1.GENERAL

1.1 RELATED DOCUMENTS:

A. Some information contained in this specification is also found on the associated drawings. Work shown on either is deemed to be in both.

B. The drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

C. If a discrepancy in quantity exists between this specification and the associated drawings, the Contractor shall furnish the greater quantity or value unless otherwise directed by the owner.

D. Some information contained in this specification and the associated drawings is also noted on the project electrical specification and drawings. Any conflicts between the electrical sections and the Audio and Video Systems shall be immediately reported to the Architect and Consultant.

1.2 SUMMARY OF WORK

A. A/V Infrastructure: The design intent for this project is to facilitate simple yet highly flexible A/V setups for the rooms in this building while respecting the architecture and maintaining a minimum visual impact on the space when technology is not in use. This is accomplished through the strategic placement of connection points throughout the rooms. The quantity of connection points is also minimized by allowing them to be utilized as inputs and/or outputs of the system. The wired infrastructure will be divided into two segments.

1. A/V IP network: The foundation of the system is the implementation of a dedicated high IP network. This network will primarily distribute all of the video throughout the building allowing any video input to show up at any video output at any AV network connection location. It will also be an on/off ramp for Dante digital audio. Having an A/V network set up in this fashion allows for any A/V connection in the building to instantly transform into virtually any type of IP audio or video signal.

2. Analog audio: While the fiber optic IP network takes the facility into the future, traditional microphone inputs and audio output connections are included to maintain traditional audio connection. Eight channels of wireless microphones will be sharable throughout the facility to help lower cable clutter.

B. Video Systems: The expressed desire for the systems in this space is to facilitate high quality video presentation support in all rooms. The systems are to be highly flexible to accommodate different room configurations. This flexibility will be accomplished in the following ways;

1. Mobile flat panel carts: Large flat panel monitors will be installed onto mobile carts to allow for easy relocation. Below the monitor will be a shelf. On that shelf will be a button controller that will control all of the A/V functions on the cart such as display power on/off, volume up/down, and source selection. A sound bar speaker will be mounted above the display to provide audio reinforcement of the video source into the room. An HDMI cable will be permanently connected and strain relieved to the mobile cart for video source connection. Selections on the button controller will allow the user to determine which video source will be shown on the screen. Custom hooks will be installed on the back of the cart to create simple storage for all attached cart cabling. The cart will also contain a Cat6 network cable that will be used when multiple carts need to show the same video source. This network cable will be combined with the power cable for the cart to make a “single cable” type look

to create a clean appearance when connecting the cart to the wall connections for power and A/V distribution to other video end points.

It is the intention of the design that small meetings would be able to fully function by using a stand-alone flat panel cart and not connecting to the facility infrastructure at all. This allows for system that are quick to set up and simple to use for all involved.

2. Portable Video Input/Output boxes: These boxes provide two (2) HDMI inputs and one (1) HDMI output and have an accompanying Cat6 cable for connecting to the building A/V network. Once connected to the A/V network, the video sources are available to be routed to any available video destination such as mobile flat panel carts and projectors.

C. Facility Control System: The control system in this facility is key to the functionality of the entire system and considerable thought and care needs to be taken while implementing this portion of the system. The following paragraphs will attempt to convey the complete intended functionality of the system but the A/V contractor is encouraged to have deliberate correspondence with the Consultant to fully embrace the intended power of the control system.

1. Specific rooms will have touch panels mounted to the walls. By default, the user should be asked to choose the level of operation of the system in the room; Basic or Advanced.

a. Basic: This selection should offer a simple control page that allows for audio level controls, wireless microphone status feedback (battery level, power status, etc), and basic video source selection. No complex video routing of different sources to different destinations. That type of complexity should be reserved for and advanced operation mode. The user should also be able to control the WAN streaming ability of the system. The user should have the ability to power off the system via a shutdown confirmation page.

b. Advanced: This option will break the functionality and flexibility of the system down to a more specific and highly configurable setup. The user should be able to route and control any audio and/or video source to any location within the facility. The user should also be able to control the WAN streaming ability of the system.

