative technologies standards. The newest technology will have an interactive touch screen, 4K video and HD audio capabilities that will enhance the user experience.

The AV upgrade includes the following:

1. (1) One 98 inch and (2) two 75 inch 4K complainant LED TVs
	1. This will allow users to view multiple PC/video sources throughout the conference room.
2. (1) One Touch panel screen (Tablet based)
3. This will allow users command of the collaborative technologies in the room such as: WebEx …where users can share content from wired / wireless laptop connections and Windows/Mac room PCs. Also, audio and HD videoconference calls with other NYULMC or external locations where one to one visual interaction is crucial to the meeting.

Other technologies that will be enhanced by the AV upgrade are broadcast /satellite and over the air TV, room control and support.

The AV design and equipment integration will be guided by the new NYULMC AV strategy put in place by the IT Department which intends to future proof the technology deployed in the conference rooms.

# Part 2 General

* 1. Contractor’s General Responsibilities
		1. The Contractor shall be responsible for delivering a turnkey system to the Owner.
		2. The Contractor shall furnish all equipment and materials, whether specifically mentioned herein or not, to ensure a complete and operating system. The NIC and OFE equipment and materials are specifically exempted from this requirement.
		3. The Contractor shall generate all shop drawings and information for the complete installation and wiring of the system. The Contractor shall provide (or sub-contractor for) the on-site installation and wiring, and shall provide on-going supervision and coordination during the implementation phase.
		4. The Contractor shall be responsible for the initial adjustment of the systems as herein prescribed and shall provide all test equipment for the system checkout and commissioning. Contractor shall provide on-the-job training in the operation and maintenance of the systems for personnel designated by the Owner.
		5. The Contractor shall coordinate and submit to all site policies and adhere to all site safety procedures put in place by the Construction Manager.
		6. The Contractor shall attend all construction manager/sub-contractor coordination meetings as required by construction manager.
		7. The Contractor shall perform an RF Spectrum Analysis Survey identifying all available frequencies that may be required by any wireless equipment under this specification such that appropriate frequency allocations may be identified for the purpose of purchasing corresponding transmitters and receivers. The Contractor shall be responsible for the validity of the survey and any subsequent equipment substitution that may result even if such equipment has been previously accepted by submittal.
		8. Contractor shall coordinate all work activities within the General Contractor’s construction schedule.
		9. Contractor must be aware that there may be multiple visits for installation based on the construction schedule.
		10. Contractor shall provide adequate labor and oversight to install multiple rooms concurrently as required.

## Project Management

## The Contractor shall provide a Project Manager to oversee and coordinate all activities on the Project

## Project Manager’s Duties and Responsibilities:

## The Contractor shall provide to the Owner, as a part of the prefabrication submittal, the name of the Project Manager that will provide all duties and responsibilities as specified herein, during the term of the project.

## The Project Manager shall maintain the ability of making all managerial decisions on behalf of the Contractor on a day-to-day basis, and shall retain the authority of accepting notices of deduction, inspection reports, payment schedules and any other project related correspondence on behalf of the owner.

## The Project Manager shall attend project meetings as required, during which time all System related issues are discussed, scheduled, confirmed, and/or resolved.

## The Project Manager shall be available during normal business hours (8:00 am to 5:00 pm) by telephone during the term of the project.

## After normal business hours, the Project Manager shall be available within four (4) hours (5:00 pm to 9:00 pm) by email during the term of the project for urgent matters.

## In the event that the Project Manager is not available within the allotted time frame, the Contractor may designate additional staff to temporarily act as the Project Manager for all correspondence with the Owner.

## The Contractor shall ensure that any individual temporarily assuming the duties of the Project Manager is at equal or higher level in the Contractor’s managerial chain of command.

## Upon notification by the Owner, of any project related installation issue, or issue that may contradict the Specifications as stated herein, the Project Manager shall respond to such issue, verbally and/or in writing within an eight (8) hour period

## Responses to such issues as stated above shall include a clear understanding of the issue, along with a tentative plan of action, reflecting milestones and/or deadlines to resolve the issue.

## Where appropriate, based on the overall importance of the project issue, the Project Manager shall follow-up their initial response with a written response to the issue within 24 hours of identification of the issue.

## Prior to the initiation of the Work, the Project Manager shall collaborate with NYUHC and the owner’s construction manager/general contractor to develop a schedule reflecting key milestones of the Work, including but not limited to the following:

## Bid award

## Kick-off meeting

## Plan submittal

## Prefabrication submittal

## Ordering, delivery, and installation of System equipment

## Warehouse / Field equipment delivery

## Project management schedule

## Installation start and completion dates

## System training

## Delivery of As-Built documentation

## Delivery of Operations & Maintenance Manuals

## Commissioning

## Acceptance of System

## The Project Manager shall update the schedule on a weekly basis to reflect the status of each key milestone as the Work progresses.

## As the System installation progresses, the Project Manager shall be capable of discussing any/or all of the above mentioned items at the request of the Owner, and shall address each item, as it relates to the current status of the Work.

## If for any reason, the Contractor shall become unable to meet the milestones outlined in their project schedule, the Project Manager shall notify the consultant, design team, and contractors associated with related work, so as minimize delays in other project work paths.

## Shop Staging

## To obtain acceptance of pre-installation system’s conformity and to receive approval to install the audiovisual systems, the Contractor shall stage and demonstrate at their facility the full system’s functionality of one of each of the room types below at no additional cost to NYUHC.

## Standard Conference Room

## The Contractor shall perform a full testing and acceptance procedure per their approved testing and acceptance documentation. In such instances where a previously specified piece of equipment is unavailable for staging, the Contractor will recommend a substitute for the purpose of the demonstration only.

## Reference to Architect/Owner General Conditions

## The Architect and/or Owner’s General Conditions shall be considered part of this Specification except where this Specification contains statements which are more definitive or more restrictive than those contained in the General Conditions regarding a specific item or items. This Specification shall not be interpreted as waiving or overruling of any requirements expressed in the General Conditions.

