

1. General

1.1. Scope

A. Overview Statement

1. The purpose of the AV system is to provide video upgrades to the City of Manitowoc council chamber. Video presentation equipment and sources shall be upgraded. Additionally, video capture for broadcast and recording shall be upgraded.

B. The system shall include the following items in the bid contract:

1. Hardware
2. Installation
3. Training of owner and representatives
4. Operation and Maintenance Manuals (O&Ms)
5. Coordination of AV service and conduit to equipment locations with the Owner or the Owner's Electrical Contractor for the project
6. As-Built Drawings
7. Shipping and related processing fees
8. Programming files in uncompiled state and shall be the property of the owner upon completion of the project.

1.2. Description of Services

- A. The AV Contractor shall provide all necessary equipment, materials, accessories, and interconnects as specified in this document to provide a fully functioning audio and video system. Any equipment or items required to complete the project even if not specifically called for in this document are required as part of this contract. The AV Contractor shall account for shipping fees in their bid response.
- B. An Electrical Contractor hired by the Owner shall provide power to locations shown on the drawings and as specified in this document. The Owner or Electrical Contractor shall provide pull string in all new conduit. Conduit runs ending at rack or equipment locations shall be coordinated with the AV contractor for proper installation and mating to equipment. This includes bushings on conduit ends and proper electrical isolation.

1.3. Quality of Workmanship

- A. The AV Contractor shall be an authorized dealer/provider of the equipment specified herein.
- B. The AV Contractor shall have been in business and providing AV system installation for a minimum of five years.
- C. The AV Contractor shall have at least one staff member who has obtained a CTS-D certification
- D. The AV Contractor shall have a minimum of three CTS certified employees who have been on staff a minimum of six months at the time of the bid response submittal.
- E. The AV Contractor shall have a CTS-I certified employee who have been on staff a minimum of six months at the time of the bid response submittal.
- F. The AV Contractor shall have a QSC Q-Sys Level 2 certified programmer on staff, and cannot outsource the programming for the specified AV system.
- G. The AV Contractor shall provide references pertaining to similar sized projects on request.

- H. The AV Contractor shall comply with the NEC and all state and local codes in relation to installation of components and system wiring.
- I. All equipment mounted in the ceiling shall be tethered to structural support in addition to the ceiling grid.
- J. All wiring or cable runs shall be supported by the building structure and shall not lay on or be supported by the ceiling grid or ceiling grid support wires.
- K. The AV Contractor shall provide training on the systems. Training shall be hands on by demonstration of system functions.
- L. All equipment and installation, including Audio/Video wiring shall be guaranteed for 12 months from final acceptance of completion.
- M. The AV Contractor must designate a person in their company to provide on-going communication, coordinate service, answer questions and expedite delivery. The person will be designated as the Project Manager.
- N. Substitutions
 - 1. Request for substitution shall be submitted ten working days before the bid is due. The request shall include the make and model, and a copy of the architects and engineering specification of the equipment along with a copy of the system diagram drawings showing the implementation of the alternate equipment. Failure to provide a request for substitution is grounds for rejecting the bid.
 - 2. Substitutions after submittals have been reviewed shall not be allowed unless the product has been discontinued. Alternatives for discontinued product must be reviewed by the Design Consultant and City of Manitowoc representative as soon as a known replacement product is available.
 - 3. Alternate equipment must be equal or better in all performance characteristics.
 - 4. Any additional cost due to alternate equipment shall be reviewed and approved by Owner before equipment is ordered.
 - 5. Any cost savings from alternate equipment shall be passed as a credit to the Owner.