1.3 DEFINITIONS AND TERMS

A. The following definitions shall be used.

B. The following terms shall be used to refer to the division of labor and define various entities associated with the project.

1. Owner – Organization or person who has undertaken to construct the space.

2. Construction Manager – General Contractor as hired by the owner.

3. Installing Contractor – The successful bidder of this section as awarded by the construction manager.

4. Electrical Contractor – The successful bidder for the electrical portions of the contract, typically, but not limited to, division 26.

5. Subcontractor – Company or organization contracted by the Installing Contractor to perform or supply any portion of this specification.

6. Consultant – Individual or company hired by the architect or owner to design the systems, write the specification, and detail schematic drawings.

7. Architect – Company or individual hired by the owner to provide the design of the space.

1.4 SUBMITTALS

A. Submittal sheets are required to be submitted for all specified equipment. All submittals and shop drawings shall be submitted and approved by the Consultant prior to the beginning of installation. These submittals shall be provided not more than 6 weeks following award of contract.

1. Installing Contractor shall furnish either an electronic PDF document or (3) sets of printed submittal sheets for any equipment request that is not the specified product. Any printed submittal sets are to be bound on the left side and printed on 8.5x11 inch paper.

2. A complete Bill of Materials will be submitted by the Installing Contractor showing all the equipment to be installed. Materials will be listed in the same order that the products are listed in Section 2 of this specification. Each sub system will be shown with all of the products to be installed as part of that sub system in the order listed in the specification. The Bill of Materials will indicate the quantity being supplied, the manufacturer, the model of the equipment, and a brief description of the equipment.

3. All product data sheet submittals shall be organized in the same order that products are listed in Section 2 of this specification. Each sub system of the design shall have the product data sheet for each piece of equipment contained in that sub system – organized in the order listed in the specification. Under no circumstance shall the product data sheets be organized in alphabetical order. Any product data sheet submittals not conforming to this will be automatically rejected.

4. Installing Contractor shall furnish either an electronic PDF or (3) printed sets of shop drawings detailing a complete installation plan. Shop drawings are expected to expand upon the construction documents and shall show all components and wires, complete with individual wire numbers, proposed rack layouts, riser diagrams and schematics for individual subsystems, calculations, and details of proposed rigging. Schematics shall show a separate designation for each device and labeling shall correspond to that of the rack layouts. Installing Contractor shall convey that that the system is ready to install as shown in the shop drawings, and that details not explicitly defined by this specification or on the drawings have been addressed by the Contractor. Printed shop drawings are to be bound on the left side and printed on E-size (30x42) paper.

5. Scanned or copied versions of the construction documents will not be accepted and shall be automatically rejected. All drawings are to be done in a clear and professional manner.

6. Failure to furnish all information as noted above shall result in the rejection of submittals. Questions regarding submittal information should be directed to the Consultant prior to drawing submissions.

7. The Consultant's ACAD 2014 drawings shall be available for floor plans, conduit & wire pull layouts, and some detail drawings. Earlier versions of drawings can be supplied for an additional charge of $20 per drawing. It shall be the responsibility of the Contractor to implement any drawings furnished by the Consultant. Any time expended by the Consultant at the request of the Installing Contractor to interface drawings to other third party software

shall be billed to the Installing Contractor at the Consultant's standard hourly rate. Additional charges may be assessed by the Architect or Construction Manager for furnishing electronic copies of drawings.

B. See section 3 for additional post-installation submittal requirements.

1.5 DIVISION OF LABOR

A. Electrical Contractor shall furnish and install all conduit and boxes associated with the AV Systems as specified, as shown on the drawings, and as required by the Installing Contractor.

B. Electrical Contractor shall supply a pull string in all conduits for the AV Contractor.

C. All AV wiring shall be supplied and installed by the AV contractor.

D. All electrical connections carrying line voltage (above 100 volts) shall be connected and terminated by the Electrical Contractor. All line voltage wire and cable for the audio and video systems shall be provided by the Electrical Contractor.

