
Audio Visual Systems Project

Conceptual Design and Statement of Work for an Integrated Audio and Video Presentation System with Centralized Control Capabilities

STATEMENT OF WORK

Introduction

The following Statement of Work defines the scope of the services that the Audio Visual Integrator, hereafter referred to as "Contractor", will provide to Portland Metro, hereafter referred to as the "Operator". The conceptual design and layout recommendations contained within this document are based on input obtained from the Operator's representatives during a site visit conducted on October 23, 2009. Additionally, significant input has been provided by the Operator's consultant, Robert Schmitt. These recommendations include the use of a mixture of wired tabletop mounted microphones, ceiling mounted microphones, touch panels, and table mounted displays. These modifications include but are not limited to, construction of a display wall, core drills and conduit from the equipment rack to the table location as well as additional electrical requirements. Modification to the HVAC system may also be required in order to cool the equipment room.

The Operator should note that the costs associated with these facilities modifications are not included in this proposal.

Purpose

The purpose of this project is to implement a Multimedia Presentation System. This system shall include audio and video presentation capabilities in addition to audio/video teleconference and voice reinforcement features. The proposed system shall also include a custom designed control system which will operate as the single point of control for all system components and features.

About this Document

This document is intended to ensure that the Contractor and Operator share a common and equal understanding of the end result that the Operator intends for this project. The information contained herein will describe the project scope and specify or refer to other existing documents which may describe any hardware/software products to be included.

Inclusions

This Statement of Work includes the following:

1. Scope of Work to be Performed by Contractor
 - a. Part 1 – Display System and Source Connectivity
 - b. Part 2 – Collaboration
 - c. Part 3 – Audio System
 - d. Part 4 – Videoconference System
 - e. Part 5 – Control System
 - f. Part 6 – Additional System Components
2. Facility Impact Considerations
3. Acoustical and Noise Concerns
4. What is Not Included
5. Additional Terms and Conditions
6. Assumptions/Operator Responsibilities
7. Schedule
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1. SCOPE OF WORK

Part 1: Display System and Source Connectivity

Display System Requirements:

1. Multiple displays with matrix source switching
2. Support for 720p resolution
3. Annotation Capabilities

Display System

The Display System shall be comprised of one (1) 87" (16:10) diagonal interactive white board and its associated multimedia projector. Additional displays in the form of two (2) 65" Flat Panels (LCD or Plasma) shall be mounted on each side of the interactive whiteboard screen for use during Videoconference mode. The 87" display will serve as the primary display for both in-room and videoconference content sharing. A videoconference camera shall also be mounted on the display wall directly above, and centered on the interactive display.

1. Contractor shall provide and install one (1) 4000 lumen wide-format multimedia projector. This projector shall be ceiling mounted in a manner and location that will optimize the projected image on the interactive whiteboard.
2. Contractor shall provide and install one (1) SMART 87" interactive whiteboard. The device shall be mounted in accordance with the manufacturer's specifications. The bottom of the screen shall be installed at approximately 34 inches above the finished floor.
3. Contractor shall provide and install two (2) 65" diagonal flat panel displays (LCD or Plasma). These displays shall be mounted to the right and left of the wall mounted interactive whiteboard. Both displays shall be mounted at a height that is appropriate for viewing, and for use with their associated SMART interactive Overlays.
4. Contractor shall provide and install two (2) SMART interactive overlays for the 65" flat panels.
5. Contractor shall provide and install one (1) SMART 22" Podium at an appropriate Operator specified table location. This device shall be installed using an articulating arm appropriate for its selected mounting location.
6. Contractor shall provide and install one (1) SMART Slate wireless (Bluetooth) annotation device. This device shall permit meeting participants to annotate on the SMART enabled PC.
7. All SMART connectivity for the three (3) SMART enabled displays, the SMART Podium and the SMART Slate shall be terminated at the one (1) Operator provided system PC. This device shall be equipped with a triple-headed graphics card and a minimum of five (5) USB 2.0 ports. SMART MeetingPro software shall be included with the SMART products.