## Applicable Codes, Standards, Permits and Inspections

## All audiovisual work shall meet or exceed the latest requirements of all National, State, City, County, Municipal and other Authorities having Jurisdiction over the audiovisual work and the project.

## Any portion of the audiovisual work not subject to the requirements of an electrical code published by a specific authority having jurisdiction over such work shall be governed by the National Electrical Code and any and all applicable sections of the National Fire code, as published by the National Fire Protection Association.

## Installation procedures, methods and conditions shall be in compliance with the latest requirements of the Federal Occupational Safety and Health Administration (OSHA), the Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA).

## The Contractor is responsible for all costs incurred to meet these codes and conditions.

## Additional codes and requirements pertaining to the work:

## International Building Code (IBC)

## NFPA-72 National Fire Alarm and Signaling Code

## International and National Electric Codes (IEC/ NEC)

## IEC 60268-16 Third Edition 2003-05 Objective rating of speech intelligibility

## ANSI/Infocomm

## 1M:2009 Audio Coverage Uniformity Standard in Enclosed Listener Areas

## 2M:2010 Standard Guide for Audiovisual Systems Design and Coordination

## 3M:2011 Projected Image System Contrast Ratio

## X3T9.5 FDDI

## X3T9.5 CDDI

## Sustainable Technology Environments Program

## Underwriters Laboratories, Inc. (UL)

## Society of Motion Picture and Television Engineers (SMPTE)

## Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual - latest edition.

## ANSI/TIA/EIA-568-B - Commercial Building Telecommunications Cabling Standard

## ANSI/TIA/EIA-569 - Commercial Building Standards for Telecommunications Pathways and Spaces

## ANSI/TIA/EIA-606-A. Administration Standard for Commercial Telecommunications Infrastructure

## ANSI J-STD-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

## EIA RS-232 Serial Communications Electrical Interface

## EIA RS-310-C Racks, Panels and Associated Equipment

## FCC Part 15

## FCC Part 68

## IEEE 802.3

## IEEE 802.5

## Article 770 Optical Fiber Cables

## Article 800 Communications Circuits

## NFPA 70 National Electrical Code

## NFPA 75 Protection of Electronic Computer / Data Processing Equipment

## United States Green Building Council (USGBC): Leadership in Energy & Environmental Design(LEED®): Green Building Rating System for New Construction & Major Renovations (NC) Version 3.0 (2009) [www.usgbc.org](http://www.usgbc.org/).

## Status Reports

## After the award of contract, the Contractor is responsible for providing weekly status reports outlining his progress on the project. These reports should include information on the work completed during the week, the work to be completed during the upcoming week and any potential scheduling issues. The following should be included in this Status Report:

## Expected date of project submittals, including equipment cut sheets, shop drawings, control system interface designs, etc.

## Anticipated completion date and percentage complete of in-house rack fabrication and testing, prior to shipping to the job-site.

## Anticipated completion date and percentage complete of control system programming, prior to shipping to the job-site.

## Work completed during each previous week

## Work planned for each upcoming week

## Schedule and percentage complete of on-site wiring and supervision.

## Schedule and percentage complete of on-site installation.

## Risk register

## Change Order log

## Schedule for owner training.

## Schedule for systems checkout and turnover to the Owner.

## Related Work Not In Contract (NIC)

## Certain equipment and materials will be provided and installed by others. Unless otherwise indicated in these specifications, or on the related drawings, these will include the following:

## All conduits, wireways, connection boxes, pull boxes, junction boxes, and outlet boxes permanently installed in walls, floors, and ceilings.

## All room lighting fixtures, dimmers, power receptacle outlets, and interconnecting wiring for these circuits.

## All electrical breaker panels required to power the audiovisual and television equipment.

## All structural work, wall openings, platforms, railings, stairs, fire prevention and safety devices, rough and finished trim, painting and patching, drapes, carpets, floor coverings, computer floors, glazing, acoustical treatments, and heating, ventilating, and air conditioning systems.

## Moveable furniture, desks, and chairs.

## Though not under the scope of this document, the Audiovisual Systems Contractor is responsible for coordination of these and any other related items required to provide and integrate a fully functional AV system as described in this specification.

## Owner Furnished Equipment (OFE)

## The Contractor shall be responsible for obtaining any new or existing OFE equipment from the Owner. Existing equipment shall be brought back to the Contractor’s facility where they shall ascertain that the OFE equipment is performing at or above factory specifications.

## If existing equipment is not operating “as-new”, or is missing accessories necessary to be properly integrated with the rest of the system as intended, the Contractor shall provide a proposal, including a time line, for returning the equipment to “as-new” condition, provide the needed accessories, arrange to have the owner replace equipment, or submit a proposal for replacement or alternative equipment.

## Quality of Materials and Equipment

## All materials and equipment supplied by the Contractor shall be new and shall meet or exceed the latest published specification of the manufacturer in all respects.

## The Contractor shall supply the latest model available at the time of order placement for each piece of equipment.

## All equipment shall be UL listed, or equivalent.

## Contractor’s Documentation

## Pre-Construction SubmittalsPrior to fabrication, the Contractor shall submit to the Owner’s Representative, for approval, any custom designs pertaining to the systems. Contractor is to provide three (3) sets of all documentation. Drawing submittals to be delivered electronically in PDF and working format (such as AutoCAD) to Shen Milsom & Wilke and the owner, and at their option to the architect. These designs include, but are not limited to, the following:

## Complete system construction and point to point wiring schematic drawings, including all component values, and showing complete letter and number identification of all wire and cable as well as jacks, terminals and connectors. All connections are to be shown; details with “typical” connection diagrams are not acceptable.