E. All electrical connections carrying low voltage (below 100 volts) shall be connected and terminated by the Installing Contractor. All low voltage wire and cable for the audio and video systems shall be provided by the Installing Contractor.

1.6 QUALITY ASSURANCE

A. All electrical installation shall be in compliance with the N.E.C., and shall be inspected by the Michigan Department of Labor/State Electrical Inspection Authority. All installation shall be subject to inspection by the Local Authority Having Jurisdiction. All installation shall be in accordance with the AHJ. Any installation methods found to not be in compliance with the AHJ shall be rectified by the AV contractor without claim for additional payment.

B. Bidders for this section are expected to be an authorized dealer for all major pieces of equipment or purchasing them through an authorized dealer. Documentation of dealer status may be requested from bidders. Failure to provide adequate documentation may be grounds for disqualification from the bidding process.

C. The master/lead technician working on site shall have a minimum certification of NICET Level 2, CTS, or C-EST. Contractors unable to provide proper certification should confirm qualifications with the Consultant prior to bidding. Failure to provide proper qualifications shall be grounds for disqualification from the bidding process.

1.7 STANDARDS

A. All equipment and installation practices, where applicable standards have been established, shall be built and installed to the standards of the following institutions:

1.8 DELIVERY, STORAGE, AND HANDLING

A. Include delivery, storage, and handling of all products and materials to be delivered and installed.

B. Installing contractor shall be responsible for providing on-site storage if necessary. Installing Contractor may negotiate a storage facility with the Construction Manager, but shall still be responsible for his own materials.

1.9 PROJECT CONDITIONS

A. Installing Contractor bears the responsibility to verify all site conditions and coordinate with the Electrical Contractor to ensure a complete and functional system is supplied to the Owner.

B. Verify dimensions of major components to check for entry through doors, ceiling height clearance, and column interference prior to the installation of the equipment.

C. Installing Contractor shall stay aware of all project time schedules and shall coordinate with all other trades for all aspects of the work.

D. During the installation, and up to the date of final acceptance, the Contractor shall be under obligation to protect his/her work against damage and loss. Such damage shall be replaced or repaired at no cost to the Owner.

E. Installing Contractor shall include provisions in the bid to make at least three (3) visits to the site prior to beginning of site work to verify site conditions, coordinate with other trades, meet with representatives of the Owner, or deal with other issues that may arise in the course of building construction.

F. In addition to the three (3) site visits the Installing Contractor shall attend progress meetings and foreman meetings as required by the Construction Manager.

1.10 WARRANTY

A. The Installing Contractor shall provide timely maintenance of any malfunctions of the installed systems, at no additional cost to the owner, for a period of twelve (12) months from the date of acceptance by the owner unless damage or failure of the system is caused by misuse, abuse, neglect, or accident.

B. The Installing Contractor shall guarantee availability of local service by factory-trained personnel from an authorized distributor of the equipment manufacturer. The distributor shall have available a stock of the manufacturer's standard parts.

2.PRODUCTS

2.1 EQUIPMENT AND MATERIALS—GENERAL

A. All equipment and components shall be new and the manufacturer's current model.

B. All components and the system as a whole shall meet or exceed the minimum standards issued by the EIA.

C. All work and materials in conjunction with this installation shall meet or exceed the provisions of the National Electrical Code and other applicable codes.

D. The materials, appliances, equipment and devices shall be tested and listed by Underwriters' Laboratories, Inc. or other similar testing agency. The system shall be listed by U.L. or other testing agency, and each major component shall bear the manufacturer's name, catalog number, and U.L. or other testing agency label.

E. The Installing Contractor shall be responsible for providing a complete and fully functional system, including all necessary components, whether included in this specification or not.

F. Pricing for Alternates shall be provided on the same document as the base bid, under a separate line item for each Alternate. All costs associated with each Alternate shall be included in the price for each.