Input Connectivity

1. Contractor shall provide the following input connectivity:

- a. Conference Table Computer Connectivity – Audiovisual connectivity shall be in the form of three (3) Extron Cable Cubby 600 table interfaces. These recessed table interfaces shall be located at along the head-end of the conference table. Each interface shall provide the following connectivity:
 - i. One (1) 15-pin HD VGA w/ audio (Laptop)
 - ii. Two (2) RJ-45
 - iii. Two (2) Power Receptacles



Cable Cubby 600

- b. Lectern Location Computer Connectivity (Presenter) – In the form of a passive floor interface.
 - i. One (1) 15-pin HD VGA w/ audio (Laptop)
 - ii. One (1) RJ-45
 - iii. One (1) each - USB Connectivity for a keyboard and mouse
- c. Equipment Rack Location
 - i. Three (3) 15-pin HD VGA w/ one (1) 3.5 mm audio (Room PC with Triple Graphics Card w/ PC audio)
 - ii. One (1) 15-pin HD VGA w/ audio (Videoconference Codec)
 - iii. One (1) Cable Television
 - iv. One (1) Composite Video w/ audio (VCR/DVD Combo)

2. All display sources shall be matrix switched; any source to any display.

3. Contractor shall provide for the adjustment and alignment of the systems and provide for the system checkout and functional testing.

Part 2: Collaboration

The Contractor shall provide and coordinate with the Operator's IT staff to implement collaboration software based on SMART MeetingPro, which is included with the Smart Board display. The Contractor recommends upgrading to the Smart MeetingPro Premium application and the Smart Bridgit web conferencing collaboration software. Smart MeetingPro is available in versions that cater to one interactive display, 2 displays, 4 displays or up to as many as 16 displays simultaneously. It is possible to slide documents between screens and write notes on different displays at the same time.

Smart Bridgit is a webconferencing application that would allow sites outside the facility and network to view and collaborate on documents, even during audio only conferences. The Contractor may provide more information on these collaboration tools including a demonstration and meeting directly with Smart Technologies. It is important to provide the Operator with a full understanding of the advanced collaboration solutions available from Smart and their application in the Conference Room and elsewhere in the Operator's enterprise.

The videoconferencing system also includes "presentation sharing" features based on the H.239 standard of the H.323 videoconferencing standards. H.239 shall allow the Operator to share PC data and peripheral cameras as content to the far end. These sources shall include PC for sharing the interactive whiteboard screen, any PC/MAC application such as Microsoft Word, Excel, a Web Browser, the Document Camera, DVD player, or a laptop connected at one of the table interface locations.

Note: MeetingPro Premium and Bridgit are upgrade options and are to be priced as an alternate.

Part 3: Audio System

Requirements of the audio system are as follows:

1. Implement Teleconferencing audio within the entire room.
2. Implement Speech reinforcement for general meetings.
3. Provide a means for recording meeting audio.

DSP Audio and Teleconferencing

1. The Contractor shall provide and install one (1) 12 input, 8 output audio DSP matrix switching system with integral condenser microphone phantom power capability. The Contractor shall also provide nine (9) radio frequency resistant (Blackberry/iPhone) ceiling mounted microphones. These microphones shall provide for voice pickup of participants seated at the conference room table. Two (2) standard wireless microphones, one (1) handheld and one (1) lapel, shall be provided for presenter use and public address functions.
2. The Contractor shall provide and install one (1) analog teleconferencing codec. This device shall be integrated into the audio system in order provide audio conferencing capabilities to meeting participants. This system shall be configured so that an audio conference can be mixed with the audio from a video conference.

Distributed Audio

The Contractor shall provide and install a high impedance distributed audio system. The system shall consist of one (1) multi-channel power amplifier which shall have the appropriate number of channels to accommodate the speech reinforcement design and the correct number of recessed ceiling speakers. The Contractor shall also provide and install two (2) flush mount wall speakers. These speakers shall be installed in the display wall and shall provide direction oriented audio during a videoconference.

Ceiling Microphones

Due to the variable seating configuration of this room the use of ceiling mounted microphones is required. The Contractor provided ceiling mounted choir microphones, estimated to be nine (9), shall be distributed to provide the best room coverage reasonably possible. The contractor shall also supply provisions for 2 additional speakers for future.

While ceiling mounted microphones are ideal for large group conference environments from a room coverage and cabling standpoint, they may also be problematic with regard to audio quality. There are typically two major reasons for audio difficulties with ceiling mounted microphones:

1. Location – The microphone is at a greater distance from the talker than traditional tabletop microphones. Because of this distance the microphone's sensitivity must be turned up making the system susceptible to ambient room noise.
2. Noise – HVAC and other building mechanical noise is often transmitted through the ceiling introducing unwanted noise into the audio system. The frequency range of HVAC noise can be especially challenging.