## Provide bound technical specification details (cut sheets) on all equipment required to complete this project.

## All control system GUI design pages, both touch panel based and control computer based as appropriate.

## All control system front panel layouts, where applicable.

## All panels, plates, and designation strips, including details relating terminology, engraving finish and color.

## All custom designed consoles, tables, carts, support bases, and shelves.

## Schematic drawings of all custom components, assemblies and circuitry, including wall and/or floor plates.

## All unusual equipment modifications.

## Run sheets or field wiring details.

## Patch panel assignment layout drawings.

## Elevation Drawings of each equipment rack, both front and rear as appropriate.

## All items of equipment, whether a stock manufactured item or custom-built item, shall be supported by complete and detailed schematic drawings and replacement parts lists. No “black boxes” or unidentified components shall be acceptable under this specification.

## Verification of the focal lengths of projection lenses to achieve the specified image sizes.

## Testing procedures, passing criteria and checklists for all systems included in this specification. Testing procedures are to include (at a minimum) testing methods, materials, equipment, and documentation of results to be provided. Note: Submittals not providing testing procedures will be rejected.

## Close Out Submittals

## At the completion of the installation, the Contractor shall provide three (3) copies each of the following:

## Test results, in “spreadsheet” format, of electrical audio and/or video performance testing for all systems end-to-end in every room and/or between rooms as applicable. Note: It is the sole responsibility of the Contractor to fully test the audiovisual systems prior to Consultant check-out and verification. Until these test results are provided, no audiovisual systems check-out or verifications (functional or otherwise) will be performed by the Consultant. If any anomalies in system performance are detected, the Contractor shall correct these before performing any other tests.

## Results of RF Spectrum analysis as used to establish available frequencies for wireless devices included in this contract.

## Equipment manufacturer’s operation manuals for each piece of equipment.

## “As-built” drawings for every item indicated in the “Detailed Specification” sections of this specification as installed. A final, approved copy shall be placed in a metal pocket mounted on the inside of the rear door of the rack. Contractor to coordinate the preferred format (hard copy or digital) of these documents with the owner upon completion.

## System functional block drawings showing all input and output circuit cable and terminal block numbers as well as all jack field circuit I.D. designations. A copy of these drawings shall be framed in protective plastic and mounted near the equipment racks, or as otherwise directed by the owner.

## A System Operation and Maintenance Manual. This manual shall be produced by the Contractor especially for the systems detailed herein. The “Operation” section shall describe all typical procedures necessary to activate each system to provide for the functional requirements as listed under the Detailed Specifications. Manuals will use graphical representation of touch panel screens, as to easily be identified by user. Owner’s Manuals and/or Operations manuals supplied by manufacturers for a given piece of equipment, though required, are not acceptable substitutes for these materials.

## The reader of this manual shall be assumed to be technically competent, but unfamiliar with this particular facility. Additionally, the Contractor shall provide a single page of basic operating instructions for each room, and other audio-visually equipped spaces.

## The “Maintenance” section shall provide a recommended maintenance schedule with reference to the applicable pages in the manufacturer’s maintenance manuals. Where inadequate information is provided by the manufacturer, the Contractor shall provide the information necessary for proper maintenance. In addition to the Operation and Maintenance Manual(s), the contractor shall provide a simplified user’s guide (“cheat sheet”) for each audiovisual system.

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## Risk register

## Change Order log

## Schedule for owner training.

## Schedule for systems checkout and turnover to the Owner.

## Related Work Not In Contract (NIC)

## Certain equipment and materials will be provided and installed by others. Unless otherwise indicated in these specifications, or on the related drawings, these will include the following:

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## All room lighting fixtures, dimmers, power receptacle outlets, and interconnecting wiring for these circuits.

## All electrical breaker panels required to power the audiovisual and television equipment.

## All structural work, wall openings, platforms, railings, stairs, fire prevention and safety devices, rough and finished trim, painting and patching, drapes, carpets, floor coverings, computer floors, glazing, acoustical treatments, and heating, ventilating, and air conditioning systems.

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## The Contractor shall supply the latest model available at the time of order placement for each piece of equipment.

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## Contractor’s Documentation

## Pre-Construction SubmittalsPrior to fabrication, the Contractor shall submit to the Owner’s Representative, for approval, any custom designs pertaining to the systems. Contractor is to provide three (3) sets of all documentation. Drawing submittals to be delivered electronically in PDF and working format (such as AutoCAD) to AV Design Firm and the owner, and at their option to the architect. These designs include, but are not limited to, the following:

## Complete system construction and point to point wiring schematic drawings, including all component values, and showing complete letter and number identification of all wire and cable as well as jacks, terminals and connectors. All connections are to be shown; details with “typical” connection diagrams are not acceptable.

## Provide bound technical specification details (cut sheets) on all equipment required to complete this project.

## All control system GUI design pages, both touch panel based and control computer based as appropriate.

## All control system front panel layouts, where applicable.

## All panels, plates, and designation strips, including details relating terminology, engraving finish and color.

## All custom designed consoles, tables, carts, support bases, and shelves.

## Schematic drawings of all custom components, assemblies and circuitry, including wall and/or floor plates.

## All unusual equipment modifications.

## Run sheets or field wiring details.

## Patch panel assignment layout drawings.

## Elevation Drawings of each equipment rack, both front and rear as appropriate.

## All items of equipment, whether a stock manufactured item or custom-built item, shall be supported by complete and detailed schematic drawings and replacement parts lists. No “black boxes” or unidentified components shall be acceptable under this specification.

## Verification of the focal lengths of projection lenses to achieve the specified image sizes.

## Testing procedures, passing criteria and checklists for all systems included in this specification. Testing procedures are to include (at a minimum) testing methods, materials, equipment, and documentation of results to be provided. Note: Submittals not providing testing procedures will be rejected.

## Close Out Submittals

## At the completion of the installation, the Contractor shall provide three (3) copies each of the following:

## Test results, in “spreadsheet” format, of electrical audio and/or video performance testing for all systems end-to-end in every room and/or between rooms as applicable. Note: It is the sole responsibility of the Contractor to fully test the audiovisual systems prior to Consultant check-out and verification. Until these test results are provided, no audiovisual systems check-out or verifications (functional or otherwise) will be performed by the Consultant. If any anomalies in system performance are detected, the Contractor shall correct these before performing any other tests.