2.2 MANUFACTURERS

A. Listing of approved manufacturers for each component follows component description below.

B. The base bid shall be based on the specified equipment or approved equivalent equipment. Alternate equipment must be so noted on a separate bid form with an ADD or DEDUCT to the base bid.

C. All approved equivalent equipment must meet or exceed the specified equipment in every aspect of performance, form, and function.

2.3 REQUESTS FOR ALTERNATE EQUIPMENT

A. Requests for equipment to be considered as alternates shall be considered only when the following have been submitted to the Consultant:

2.4 COMPONENTS

A. The following approved manufacturers, quantities, and model numbers shall form the basis of the system. These are minimum requirements. Installing Contractor shall verify all quantities prior to ordering and installation. Quantities are provided for reference only. Installing Contractor is still responsible to provide a complete and working system without claim for additional payment. All equivalents and alternates must be approved by the Consultant prior to system installation.

B. The Installing Contractor shall furnish all equipment and work as noted or implied on the drawings or specifications. In case of a conflict between the drawings and specification, furnish the equipment and work with the greatest cost impact.

C. …

3.EXECUTION

3.1 GENERAL INSTALLATION (MATERIAL AND WORKMANSHIP)

A. Non-compliance with any of the following so viewed by Owner’s sole discretion shall be cause for rejection of Work by the Owner, and replacement by Installing Contractor to Owner’s satisfaction, and at no added cost to the Owner.

B. Material, workmanship, wire, and wiring methods shall be performed as specified.

C. If, in the opinion of the Installing 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 Owner and Engineer. Modifications shall not be implemented without the written approval from the Engineer.

D. All materials and labor shall be furnished, whether specifically mentioned or not, to form a complete system operational as per the intentions and description set forth in Part 1. Include the delivery, unloading, placement, fastening to walls, floors, ceiling, or counters, other structures where required, interconnecting wiring of the systems components, equipment alignment, and all other work whether it is necessary to result in complete operational systems.

E. All installation activities shall be in accordance with accepted broadcast and audio engineering practices. All efforts shall be invoked to ensure the owner's desire that the system have extended life.

F. It shall be the responsibility of the Installing Contractor to cooperate at all times, and to the fullest extent, with all trades and contractors doing work in the building, to the end that lost time, work stoppages, interference, and inefficiencies do not occur. Communicate installation scheduling with the Electrical Contractor, and coordinate with other trades.

G. Installing Contractor bears the responsibility to verify all site conditions and coordinate with the Electrical Contractor to ensure a complete and functional system is provided to the Owner.

H. Verify dimensions of major components to check for entry through doors, ceiling height clearance, and column interference prior to the installation of the equipment.

I. During the installation, and up to the date of final acceptance, the Installing Contractor shall be under obligation to protect his/her finished and unfinished work against damage and loss; such work shall be replaced or repaired at no cost to the Owner.

3.2 SUBCONTRACT

A. The Installing Contractor shall be responsible for the complete and unconditional implementation of each system, even though he may have subcontracted a portion of the installation or had certain manufacturers install their own equipment.

B. Any delay in system commissioning caused by a Subcontractor shall be the responsibility of the Installing Contractor. If such delays cause significant disruption to the successful completion and usage of the project, the Installing Contractor shall be liable for reasonable compensation to the owner.

3.3 PHYSICAL INSTALLATION

A. All equipment not specifically portable shall be held firmly in place and supported by fastenings, brackets, etc., capable of supporting the load with a minimum safety factor of 5 or as approved by the Architect.

B. Boxes, equipment, cabling, rack, etc. shall be installed and secured plumb and square with building lines.

C. At all times during the installation the Installing Contractor shall consider not only the operational efficiency of equipment but also the aesthetics of the space. Questions or conflicts between operation and aesthetics should be directed to the Architect and Owner's Representative.

3.4 CONDUIT AND CABLE ROUTING

A. Electrical Contractor shall furnish and install all conduit and boxes associated with the audio and video systems as shown on the drawings or as required by the Installing Contractor.