In order to help compensate for the challenges presented by ceiling mounted microphones, high quality audio processing equipment has been included as part of this system configuration. In most cases electronic processing and filtering of room noise is successful.

Part 5: Videoconference System

1. The Contractor shall provide and rack-mount one (1) Polycom HDX 9004XLP High Definition Videoconference Codec (IP only) and two high definition (HD) video communication cameras. The system shall be capable of delivering videoconferencing in high definition (720p at 30 fps). Contractor shall provide and wall-mount one high definition video communication camera on the display wall. This camera shall provide a traditional videoconference room view. The second HD video communication camera shall be mounted at the back of the room and shall provide a, "presenter view" for far-end conference participants.
2. The Contractor shall provide input connectivity from the Rack PC, laptop interfaces and VCR to the video codec so that the Operator will be able to conveniently take advantage of the codec's, "People and Content" presentation functionality during videoconference presentations.

Audio from a voice teleconference may be mixed with the audio from a Videoconference so that audio only conferees may participate in the audio portion of a videoconference.

Part 6: Control System

The multimedia presentation and videoconference system shall be integrated with a centralized Control System to support preset Room Modes and Configurations as well as room control functions. During the site survey and interview process, the Contractor suggested a Crestron Control System be used for this design. The Contractor recommended using two (2) identical touch panel interfaces for room automation with one being a tabletop style installed at the podium location and the other installed at the conference table. The touch panel designs and configurations shall be identical to support ease of use in either mode. To control costs, a single touch panel can be used for this system and an interface could be provided to plug in the touch panel at either location. The Control System shall support the following defined features and functionality:



1. Two points of control:
 - a. One (1) 10" Tabletop style Wired Color Graphical User Interface at head end of the conference room table
 - b. One (1) 10" wall mount style Wired Color Graphical User Interface at room podium
2. The Control System shall control the following A/V System items:
 - a. Display input selection
 - b. Preset Configuration Modes – Videoconference and Presentation
 - c. Videoconference – Dial Pad, Dial, Hang-up, Camera Control, Screen Navigation, Presentation Sharing initiation
 - d. Teleconferencing – Dial Pad, Dial, Hang-Up and Flash
 - e. Audio level control – Graphical Feedback
 - f. System Power
 - g. Source device control
 - i. VCRs – Play, Pause, Stop, FFWD, REW, SFWD, SREV, REC
 - ii. DVD – Play, Pause, Stop, SFWD, SREV
 - iii. Cable TV – Channel select and navigation
3. The Control System shall control the following room environmental items:
 - a. Room lighting
 - b. Window shades up and down
 - c. HVAC

- d. Lighting Control – Scene selection of an Operator provided and programmed lighting system via RS-232 control
- e. Window Covering Control – Scene selection of an Operator provided and programmed motor system via RS-232 control

Part 7: Additional System Components

The Contractor shall provide and install an audiovisual equipment rack. This equipment rack shall be sized appropriately for the equipment specified and shall be installed at an appropriate user specified location. It is recommended that access to the equipment rack be located within the conference room. This will allow easy access to rack components, e.g. DVD Player, Room PC, etc., and also allow only one technician to be dispatched for service calls if necessary. A single technician will be able to troubleshoot, and resolve technical issues by being able to adjust levels at the rack location and still be able to monitor the effect these adjustments will have relative to the room environment. The equipment rack shall house the following components:

1. Crestron Controller and its components
2. Cable TV
3. VCR/DVD Combo
4. Audio Recorder
5. Switch and Signal Components
6. Teleconference Components
7. Videoconference Components
8. Audio Amplifier/Mixer

2. FACILITIES IMPACT CONSIDERATIONS

Electrical

The same phase leg from the facility power distribution box will power all AV components that are interconnected. All components will be connected to a common earth ground. Power to the display devices will be single-phase 120VAC from an independent 20A feed from the main distribution box. No lighting or lighting control devices are to be fed by any of the AV circuits. Electrical Plan Requirements Drawings of the final audiovisual system should be provided to the Operator prior to installation so that the contracted Electrician can properly install the required electrical connectivity.

1. Electrical connectivity will be required at the following locations:
 - Display mounting locations:
 - ▶ Multimedia projectors
 - ▶ Flat panel displays
 - ▶ Primary Camera Locations
 - Wall mounted electric screens
 - Podium
 - Conference Table
 - Equipment rack
 - Tables where laptop connectivity is required
2. Estimated Audiovisual Power Requirements - Four (4) 20A Circuits – Rack Location, Projectors and Screens, Plasma Displays and Conference Table Location.