## Results of RF Spectrum analysis as used to establish available frequencies for wireless devices included in this contract.

## Equipment manufacturer’s operation manuals for each piece of equipment.

## “As-built” drawings for every item indicated in the “Detailed Specification” sections of this specification as installed. A final, approved copy shall be placed in a metal pocket mounted on the inside of the rear door of the rack. Contractor to coordinate the preferred format (hard copy or digital) of these documents with the owner upon completion.

## System functional block drawings showing all input and output circuit cable and terminal block numbers as well as all jack field circuit I.D. designations. A copy of these drawings shall be framed in protective plastic and mounted near the equipment racks, or as otherwise directed by the owner.

## A System Operation and Maintenance Manual. This manual shall be produced by the Contractor especially for the systems detailed herein. The “Operation” section shall describe all typical procedures necessary to activate each system to provide for the functional requirements as listed under the Detailed Specifications. Manuals will use graphical representation of touch panel screens, as to easily be identified by user. Owner’s Manuals and/or Operations manuals supplied by manufacturers for a given piece of equipment, though required, are not acceptable substitutes for these materials.

## The reader of this manual shall be assumed to be technically competent, but unfamiliar with this particular facility. Additionally, the Contractor shall provide a single page of basic operating instructions for each room, and other audio-visually equipped spaces.

## The “Maintenance” section shall provide a recommended maintenance schedule with reference to the applicable pages in the manufacturer’s maintenance manuals. Where inadequate information is provided by the manufacturer, the Contractor shall provide the information necessary for proper maintenance. In addition to the Operation and Maintenance Manual(s), the contractor shall provide a simplified user’s guide (“cheat sheet”) for each audiovisual system.

* + 1. Distribution
			1. Three copies of the above documentation will be retained by the Owner.
			2. One copy of the above documentation will be retained by the Architect.
			3. One copy shall be delivered to the Owner’s Representative prior to the System Commissioning.
			4. At least one copy of the above documentation will be retained by the Contractor.
		2. Procedure for Resubmitting
			1. Make corrections or changes in O & M and/or Record Drawings as required by the Architect and resubmit when the Architect’s stamp requires re-submittal.
			2. Clearly identify changes made other than those specifically requested by the Architect when resubmitting Record Drawings. Changes shall be clouded or similarly highlighted as coordinated with the Architect. Only changes that have been specifically requested by the Architect or have been clouded by the Contractor will be reviewed on resubmittals.
			3. Any drawing sheets added to the resubmittal shall be clearly identified and clouded, and shall not change the sheet numbering scheme for previously issued Record Drawings.
			4. The Contractor shall be responsible for any delays caused by the re-submittal process.
	1. Cooperation with Other Trades
		1. It shall be the responsibility of the Contractor to cooperate at all times, and to the fullest extent, with all trades doing work in the building, to the end that lost time, work stoppages, interference, and inefficiencies do not occur.
		2. It shall also be the responsibility of the Contractor to participate in the preparation of coordination drawings and attend coordination meetings, before and during construction, at the request of the Construction Manager. It is not anticipated that these meetings will be held more than once a week.
	2. Equipment Delivery and Storage
		1. All equipment delivered prior to installation shall be stored by the contractor, at their place of business. Costs of all shipping, and of all unusual storage requirements, shall be borne by the Contractor. The contractor shall inform the owner seven (7) days in advance to delivery to the site. It shall be the responsibility of the Contractor to make appropriate arrangements, and to coordinate with authorized personnel at the site, for the acceptance, handling, protection, and storage of equipment so delivered.
	3. Cleanup and Repair
		1. Upon completion of work each day the Contractor shall remove all his refuse and rubbish from and about the premises, 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. All repairs are to be completed by the General Contractor and will be billed to the AV Contractor.
	4. Owner Training

The Contractor shall provide on-the-job training by a suitably qualified instructor, to personnel designated by the Owner, to instruct them in the operation and maintenance of the systems. In the event the Contractor does not have qualified instructors on staff for certain sophisticated equipment, the contractor will provide a manufacturer’s representative for such instruction to the owner at no additional cost. All training shall take place after the systems are operational and accepted.

* 1. Publication

No information relative to this job may be released for publication without prior written approval from the Owner, Architect and Owner’s Representative.