B. Electrical Contractor shall provide all junction boxes for the audio and video systems with appropriate covers.

C. All conduits not specifically identified shall be 3/4".

D. All conduits below grade shall be PVC or as required by code. All conduits above grade shall be EMT or as required by code. Refer to conduit specification for details.

E. There shall be no more than three (3) 90-degree bends in audio or video conduit between pull points. If a conduit run requires more than two bends or if the conduit run is in excess of 150' in total length, insert a pull box. If it is not practical to install a pull box in the run due to field conditions, the conduit size shall be increased to the next trade size for each additional 90-degree bend. Offsets shall be considered as equivalent to a 90-degree bend.

F. All conduits to be labeled at the source box with the destination box in a clear and logical manner.

G. Ends of all conduits are to be deburred and bushed.

H. All conduits terminating inside of an audio/video enclosure (e.g. rack) or not terminating in a junction/pull box shall be provided with plastic insulated bushings.

I. Electrical Contractor shall provide a poly pull-line in each conduit.

J. Line voltage conduits shall maintain a minimum of 24" separation from audio or video signal conduits except to cross at 90-degree angles when necessary.

K. The main audio racks, any auxiliary audio rack, and any other audio panel containing electronic audio system devices, must be isolated or insulated from any metallic conduits. The final connection to these audio racks or panels shall be with PVC, non-metallic flex or any other non-metallic conduit. Or, where shown the cables can enter the rack or panel in a bundle through a bushed opening.

L. Junction boxes and pull boxes in the conduit system do not have to be isolated, only racks or panels with electrical power and electronic audio devices.

M. Electrical power feed to an audio rack or audio panel shall also be via PVC or non-metallic or insulated conduit.

N. All cables shall be laced or tied securely to assure no malfunctions resulting from interference of other trades or routine future maintenance.

3.5 CABLE INSTALLATION

A. All wires and cables shall be marked at every termination and connection point with permanent clear wrap-around number or letter cable markers. There shall be no unmarked cables in the systems. Any unmarked cables found at Contractor Checkout shall be immediately labeled. Failure to label wires can be cause for rejection of work by the Owner and shall be corrected at no additional cost to the owner. Marking codes used on cables shall correspond to codes shown on drawings or be approved by the Owner and Consultant.

B. Cables utilizing molded plastic or solderless insulation displacement connectors shall be unacceptable.

C. All cable installed in ducts, plenums, and other spaces used for environmental air shall be Type CMP (refer to NEC Article 800.53) or be installed in metallic conduit (in compliance with NEC Article 300.22).

D. There shall be no wire splices in conduit.

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

F. All cables shall be grouped according to the signals being carried in order to reduce signal contamination and cross-talk. Separate groups shall be formed for the following cables.

1. Group one: Power Cables
2. Group two: Control Cables
3. Group three: Video Cables
4. Group four: Microphone level audio cables.
5. Group five: Line level audio cables.
6. Group six: Speaker level audio cables.

G. Do not mix signal cables and electrical power cables in the same conduit.

H. Do not tie-wrap or bundle signal cables to an electrical power cable.

I. 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 the equipment rack, as viewed from the rear.

J. All inter-rack cabling shall be neatly strapped, dressed, and supported as approved by the Owner or Consultant. Cabling within racks shall be contained in Panduit finger tray and secured to lacer bars when appropriate. Such cables shall remain separated as indicated herein.

K. All cables routed outside of racks and conduit shall be contained in a suitable harness or wireway to maintain a neat, clean, and finished product.

L. All cables shall be cut to the length dictated by the run. All equipment installed in racks shall have a service loop of appropriate length.

1. For equipment mounted in drawers or slides, the interconnecting cables shall be provided with a service loop of appropriate length to allow for full travel of drawer or slide and enough slack to service and remove any necessary items.
2. For equipment mounted in racks accessible from both front and back, provide a service loop length sufficient to plug and unplug cable from the unit to allow for trouble-shooting and service of equipment.
3. For equipment mounted in racks accessible from the front only, provide a service loop length sufficient to remove the unit from the rack and easily plug and unplug all connectors.