Telecommunication Connectivity Requirements

1. Audio Conferencing – Analog Telephone Lines
 - ▶ Two (2) lines required at the equipment rack location
2. Video Conferencing – IP only
 - Local Area Network Connectivity should be provided at the following locations:
 - ▶ Equipment Rack – Three (3) network connections at the equipment rack location
 - ▶ Podium – One (1) network connection
 - ▶ Conference Table – Two to four network connections (2-4)

Information Technology

The Contractor recommends the Operator perform an analysis of the available and required network connectivity and bandwidth for the applications for this room. The videoconference systems will require at least 1MB in a point to point high definition videoconference call. The analysis should include Quality of Service (QoS) issues such as traffic flow, security, packet prioritization to ensure video conference readiness of the Portland Metro local and wide area network.

3. ACOUSTICAL AND NOISE CONTROL CONCERNS

When designing the Third Floor Conference Room, there are some common design elements that should be noted to avoid undesirable situations with regard to noise interference in the proposed conference room. In addition, it was noted there may be conversations and content shared within the conference room that would be sensitive or private in nature and it was desirable to prevent this information from being intelligible outside of the room.

Noise from sources outside of the conference room can be disruptive for participants in these rooms during a conference, training, or during daily activities. This invasive noise condition is particularly noticeable during teleconferencing or video-teleconferencing, in that microphones are used in such meetings, and the microphone will pick up and transfer those noises to the far end where it is distracting to listeners there. It affects not only the intelligibility of the speech content, but acts as a negative psychological factor for parties at both ends, resulting in listener fatigue. It is therefore highly desirable to reduce the possibility of any unwanted noise entering into the conference room. The concerns are as follows:

Noise Criteria

The recommended Noise Criteria for a conference room is no greater than NCB30.

(Based upon Balanced Noise Criterion curves (NCB) (1989) standards.)

In order to accomplish this noise “floor level”, noise contributors within the room must be reduced, as well as those noise sources originating outside of the room. There are several paths of possible noise contamination.

1. Structurally Transmitted Mechanical noise
 - a. Motors used in HVAC equipment can generate noise that will be transmitted through walls, ceilings, and concrete floors in buildings. Such equipment must be mechanically isolated from the structural floor, and the walls must be properly designed and built to isolate the airborne noise within mechanical HVAC rooms so that it is not transmitted into the classroom. Proper adherence to STC factors of the wall construction must be maintained. An STC specification for such a wall would be dependent upon the predictable amount of noise to be generated by the equipment.
2. Flanking Noise
 - a. Airborne noise originating in adjacent rooms can also be transmitted through the ceiling plenum area. In order to avoid this noise path, the common walls between the adjacent

areas and rooms, and other rooms should run from floor to structural ceiling, and not stop at the height of the Grid Ceiling. Proper mechanical isolation of these common walls at both the floor and the structural ceiling must be maintained so as not to negate the efficiency of the noise reduction.

- b. Selection of the proper ceiling tiles and above ceiling noise abatement material, i.e. insulation, can also reduce the Flanking noise problem.

3. HVAC Noise Components

- a. HVAC mechanical noise can also be transmitted through HVAC ducting. Proper routing and/or internal duct noise reduction devices and techniques should be implemented.
- b. Proper design consideration with regard to the rate of air flow (cfm) needs to be addressed as well so as not to negatively impact the room with excessive airflow noise. These 'hissing' sounds are quite distracting in teleconferencing and video teleconferencing calls.

4. Doors and Windows

While the window areas appear not to be of great concern, the entry doors to the conference room are. Since there is a hallway directly outside the conference room, the doors should be properly sealed and thresholds treated so as not to permit any noise leakage either in or out of the room in order to maintain the NCB30 criteria.

5. Conference Room Walls

- a. Adjacent walls within the rooms should be acoustically treated to reduce or eliminate acoustical reflections that result in flutter echo and other near field reflections that reduce speech intelligibility. Ceiling tiles and carpet can also be selected to help reduce this problem, but wall treatments are more effective in overall reflectivity reduction.
- b. The conference room walls should also be constructed in accordance with the NCB30 specification to overcome invasive noise from adjacent work areas.

4. What is Not Included

The following items are not considered to be within the Scope of Work of the AV Contractor. Any amendments that the Operator may feel are required should be addressed prior to issuance of a Purchase Order. Any amendments requested or required subsequent to issuance of a Purchase Order shall be accomplished by means of a written Change Order.