* 1. Installation Practices
		1. General
		2. Installation shall include the delivery to the installation site, unloading, setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of the system components, equipment alignment and adjustment, programming and configuration and all other work whether or not expressly required herein which is necessary to result in complete and fully operational systems.
		3. Prior to ordering equipment, the contractor shall coordinate the frequencies of all wireless devices to prevent unwanted interaction between devices and rooms. This includes, but is not limited to, wireless microphones, assisted listening system devices, wireless control panels, etc.
		4. All accessories, including rack mounting hardware, power supplies, etc., shall be obtained from the original equipment manufacturer. Unless otherwise noted or specified, third party accessories shall not be used.
		5. All installation practices shall be in accordance with, but not limited to, these specifications and drawings. Installation shall be performed in accordance with the applicable standards, requirements, and recommendations of National, State, and Local authorities having jurisdiction.
		6. If, in the opinion of the Contractor, an installation practice is desired or required, which is contrary to these specifications or drawings, a written request for modification shall be made to the Design Team. Modifications shall not commence without written approval from the Design Team
		7. During the installation, and up to the date of final acceptance, the Contractor shall be under obligation to protect his finished and unfinished work against damage and loss. In the event of such damage or loss, the damage shall be replaced or repaired at no cost to the Owner.
		8. Physical Installation
			1. All equipment shall be firmly secured in place unless requirements of portability dictate otherwise.
			2. All equipment shall have an engraved plaque permanently affixed, denoting its function.
			3. Fastenings and supports shall be adequate to support their loads with a safety factor as per AHJ. All boxes, equipment, etc., shall be secured plumb and square.
			4. Projectors, lenses, and mirrors shall be solidly mounted and braced or isolated, so that there is no observable movement in the image induced by motor vibration or other mechanical operations at the intended minimum viewing distance.
			5. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
			6. All overhead equipment must have security cables attached to the building structure to assist in the prevention of loss as required by building code.
		9. Finishes, Trim and Escutcheon Components
		10. To insure a proper finished appearance, the AV Contractor shall furnish and install trim/escutcheon components at all conditions where A/V components pass through the finished ceilings. This would include but not be limited to video projector supports, television monitor/receiver supports and any other component which is not specifically supplied with integral flanges/trim components; i.e. speaker mounts, assistance listening devices, etc.
		11. The visible component of any trim should be minimal in size, preferably no wider than 1/2”. All trim components at the ceiling plane shall be finished to match the approved ceiling finish. The audiovisual contractor should obtain a sample from the General Contractor, including any custom color information, or standard color numbers.
		12. All visible components and finish options shall be submitted to the Design Team for review and approval prior to fabrication.
		13. Raceway Systems and Cable Installation
			1. All wire bundles are to be neat and combed free of cable crossovers.
			2. All cables, regardless of length, shall be marked with a permanent, self-laminating wrap-around number or letter cable marker at both ends, similar to the Panduit “Pan-Code” system. Labels must be computer-generated for legibility. Wire labels done by hand in the field must be replaced with computer generated labels. There shall be no unmarked cables at any place in the system. Marking codes used on cables shall correspond to codes shown on drawings and or run sheets.
			3. All cables shall be grouped according to the signals being carried. In order to reduce signal contamination, separate groups shall be formed for the following cable families:
				1. Power cables
				2. Control cables
				3. Video cables
				4. Audio cables carrying signals less than – 20 dBm
				5. Audio cables carrying signals between – 20 dBm and +20 dBm
				6. Audio cables carrying signals above +20 dBm
			4. As a general practice, all power cables, control cables, and high level cables shall be run on the left side of an equipment rack as viewed from the rear. All other cables shall be run on the right side of an equipment rack, as viewed from the rear.
			5. Cables ties shall be placed at appropriate intervals of no greater than six inches for vertical bundles, two inches for horizontal bundles.
			6. All vertical cable bundles shall be attached to the rack frame.
			7. All cables shall be continuous lengths without splices. All system wire, after being cut and stripped, shall have the wire strands twisted back to their original lay and be terminated by approved soldered or mechanical means. Except where noted otherwise in the specifications, NO BARE WIRE TERMINATIONS WILL BE ACCEPTED. Heat-shrink tubing shall be used to insulate the ground or drain wire. Unused wires at the end of a cable shall remain unstripped and shall be laid back and held in place with wire ties.
			8. All solder connections shall be made with rosin-core solder using temperature-controlled solder stations. Care shall be taken to avoid cold or cracked solder joints. Any connections that do not appear to be clean and shiny, or which show signs of cracking, shall be resoldered by the contractor before final acceptance of the system.
			9. Mechanical connections using insulated, crimp-type connectors shall be bonded to the connector by soldering the wire to the metal part of the connector.
			10. Connections made with screw actuated pressure type terminal strips shall be made by stripping approximately 1/4 inch of insulation from the stranded conductor. Then the un-tinned wire shall be inserted into the terminal and the screw tightened using a secure fitting precision screwdriver.
			11. Terminal blocks, boards, strips or connectors shall be furnished for all cables which interface with racks, cabinets, consoles, or equipment modules. No audio cables shall run directly to the audio patch panel jacks. Each audio patch panel shall be furnished with an audio terminal block, and all audio cables to and from the audio patch panel shall terminate on this block.
			12. All wire markers shall face a common direction.
			13. All cables shall have proper connector housing.
			14. Cables shall not protrude from the back of racks.
			15. All cable entry shall be through the tops of racks or through entrance holes in the base of the rack. No cable shall enter racks through front, rear or side panel openings.
			16. Unless otherwise called for in these specifications and drawings, the following cables, or their approved equals, shall be used in these systems:

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Manufacturer** | **Non-Plenum** | **Plenum** |
| RF-CATV (Horizontal-RG6) | Belden  | 1189A | 1189P |
| RF-DBS/DSS (Horizontal-RG6) | Belden  | 1829A | 1829P |
| RF-CATV (Vertical-RG11) | Belden  | 1617A/7731 | 1153A |
| RF-50 Ohm (Horizontal RG-8) | Times Microwave | Microwave | LMR400 |
| Video (Baseband & SDI) | Belden  | 1505A | 1506A |
| S-Video | Belden  | 1807A | 7700A |
| Control (4 conductor shielded) | Belden  | 1502R | 1502P |
| Control (12 conductor shielded) | Belden  | 9556 | 6309FE |
| Audio | Belden  | 9451/1266A | 9451P |
| Audio (8 Ohm program speakers) | Belden  | 8473 | 1861A |
| Audio (70 Volt Speaker) | Belden  | 8461 | 1863A |
| Video, RGB (RG6) | Belden  | 7721A | None |
| Video, RGB (RG59) | Belden  | 7796A | 1826A |
| Multi-Channel Audio | Belden  | 8774 | 88778 |
| Digital Audio (110 Ohm) | Belden  | 1800B | 1801B |
| 4-Fiber Riser Cable |   |   |  |
| Tight-Buffered 50 µm multimode (OM3) | Corning Cable Systems |   | 004T88-31180-29 |
| Category 6e | Berk-Tek |   | LANmark-1000 Enhanced Category 6 UTP |
| Category 6 | Berk-Tek |   | LANmark-6 CAT 6 UTP Plenum |
| Category 5e | Berk-Tek |   | LANmark-350 Prem. Cat 5e |

Note: These cable types are cited to illustrate the type and quality of cable required. Unless otherwise noted, cables from other manufacturers, i.e. Canare, CommScope, Extron, Gepco, Liberty, etc. will be considered if data sheets indicating equivalency are submitted to Consultant for approval prior to installation.