1.4. Submittals and Documentation

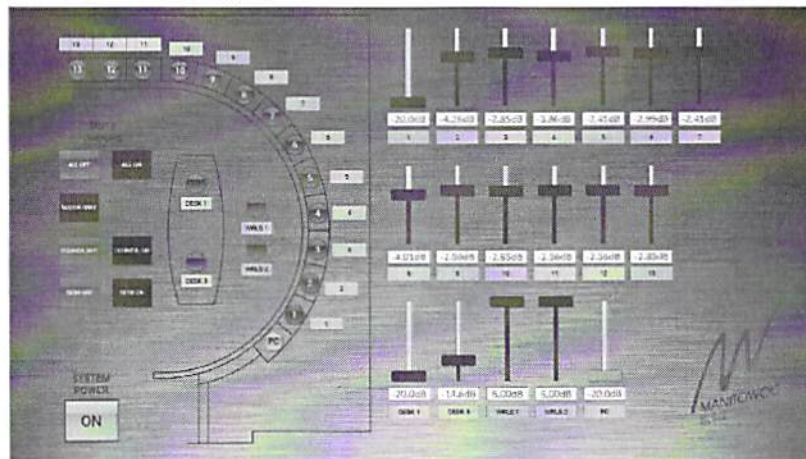
- A. Shop Drawings (provide the following for approval):
 - 1. Drawings rendered by the AV Contractor in Visio or AutoCAD. The functional block diagram shall show all equipment and connections including video, audio, power, control system wiring.
 - 2. All wiring shall be numbered in a logical format.
 - 3. Rack elevations shall be submitted
- B. As Built drawings: A CD or memory stick with the following information as PDF files neatly organized into a logical folder structure shall be required.
 - 1. Functional wiring diagrams reflecting final installed system (As Built) showing all connections, with wire numbers.
 - 2. Service and Operations Manuals provided by the manufacturer of equipment.
 - 3. Statement of Warranty for equipment if not provided in the above manual
 - 4. DSP program file saved to a CD or memory stick.

5. Operating instructions specifically written for the system called out in this specification.
6. "Quick Reference" instruction sheet laminated to provide simple instruction for room subsystems shall be provided at the request of the owner or Architect Engineer

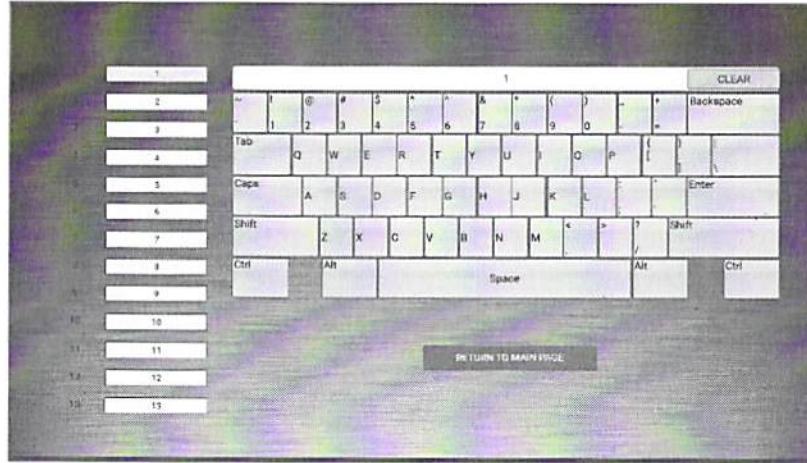
1.5. System Descriptions

A. Audio

1. The current audio system shall be used for this project. The Audio system was recently installed. The video system is using the QSC Core 110 as the central video router and controller. The current system is detailed below.
 - a. Each council member has a Shure gooseneck microphone. Muting of the microphone is controlled on the touch panel at the Clerk desk. The council meetings are moderated meaning that there is one person speaking at the direction of the Mayor. Microphone muting shall drive camera presets as detailed below.
 - b. There are two wireless microphones, one used at the podium as a gooseneck, the other as a handheld for public comment.
 - c. There is a desk used for smaller meetings in front of the main dais. This desk has three area microphones and is used for both separate meetings and as part of a full council meeting.
 - d. The Clerk PC is a source for the audio system.
 - e. Each desk position has a small speaker providing a mix minus audio experience. Additionally, ceiling speakers are provided for the public seating area and are set in three separate zones.
 - f. An output feeds the current video recording system which shall be replaced with the new video system.
 - g. The current touch panel main screen:



- h. By touching the Manitowoc logo, an admin screen allows a user to update the name labels for each of the microphones



- i. All of the current features of the touch panel shall be retained with updates as listed below in the video section.