1. Provision of any additional AV components other than noted in the proposal.
2. No PC or Laptop computers are included. All computers are to be furnished by the Operator.

5. Additional Terms and Conditions

1. The Contractor shall ensure that there are no defects in either the audio or video signal quality and, to the extent that the contractor has control over the physical and electrical conditions that affect that quality of signal, shall correct any conditions to bring the signal to an acceptable level and quality.
2. Contractor is not responsible for correcting improper facilities electrical conditions (dirty power) that may contribute negatively to audio or video reproduction quality nor shall the Contractor be responsible for any damage to the equipment caused by Operator or any of their other contractors. The Contractor may, at an additional cost, troubleshoot and recommend necessary modifications to

Operator's existing system in order to improve any unforeseen problems with audio or video signal quality due to facilities wiring issues.

3. Contractor is not responsible for correcting conditions that may contribute negatively to the system's Audio performance or its Radio Frequency and Infrared control functions. These interference factors can be caused by signals generated by others. The Contractor may, at an additional cost, troubleshoot and recommend necessary modifications to Operator's existing system in order to improve any unforeseen problems with audio or video signal quality due to facilities wiring issues.
4. All material is guaranteed to be as specified. All work is to be completed in a workmanlike manner according to standard practices. Any alteration or deviation from written specifications involving extra costs shall be executed upon written Change Order, and shall be subject to an additional cost over and above the stated cost set forth in this document. All agreements and schedules are contingent upon strikes, weather delays, accidents or other delays beyond the Contractor's control.

6. Assumptions / Operator Responsibilities

This section will detail those areas where the Operator will bear responsibility in order to help promote the efficiency of this engagement and to assist in ensuring that it remains inline with the quoted estimates:

1. The contractor shall provide Operator with Electrical Plan Requirements Drawings prior to installation.
2. Operator shall provide a safe, clean and unencumbered working environment free from any known hazardous materials.
3. Operator is responsible for providing access to all pertinent areas for Contractor's work to be performed during agreed upon working hours and free from restrictions that may cost the Contractor down time in his work. Any down time resulting in additional cost to the Contractor may be billed as a change order at the Contractor's discretion.
4. Operator is responsible for providing uninterrupted access during the programming phase of the installation. Normal work hours will be from 6:00PM-6:00AM M-F. An alternate price for 6:00AM-6:00PM will also be provided
5. Operator shall appoint a responsible individual who will serve as the primary contact point for the Contractor. This contact shall have the authority to approve changes and to accept completed work.

7. Schedule

Conceptual Schedule

All project schedules are subject to change depending upon current obligations in place upon the receipt of any new purchase orders. The following proposed schedule represents a typical timeline expected for such work as outlined in this proposal when there are no conflicting obligations. This proposal contains custom design elements which have long lead times for construction and or manufacturing. Actual delivery dates may fluctuate due to contracted work by others whose schedules are beyond the control of the Contractor. Every means to adhere to a proposed schedule will be pursued by the Contractor once a purchase order has been received and a production schedule has been established and confirmed with all parties.

D-Day Operator provides PO or Contract. (Operators choice)
D+2 Requisition required materials
D+7 Begin control system programming
D+10 to D+45 Receive materials on site
D+45 Begin onsite installation
D+90 Final inspection and acceptance signoff

8. Training

End user training shall consist of one (1), two hour session upon completion of installation and system acceptance.

9. Warranty Information

Equipment Warranty

All Contractor provided equipment shall be warranted as specified by the specific product manufacturer. Product repair, replacement and related shipping charges will be handled in accordance with the product manufacturer's written warranty. The contractor will be required to handle coordination of equipment failure issues for one year.

Programming Warranty

The Contractor shall provide the Operator with copies of all AMX control program files. In the event that the Contractor installed AMX control program files become corrupted or damaged the Contractor shall reinstall the original program for up to 1 year from the system acceptance date at no charge to the Operator. Operator shall be responsible for all travel costs related to warranty service.

Labor Warranty

In the event of a Contractor provided equipment failure, the Contractor shall provide the on site labor to remove and reinstall the failed component at no charge to the Operator for up to 1 year from the system acceptance date. Operator shall be responsible for all travel costs related to warranty service.

Exclusions

Contractor's warranty coverage excludes damage related to Operator's improper use and/or improper handling of equipment. Damage related to faulty power is also excluded.