* + - 1. It is the responsibility of the Audiovisual Contractor to verify, furnish and install the correct CATV cable type and connectors, as per the local CATV provider.
			2. Unless otherwise noted, all video and computer video cables are to be terminated using seventy-five ohm (75 Ohm) connectors, with a captive center pin.
			3. All cables that can be terminated in the field (except video and 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 permission of the Consultant. For equipment mounted on casters, in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.
			4. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer.
			5. Where cables are visible, the cables will be sheathed in a color wrap that has been submitted for approval by the Design Team.
		1. Connection Plate Receptacles unless otherwise specified
			1. Audio (microphone or line level) – XLR type.
			2. Audio (loudspeaker level) – Neutrik Speakon®.
			3. Intercom – XLR or ¼ inch diameter tip/ring/sleeve type, or as required by the intercom system. Jack shall be insulated from panel type.
			4. Video – BNC type.
			5. VGA – DB-15HD jack, isolated from panel type, with hex nuts.
			6. RF – “F” type. Receptacles shall be insulated from panel type.
			7. DVI (Inclusive of DVI-A, DVI-I and DVI-D signal types) – DVI-I type connector unless otherwise specified.
			8. HDMI – HDMI with locking nut.
			9. USB – USB Type A
			10. Category 5/6 – RJ45 Type

Note: All connectors on wall plates, or in other exposed locations, are to be recessed.

* + 1. Patch Panel Assignments

All patch panels shall be wired so that signal “sources” (outputs from) appear on the upper row of a row pair; and all “loads” (inputs to) appear on the lower row of a row pair.

* + 1. Patch Panel Designation Strips

All audio and video patch panel designation strips shall utilize alphanumeric identifications and descriptive information. The jack position in each horizontal row shall be numbered sequentially from left to right. The horizontal jack rows shall be lettered sequentially from top to bottom. The alphanumeric identification of each jack shall be included on the functional block drawings, as well as on reproductions of these drawings, which shall be mounted in an appropriate location near the patch bays.

* + 1. Maintaining Ground Integrity

In order to minimize problems resulting from improper grounding, and to achieve maximum signal-to-noise ratios, the following grounding practices shall be adhered to in order to maintain the integrity of the grounding system:

* + - 1. General

Because of the great number of possible variations in grounding systems, it shall be the responsibility of the Contractor to follow good engineering practice, as outlined below, and to deviate from these practices only when necessary to minimize crosstalk, ground loops, ground-induced noise, and to maximize signal-to-noise ratios in the audio, video, and control systems.

* + - 1. System Power Ground: A single primary “system ground” shall be established for the system in each particular area. All grounding conductors in that area shall connect to this primary system ground.

The system ground shall be provided at the audio equipment rack for the area, and shall consist of a copper bar of sufficient size to accommodate all secondary ground conductors. A copper conductor having a maximum of 0.1 Ohms total resistance shall connect the primary system ground bar to the nearest approved ground. The Contractor shall be responsible for determining if the metallic conduit is properly electrically bonded to the building ground system.

Secondary system grounding conductors shall be provided between all racks, audio consoles, and audiovisual system equipment local to the area. Each of these grounding conductors shall have a maximum of 0.1 Ohms total resistance.

Under no conditions shall the AC neutral conductor, either in the power panel or in a receptacle outlet, be used as a system ground, except as specifically defined by NFPA 70 for bonding.

Ungrounded equipment with either an inline transformer or a 2-prong plug, shall be bonded to the rack bus bar using #12awg cable.

* + - 1. Audio Cable Shields

All audio cable shields shall be grounded at one point only. There are no exceptions. For inter and intra-rack wiring, this requires that the shield be connected at one end only. For ungrounded portable equipment, such as microphones, the shield shall be connected at both ends but grounded at only one end.

* + - 1. Video Receptacles

All video receptacles that are provided and installed by the Contractor shall be insulated from the mounting panel, outlet box, or wireway. Unless otherwise detailed herein, this shall be accomplished by using insulated-from-panel type receptacles.

* + - 1. Audio Receptacles

All audio receptacles that are provided and installed by the Contractor shall be insulated from the mounting panel, outlet box, or wireway. Unless otherwise detailed herein, this shall be accomplished by using insulated-from-panel type receptacles.

* 1. General System Performance Standards
		1. Unless restricted by the published specifications of a particular piece of equipment, or unless otherwise required under the Detailed Specifications, the following performance standards shall be met by each system. The signal paths for the above Performance Standards shall be as follows: From all source inputs to all signal destinations. See Contractor System Checkout Section I-K for testing procedures.
		2. Analog Audio

Frequency Response Within plus or minus 0.5dB, 20 Hz to 20,000 Hz

Signal to Noise Ratio greater than 90dB
(including crosstalk and hum at
all input/output levels)

Total Harmonic Distortion 0.05% maximum from 20 Hz to 20,000 Hz.

Input Levels

Microphone (Nominal) -50dbu

Overload (Minimum gain) -5dbu

Maximum Gain -26dbu

Line (Nominal) +4dbu

Overload (Minimum gain) +24dbu

Maximum Gain +9dbu

Input Common Mode Rejection >100db

Output Levels

Line (Nominal) +4dbu

Maximum +24dbu

Output Impedance < 0.5 Ohms

Load Impedance >150 Ohms

* + 1. Analog Video (signal)