3.6 IDENTIFICATION

A. Except where otherwise specified, label all connectors on plates or panels, switches, controls, and receptacles. Labeling material to have white lettering and to be engraved black plastic laminate with metal backing or engraved black anodized aluminum plates. Minimum plate thickness shall be .125". Black P-Touch Extra Strength Adhesive labels with white lettering for rack-mounted equipment labels are also acceptable. All labels are to be relatively permanent and shall be done in a professional and orderly manner. Any labels found to be unacceptable upon project inspection shall be remedied by the Installing Contractor without claim for additional payment. All labels shall correspond to the drawings.

B. Identify all wires and cables at every termination and connection point with permanent type markers.

C. Every piece of rack-mounted equipment shall have an engraved or P-Touch label indicating function and schematic label. Provide and install on front panel engraved labels for each item of rack-mounted equipment. Designate function and input and output line(s) or loudspeaker(s) served by labeled equipment. Key all designations to system functional and patch panel diagrams.

3.7 SYSTEM PERFORMANCE, TESTS AND ADJUSTMENTS

A. Acceptance testing: Before Acceptance Tests are scheduled, the Installing Contractor shall perform his own systems checkout. Installing 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 these specifications and drawings. This work shall include the following:

1. Testing of all inputs, outputs, and tie-lines.

2. Testing of all display devices, equipment configurations, speakers and jacks.

3. Testing of any other wires or components.

4. Test all audio for compliance with the Performance Standards.

5. Check all controls functions, from all controlling points to all controlled devices, for specified operation.

B. Testing Personnel: The Installing Contractor shall have a minimum of two persons knowledgeable as to the systems as installed available for testing and adjustment with the Consultant.

1. All costs to the Installing Contractor for testing personnel shall be included in the bid.

2. Installing Contractor shall allow for up to (8) eight hours of testing and adjustments with the Consultant.

3. Failure of the Installing Contractor to provide adequate personnel or testing equipment causing lost time to the Consultant shall result in the Installing Contractor paying the Consultant's standard hourly rate for additional time and expenses as necessary.

C. Test Equipment:

1. All equipment for testing and adjustments to the sound system shall be furnished by the Installing Contractor. Test equipment shall include:

2. Computer Measurement Platform: SMAART, TEF, SIM or other approved equal
3. Dual Trace Oscilloscope
4. High Quality Multi-meter: Fluke or Similar
5. Sweepable Tone Generator
6. The Consultant may choose to bring and use some of his own test equipment.
7. Furnish make, model, and serial number of all test equipment to be used to the Consultant prior to performing any test and adjustments to the system.

D. Noise and RF Pickup:

1. Set up system for each specified mode of operation.
2. Check to ensure that system is free of noise, hum, and radio frequency interference.

E. Buzzes, Rattles, Distortion:

1. Apply high-quality music signal to the system. Adjust the system for frequent peaks at its specified maximum sound pressure level.
2. Apply sine-wave sweep from 50 to 5,000 Hz at 10 dB below full amplifier power.
3. In both cases, listen carefully for buzzes, rattles and objectionable distortion.
4. Correct all causes of such defects. If cause is outside system, promptly notify the Owner indicating cause and suggested corrective procedures.

F. Prior to the consultant commissioning of the system, provide a written report to the consultant documenting the system performance in each of the areas noted above.

3.8 PURCHASER TRAINING

A. The Installing Contractor shall provide a minimum of six (6) hours (three 2 hour sessions) of on-the-job training sessions for the installed systems for Owner-designated personnel, instructing them in the operation and maintenance of the systems. The training sessions shall take place after the systems are operational, at a time prearranged with the Owner. The training time is to be part of the total of the installation and shall be included in the installation charges.

B. A printed “quick start” guide will be given to each of the training participants. Additionally, the quick start guide will be posted at the tech desk and on the equipment rack. Guides should be laminated.