B. Video

1. A QSC PTZ camera shall be installed using the included mount to the wall facing the dais. Refer to the AV print plan view for the location of the camera. The camera shall be controlled based on current microphone mute status as detailed under the touch panel control below.
2. Currently a tube TV is mounted in the room on the wall. This display shall be replaced with a 75" HD display as shown on the plan view. A QSC streaming receiver shall be used at the display for video content and control. The purpose of this TV is to show the current Broadcast feed to the room.
3. A Screen Innovations fixed wall screen shall be installed on the wall where the current electric screen is located. The City of Manitowoc shall remove or move obstructions on that wall as necessary (speaker, Panduit, fire strobe, etc). The bid has an option for two 136" diagonal screens. One with Black Diamond XL fabric and one with Slate 1.2 fabric. Quote both screens and one shall be chosen for the project. This screen shall be used as the presentation screen for the system.
4. The current projector shall be replaced with a Maxell (Hitachi) MP-WU8701W projector. The current UL-705 lens shall be reused with this new projector. A QSC streaming receiver shall be used at the display for video content and control.
5. For the video broadcast and recording, a number of different destinations are required. A QSC streaming appliance shall be used to receive the broadcast stream and distribute it to the various end points listed below.
 - a. The City owns a new Granicus recording system. The system has HD-SDI for a video input. A Decimator Design MD-HX shall be used to convert the HDMI output of the NV-32-H to SDI for input into the Granicus. The QSC video stream shall also include the audio that will pass through the MD-HX to the Granicus. The Granicus system is located in a lower level IT closet with a conduit path from the rack location to the closet where the AV system is located.

- b. A Vaddio AV Bridge Mini shall be used to stream video content to Facebook (currently being used by the City). The input of the AV Bridge Mini shall be fed from the HDMI loop out of the MD-HX.
 - c. A composite video modulator provides a feed to the local cable access channel. To convert from HD to SD, an Atlona AT-HD530 shall be used to down convert to SD.
 - d. The City currently uses digital signage software played out through a tower PC. This tower PC shall connect to the input of the streaming appliance. This allows the user to select either the Council Chamber video as a source to the various broadcast outputs, or this digital signage PC. A cable tuner owned by the city is used as background music for the digital signage. It shall connect to an input on the Core 110 to combine with the digital signage video.
6. The following video source devices shall be installed at the dais at the Clerk desk location. All three devices shall connect to a QSC streaming appliance. The three devices shall have buttons on the touch panel allowing the Clerk to select which source is visible on the screens.
- a. The Clerk PC shall connect to the QSC device as a source. A USB connection to the encoder shall provide audio and video feed to the computer allowing for a Skype or similar UC software to be used with the system. The audio from the Skype meeting shall route over the USB to the audio system. A new Planar 1080p monitor with touch shall be installed for the Clerk computer.
 - b. The Mayor PC shall connect to the QSC streaming appliance. A new Planar 1080p touch monitor shall be installer for the Mayor computer
 - c. A Barco CSE-200 wireless presentation device shall be provided with two USB buttons allowing laptops to connect wirelessly to the system.
7. An additional input shall be quoted and installed as an option. An additional QSC streaming appliance shall be installed with a single input from a wall plate at the dais wall. The wall plate is for a wired laptop or Doc Cam input. Quote as part of the option an Elmo TT-12D doc cam. If selected, this would show as an additional source button on the touch panel.
- C. Racks and Power
- 1. Currently a 16 space wall rack is installed for the audio system. The new video equipment shall be installed in this rack. Additionally, the modulator and cable tuner used for background music shall be moved to this rack as well. The equipment in the current "broadcast" rack shall not be used and decommissioned.
 - 2. The current digital signage PC shall be located on top or next to the rack.
 - 3. All devices in the rack shall have a rack shelf or be directly mounted to the rack
 - 4. All blank spaces in the rack shall be filled with blank rack panels
 - 5. All devices in the rack shall have a label stating the Manufacturer, Model, and primary function of the unit. "QSC Audio DSP".
 - 6. Verify that all equipment in the rack is labeled in an appropriate and reasonable manner, and the labels match those on the drawings (equipment symbols and/or

description), control system, field plates, patch panels, and any labels associated with the system. This will allow for easy serviceability, as well as prevent confusion in systems with multiples of similar equipment.

7. Reference the AV drawing set for rack elevation

D. Network Equipment

1. The current network switch shall be replaced with an Extreme Networks X440-G2-24P switch. Compatibility with the Manitowoc network is the responsibility of the AV contractor prior to purchasing the switches. The switches shall have VLANs configured for AV audio, video streaming and control. None of the AV devices as configured for this project require internet access. For service considerations, coordination with the Manitowoc network department could provide a connection to the building network for remote access. That is not in the scope of this bid.