Frequency Response Within plus or minus 0.5dB, DC to 4.2 MHz

Signal to Noise Ratio 55 dB minimum
(peak to RMS) unweighted,
DC to 4.2 MHz

Crosstalk 45 dB minimum
unweighted DC to 4.2 MHz

Line and Field Tilt: 2% maximum

Differential Gain: 3% maximum

Differential Gain: 2 degrees maximum

* + 1. SDI – Per SMPTE 259M
		2. HD SDI – Per SMPTE 292M
		3. HD SDI (Dual Link) – Per SMPTE 424M
		4. 3G SDI – Per SMPTE 424M
		5. HDMI – Per HDMI Ver. 1.3b
		6. DVI – Per DVI Ver. 1.0
		7. Analog NTSC Video
		8. COMPOSITE VIDEO SIGNAL
			1. Signal 1V P-P 75 Ω(3.58, 4.43MHz) NTSC, PAL, or SECAM as appropriate
		9. S-VIDEO SIGNAL
			1. Signal Y: 1.0V p-p, 75 ΩC: 0.286V p-p, 75Ω(3.58, 4.43MHz) NTSC, PAL, or SECAM as appropriate
		10. COMPONENT VIDEO (Beta Component)
			1. Signal Y: 1.0V p-p, 75 ΩPB/CB: 07V p-p, 75ΩPR/CR: 0.7V p-p, 75 Ω
		11. RF Broadband
			1. The RF Broadband system shall meet or exceed the published standards of the following organizations:
				1. FCC Part 15 Rules and Regulations: Radio Frequency Devices
				2. FCC Part 76 Rules and Regulations: Cable Television Service
				3. NCTA-02 Recommended Practices for Measurements on Cable Television Systems.
			2. Visual Carrier Level +7 +/- 3dBMv for each tap at channel WW(433.25 MHz)
			3. Visual Carrier Level +5 +/- 3dBMv for each tap at channel 2(55.25 MHz)
			4. Visual Carrier to Noise Ratio 42 dB minimum on any channel (4MHz bandwidth)
			5. Maximum Loss from common 45 dB or less point to any tap at channel WW(433.25 MHz)
			6. Maximum Loss from common 37 dB or less point to any tap at channel 2(55.25 MHz)
		12. Audio Video Bridging (AVB)
			1. IEEE 802.1AS: Timing and Synchronization for Time-Sensitive Applications
			2. IEEE 802.1Qat: Stream Reservation Protocol (SRP)
			3. IEEE 802.1Qav: Forwarding and Queuing for Time-Sensitive Streams
			4. IEEE 802.1BA: Audio Video Bridging Systems
		13. Cobranet Audio
		14. Audiovisual System, Control System and User Interface Programming
		15. Control system user interfaces pages and programming shall be designed for this project exclusively. While there are a great number of design approaches to designing the user interface, the following guidelines shall be adhered to:
			1. The use of custom system programming from prior projects and/or ‘modules’ provided by a given manufacturer or programmer may or may not meet the functional intent of the systems and work described herein. It is the responsibility of the contractor to meet the functional intent of the systems in this specification, including any and all necessary modification of program code or creation of custom modules as required.
			2. The operation(s) of all system(s) are to match the functional intent already implemented at the owner’s facilities as applicable.
			3. All panels are to have the time and date as icons, in the same position on every page.
			4. All panels are to have a title, indicating the piece of equipment and/or functionality being controlled.
			5. Final programming shall include capability to remotely control all functions of the audiovisual system. Only functions required for normal use shall appear on top level pages while underlying “Tech Pages” shall provide access to full manufacturer’s remote control functionality.
			6. Devices similar in nature shall be programmed to operate with a common format.
			7. No individual component shall be programmed to function atypically.
			8. Whenever the same button appears on more than one page, it will be in the same position on each page.
			9. Where feasible, multi-level access to controls should be implemented. See paragraph “e”, above.
			10. During performance testing, all equipment shall be operated under standard conditions as recommended by the manufacturer.
			11. Please see Detailed Specifications for further information on specific control system programming requirements.
	1. Contractor System Checkout

Before Commissioning Tests are scheduled, the Contractor shall perform his own system checkout based upon an approved testing procedure for the systems. The Contractor shall furnish all required test equipment and shall perform all work necessary to determine and/or modify performance of the system to meet the requirements of this specification. The Contractor shall submit a testing plan (refer to **Error! Reference source not found.**) for approval by the individual or firm representing the Owner during the Audiovisual Installation. At a minimum, the following sub-components of the Audiovisual System shall be tested and verified:

* + 1. Cable and Connectors
			1. All cables and connectors shall be tested and verified to comply with the manufacturer’s specifications and design intent.
			2. Cable test results shall be submitted in advance of the Commissioning for review by the Owner’s Representative.
		2. Devices
			1. All devices shall meet the functionality as specified by manufacturer.
			2. If any device is found to deviate from the manufacturer’s functionality it shall be replaced by the Audiovisual Systems Contractor at no cost to the Owner.
		3. Signal Types
			1. The Audiovisual System shall be tested to comply with all video and audio standards as specified in the Performance Standards section and described by the design intent.
		4. System Function
			1. The cables and connectors, devices, and signal types shall meet the functional requirements as specified by the design intent.
			2. Acceptable testing procedures may include but is not limited to that which is described in the detailed specifications such as (streaming, push-to-talk, annotation, etc.)
		5. Document that all matrix switching crosspoints have been tested and verified.
		6. Network Cabling
			1. Attachment F General Conditions and Cabling Specifications
		7. Test all audio and video systems for compliance with the Performance Standards, using the example procedure outlined in appendix A:
			1. Test Equipment.
			2. The following test equipment (or submit equivalent for approval) shall be used to test the systems on site.
			3. Video Testing:
* Video, Component, RGBS, RGBHV and Digital video signal generator, Extron VTG 400 DVI
* Digital Video test generator with EDID and HDCP components, PureLink HDG-8000 PRO
* Media and portable hardware (i.e laptop) representative of all types found in the subject system including but not limited to Blu-ray ™ players and discs (provide discs with and without HDCP encrypted content), mobile PC/Tablets.
* RGB cable, Extron BNC-5-6’HR
* Video cable
* Set of terminations, ‘T’ pieces etc.
	+ - 1. Audio Testing:
* Time based measurement system, Goldline TEF20 or SIA Smaartlive with laptop PC, calibrated omnidirectional mic, and appropriate intefaces
* Audio test set, Audio Precision ATS-1DD
* Media representative of all types found in the subject system
* Audio cables as required to connect test equipment to the system
* Set of terminations, adapters etc.
	+ - 1. Gain Setting

Adjust all systems (end to end within a system) for maximum signal-to-noise ratio. No hiss should be audible through any loudspeaker at the completion of gain structure setting, and all audio gain stages should clip simultaneously.