C. The Installing Contractor shall provide a copy of the software for every component that utilizes an outboard computer for setup and configuration. The Installing Contractor shall demonstrate the usage of each configuration software and train the Owner’s Representative for at least one hour for each software. This training time is to be part of the training time listed in part A above.

D. The Installing Contractor shall instruct the owner in the proper use of all equipment. The Installing Contractor shall have a knowledgeable representative present for the first official use of each system (i.e. production, meeting, event, etc.). Installing Contractor’s Representative shall have sufficient knowledge of systems as installed so as to troubleshoot any problems that may

arise during the first usage. Installing Contractor's Representative shall be present for the entire first usage of the system unless other arrangements are made with the Owner.

E. Furnish and turn over to the owner a digital set of operating/maintenance manuals consisting of:

1. A numerical index with equipment items listed
2. Equipment Brochures/Data Sheets
3. Operating Instructions
4. Service information and schematic diagrams
5. System as-built drawings and wiring diagrams
6. Test and tuning data
7. List of keys and numbers

3.9 FINAL ACCEPTANCE TESTING AND INSPECTION OF COMPLETED INSTALLATION

A. Upon approval of the Contractor Test Report, the Installing Contractor shall demonstrate operation of each major component in the presence of the Consultant and the Owner's Representative, using each microphone and loudspeaker furnished, all required microphone and loudspeaker positions, and all input, control and amplification equipment. Testing of each video and computer input of the system shall also be performed to verify proper function.

B. After demonstration, assist as required in acceptance tests by representatives of the Owner.

C. A factory-trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect. The demonstration shall be made in the presence of the Owner.

D. The Consultant and the Owner's Representative will both verify that all of the above items have been completed to satisfaction and that all installation details have been completed before a recommendation of final payment shall be made.

E. The Installing Contractor, at the Installing Contractor's expense, shall rectify any components not found to function in a satisfactory manner as defined by this specification.

END OF SECTION

1.GENERAL

1.1 RELATED DOCUMENTS:

A. Some information contained in this specification is also found on the associated sketch. Work shown on either is deemed to be in both.

1.2 SUMMARY OF WORK

A. *Mobile Display Cart:*

This bid section is for the provision, installation, termination, and programming of all electronics associated with the implementation of a mobile display cart.

The cart system is intended to function in two specific ways;

a. As a stand-alone video presentation system. The user will connect their video source to the cart via the provided cable and, using the installed button controller on the cart for control, present their video. A soundbar, installed on TOP of the monitor, will provide audio reinforcement of the program audio into the room. Speakers in the display will not be used.

b. As an integrated presentation system utilizing new building AV infrastructure. Additional electronics and control programming adjustments will be detailed in the specification for the building's AV infrastructure Bid Document to be released at a later time.

1.3 SUBMITTALS

A. No submittal documents, other than cost, are required for this specification.

1.4 QUALITY ASSURANCE

A. Bidders for this section are expected to be an authorized dealer for all major pieces of equipment or purchasing them through an authorized dealer.

B. Bidder must comply with any and all WSU standards. It is the Bidder's responsibility to educate themselves as to these standards.

2.PRODUCTS

2.1 EQUIPMENT AND MATERIALS—GENERAL

Qty	Manufacturer	Part #	Description	Notes
1	ProLift	G5L	Mobile display cart with motorized lift adjustment	
1	NEC	E805	Professional 80" HD commercial display with rs232 and variable audio output.	
1	Crestron	SB-200-P	Audio sound bar	Mount above display
1	Omnimount	OCSBA	Audio sound bar speaker mount	

1	Crestron	MPC-M10	Ten button controller with volume knob, rs232, and IP control capabilities	Black
1	Crestron	TTK-MP/MPC/IPAC-B-T	Tabletop kit for button controller	Black
1	Kramer	CP-AOCH/XL-33	33' optical HDMI cable	
1	Kramer	AD-AOCD/XL/TR	Spare replacement HDMI connectors	
1	Misc	Cabling	Interconnect cabling as needed	
1	Misc	Labor	Assembly and programming	

3.FUNCTIONAL SKETCH