E. Control System

1. Control shall be provided via the TSC-116-G2 touch panel currently installed in the system. Touch panel design requirements are listed below.
2. Touch Panel Design
 - a. The main touch panel screen shall maintain the left side of the screen showing the seating arrangements and microphone muting. The mute groups, and power button remain the same.
 - b. The right side of the page shall be reconfigured as video control
 - 1) Auto camera mode shall allow the camera to recall a preset based on the currently un-muted microphones. QSC allows multiple camera presets. The goal is for auto framing based on the position of the widest two microphones currently active. For example, a different camera preset is required if mic 2 and 7 are unmuted compared with microphones 3 and 13. A button shall be provided to turn off the auto camera function.
 - 2) When not in auto camera mode, there shall be the following presets:
 - a) Wide view of the whole council seating area
 - b) Three presets dividing the council seating into thirds.
 - c) Close up on the conference table in front of the dais for small group meetings
 - 3) The QSC standard camera control pane showing video from the camera (not full motion), up/down/left/right/zoom in/zoom out. Additionally a privacy button and focus buttons shall be provided.
 - 4) Video switching shall have buttons for two "destinations". One being the presentation video and the other broadcast video
 - a) Presentation video shall have buttons for Clerk PC, Mayor PC, Barco wireless, and the Wall Plate (if selected as an option)
 - b) Broadcast video shall have buttons for camera, digital signage, and presentation video. When presentation video is selected, whatever source is selected for display on the projector is also selected as the source for the broadcast output.

- c) **There shall be two buttons to stop and start the video stream from the AV Bridge Mini to Facebook. Facebook still requires a user to "go live" from the Facebook account which is not controlled by the touch panel.**
- d) **Note that the USB conferencing capabilities are only provided for the Clerk PC. Simply displaying that as a source enables the viewing of the video conference.**
- 5) **A separate power button for the projector and LG display shall be provided.**
- 6) **A volume and mute control for audio from video sources shall be provided.**
- 7) **A button shall be provided for a page flip to a new audio control page. This page shall have the volume and mute controls for the various microphones that was moved from the main video page. This page shall have a button to return to the main page. It shall also have a button to flip to the naming page.**
- 8) **A second admin page shall be provided to allow the user to store new camera presets for the five basic presets. There are potentially over 90 presets required for the auto framing script. These shall be set up by the contractor using the QSC software. Camera Preset 1 would be for mic 1. Camera Preset 2 would be for mic 2. Camera preset 3 would be for mic 1 and 2, etc.**

2. Products

Qty	Manufacturer	Model	Component ID	Short Description
Equipment				
1	Atlona	AT-HD530	CON-VID-001	HDMI/DVI to Composite and S-Video Down-Converter
1	Barco	CSE-200	VS-BYO-001	Wireless presentation system with 2 USB button System includes: 1 x ClickShare Base Unit 2 x USB button
2	Cables To Go	'28103	CBL-USB-003	3m USB 2.0 A/B Cable - Black (9.8ft)
1	Cables To Go	'54174	CBL-USB-001	2m USB 3.0 A Male to B Male Cable (6.5ft)
1	Decimator Design	MD-HX	PRO-001	Miniature (3G-HD-SD) - SDI / HDMI Cross Converter with Scaling and Frame Rate Conversion
1	Extreme Networks	1YR SKU FOR 97004-16533	NET-ACC-003	Extended service agreement - advance parts replacement - 1 year - shipment - response time: NBD - for P/N: 16533
1	Extreme Networks	PWR CORD NA 10A NEMA 5-15P IEC320 C13 11	NET-002	PWR CORD NA 10A NEMA 5-15P IEC320 C13 11
1	Extreme Networks	X440-G2 24P	NET-SWI-001	X440-G2 24 10/100/1000BT POE+ 4SFP COMBO
2	Extron	DPM-HDF/0.5 4K PLUS	CBL-ADA-002	DisplayPort Male to HDMI Female Active Adapter Cable – 6"
9	Extron	HDMI Ultra/6	CBL-VID-006	4K Premium High Speed HDMI Ultra-Flexible Cable - 6' (1.8 m)
1	Hitachi	MP-WU8701W	DIS-PJ4-001	WUXGA 7000 3LCD Laser Projector
1	LG	75UV340C	DIS-LCD-001	75" UHD Commercial TV with Essential Smart Functions