* + - 1. Signal Paths

Video/Audio

* + - * 1. Connect the output of the video signal generator to a floor box/table/rack connector and select the “Full Field Color Bar” signal. Connect the combined waveform monitor/vectorscope to a final output point, e.g. an input to a picture monitor or video projector. Ensure that the test signal is routed to the selected output.
				2. Measure and record the signal amplitudes.
				3. Repeat item ‘i’ after selecting the “Multiburst, 50 IRE” test signal.
				4. Measure and record the signal amplitudes.
				5. Repeat item ‘i’ after selecting the “Modulated 5-step” test signal.
				6. Measure and record the signal differential phase and gain.
				7. Repeat item #’s ‘i’ through ‘vi’ for other video signal paths.
				8. Repeat item ‘i’ after selecting the Window test signal.
				9. Measure and record the signal line and field tilt.
				10. Repeat item ‘i’ after connecting the Black Burst signal from a rear mounted connector.
				11. Measure and record the signal/noise ratio.
				12. Connect the output of the audio test set to a floor box/table/rack program audio connector and connect the input of the audio test set to a final output point, e.g. an input to a program speaker power amplifier. Ensure that the test signal is routed to the selected output, that the volume control is set to 100% and that the equalizers are bypassed.
				13. Measure and record the signal/noise ratio, total harmonic distortion and frequency response.
				14. Repeat items ‘xii’ and ‘xiii’ for other audio signal paths.
				15. Connect the output of the audio test set to a floor box/table/rack speech audio connector and connect the input of the audio test set to a final output point, e.g. an input to a speech speaker power amplifier. Ensure that the test signal is routed to the selected output, that the volume control is set to 100% and that the equalizer is bypassed.
				16. Measure and record the signal/noise ratio, total harmonic distortion and frequency response.
				17. Repeat items ‘xv’ and ‘xvi’ for other audio signal paths.

RGB

* + - * 1. Connect the RGB output of the signal generator to a floorbox/table/rack connector and select the SMPTE & PLUGE signal at the various computer scan rates as follows:
* 640 x 480 31.5kHz H, 60Hz V
* 640 x 480 37.5kHz H, 75Hz V
* 800 x 600 38kHz H, 60Hz V
* 832 x 624 49.7kHz H, 75 Hz V
* 1024 x 768 48kHz h, 60Hz V
* 1280 x768 48kHz H, 60 Hz V
* 1280 x 1024 64kHz H, 60Hz V
* 1366 x 768 48 kHz H, 60hz V
* 1400 x 1050 63.9 kHz H, 60 Hz V
* 720p 45 kHz H, 60 Hz V
* 1080i 33.75 kHz H, 60 Hz V
* 1080p 33.75kHz H, 24 Hz V
* 1080p 33.75kHz H, 30 Hz V
	+ - * 1. Check that the image is correctly displayed on the picture monitor(s) and/or by the video projector.
				2. Repeat item ‘ii’ using Crosshatch signal, checkerboard signal and H Pattern signal.
				3. Repeat item ‘ii’ for other RGB connection locations.
				4. Connect the output of the audio signal generator to a floorbox/table/rack ‘Left’ and ‘Right’ connectors and select the 1kHz tone. Check that the signal is emitted from the left and right program speakers.
				5. Repeat item ‘v’ for other audio connection location.

Note: The term “RGB” is used generically. The system will be tested with the sync format dictated by functional requirements, including, but not limited to, sync-on-green, composite sync and separate horizontal and vertical sync. Whenever possible, include computer sources provided by the Owner, at the desired resolution, in your testing.

At the conclusion of the tests, return all equipment settings to previously calibrated positions.

Provide written records of all test results in spreadsheet form.

Check all control functions, from all controlling devices to all controlled devices, for proper operations.

Adjust, balance, and align all equipment for optimum quality and to meet the manufacturer’s published specifications. Establish and mark normal settings for all level controls, and record these settings in the “System Operation and Maintenance Manual”.

Check all optical projection images for average light level, light fall-off, and image alignment and size to comply with the Performance Standards and specifications drawings. Check to determine that all projectors, projector bases, carts, tables, and mirrors are rigid and vibration-less in operation.

Maintain documentation of all performance tests for reference by the Owner’s Representative during the Commissioning.

* 1. Commissioning Tests

Commissioning Tests will not be performed until the Contractor’s System Checkout has **been completed and the test results have been reviewed. The Commissioning Tests will** be supervised by the Owner’s Representative and shall consist of the following at a minimum:

* + 1. A physical inventory of all equipment on site and will be compared to equipment lists in the contract documents.
		2. The operation of all system equipment shall be demonstrated by the Contractor.
		3. Review of final As-Build documentation as described in the “Contractors Documentation” section of this specification.

Both subjective and objective tests will be required by the Owner’s Representative to determine compliance with the specifications. The Contractor shall be responsible for providing test equipment for these tests.

In the event further adjustment is required, or defective equipment must be repaired or replaced, tests may be suspended or continued at the option of the Owner’s Representative.

Any charge for additional time incurred by the Owner’s Representative required to over-see the system tests, due to improper system installation or previous failed systems, shall be the responsibility of, and charged directly to the contractor.

# RFP Attachments

* Exhibit A: Equipment List and -Price Sheet – WITH DISPLAYS
* Exhibit A-1: Equipment List and Price Sheet – WITHOUT DISPLAYS
* Exhibit B: Reference Instructions
* Exhibit C: Contractor Qualification Questionnaire
* Exhibit D: Murphy Conference Room Audio Visual Diagrams
* Exhibit E: Division 27 Cabling Specification
* Exhibit F: Addendum Acknowledgement Form
* Exhibit G: MSA Terms
* Exhibit H: On-Call Agreement – IT Facilities Installation and Repair Work