2	Liberty Cable	E-DPM-M-10F	CBL-004	Display Port Molded AWM Rated Cable 10'
3	Liberty Cable	WQ558760	PLT-WAL-005	Single Gang White Plate with RJ45 "Video Network"
1	Liberty Cable	Z100AY6FT	CBL-AUD-040	3.5mm Stereo to Dual RCA Audio Cable,6'
1	Middle Atlantic	EB1	RKS-ACC-010	1SP FLANGED ECONO BLANK
2	Middle Atlantic	UMS1-5.5K	MOU-ACC-005	1SP UM SHELF,5.5"D,KIT
2	Planar	PCT2235	DIS-MON-002	22" 16:9 MULTI-TOUCH LCD MONITOR
4	QSC	NV-32-H	TXS-IPV-005	QSYS based network video appliance. Features three 1080p inputs, or two 1080 outputs.
1	QSC	PTZ-12x72	VS-PTZ-001	Q-SYS POE CAMERA FOR AV-TO-USB BRIDGING. 12X OPTICAL ZOOM 72° HORIZONTAL FIELD OF VIEW. INCLUDES LAN, 3G-SDI AND HDMI
1	Screen Innovations (SI)	ZPT136BDXL-NA-VWNA-SU-NA	SCR-FIX-001	Zero Edge Pro fixed screen. Image area 188.56" x 66.69". Overall size is 119.75" x 67.875" Black Diamond XL fabric with 20% Ambient Light Reflectance Value, 1.2 gain, and 29 degree viewing half angle. Projector must be greater than 15' from the screen for optimum performance
1	Vaddio	AV Bridge Mini	CON-VID-002	Video converter accepts HDMI and converts it to USB and IP streaming. Streaming includes RTMP format for popular video streaming sites. Rack Kit included

Optional Equipment

1	Elmo	TT-12iD	VS-DOC-001	Interactive Document Camera - 1080p
1	Extron	HDMI Ultra/12	CBL-VID-001	4K Premium High Speed HDMI Ultra-Flexible Cable - 12' (3.6 m)
1	Extron	HDMI Ultra/6	CBL-VID-004	4K Premium High Speed HDMI Ultra-Flexible Cable - 6' (1.8 m)
1	Liberty Cable	PC-G1791-E-P-B	PLT-WAL-001	Single Gang Aluminum Faceplate HDMI female pigtail 6" BLACK
1	QSC	NV-32-H	TXS-IPV-003	QSYS based network video appliance. Features three 1080p inputs, or two 1080 outputs. Also can stream or receive a single 4K60 video feed.

Optional screen to replace screen listed in equipment above

1	Screen Innovations (SI)	ZPT136SL12-NA-VWNA-SU-NA	SCR-FIX-003	Zero Edge Pro fixed screen. Image area 188.56" x 66.69". Overall size is 119.75" x 67.875" Slate 1.2 fabric with 35% Ambient Light Reflectance Value, 1.2 gain, and 35 degree viewing half angle. Projector must be greater than 15' from the screen for optimum performance
---	-------------------------	--------------------------	-------------	--

2.1. Wire and Cable

- A. Microphone, Line Level, Control (RS-232) shall be West Penn 291 (25291 Plenum) or equivalent.
- B. Speaker wire shall be West Penn 227 (25227 plenum)
- C. 70.7 Volt distributed speaker system wire shall be West Penn 225 (25225 plenum)
- D. Control cabling (1 pair with shield + 1 pair) shall be Crestron Cresnet cable
- E. Wireless microphone antenna cable shall be RG8U belden 9913, Shure RGX/U, or equivalent

- F. Digital Media Twisted Pair Cable shall be Crestron DM-CBL-8G-NP (DM-CBL-8G-P)
- G. Video Cabling shall be RG6 West Penn 815 (25815 plenum)
- H. HD-SDI cabling shall be Canare L-5.5CUHD
- I. All network cabling, patch cables, panels, jacks, shall support CAT6 standards

3. Execution

3.1. General

- A. Loudspeaker, projector, and TV rigging or mounts shall have a 5 to 1 safety factor and be installed per manufacturer's directions.
- B. Mic/line, speaker, control or AC electrical wiring shall not share the same conduit.
- C. All cables shall be marked with permanent cable label, machine printed, with a number scheme that matches "As Built" drawings.
- D. All cable routing within racks shall follow industry best practices for neatness, bundling, service loops, and routing. Like cable types shall be separated from unlike video cable types.
- E. All cabling shall be home run with no splices.
- F. Exposed cable bundles shall be encased in woven nylon sheath.
- G. Exposed shield wires shall be covered with heat shrink tubing. This includes rear side of plate terminations and within field terminated connectors.
- H. All shields shall be terminated.
- I. Crestron Touch Panel/Button Panel designs shall be submitted for approval to the Owner for review to establish ease of use by the Owner.
- J. The AV Contractor shall notify the Owner two weeks prior to final review that system is complete and operational.
- K. The AV Consultant has the authority to represent the Owner in determining that best practice procedures for installation of systems outlined herein have been followed. Resolution of issues that bear expense shall be the responsibility of the AV Contractor.