**SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT**

**TAMPA BOARDROOM AUDIO/VISUAL AND VIDEO UPGRADES**


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## I. INTRODUCTION

The Southwest Florida Water Management District is upgrading the Tampa Service Office Boardroom Audio-Visual and Video System. The District will be utilizing existing selected devices, cables, and displays in the upgraded system.

The system will be a hybrid Video-Broadcast and Audio-Visual system. All signals will be converted to 1080P HD-SDI signals for matrix switching for video production and presentation displaying of local computers, videoconferencing send & receive signals, PTZ cameras, DVR playback from production systems, along with the recording of meetings for official documentation. The system will allow for displaying computer graphics ("Content") and Video Signals ("Video") from both VTC and local sources.

A Utility PC with network access will be installed and utilized for all programming uploads and interfacing with IP connected devices. All programming files and configurations shall be stored on this PC for future modifications of systems. Copies of all configuration files shall be provided to the owner.

Four PTZ Cameras will be installed in the Boardroom. One on the front wall behind the dais, one on the rear wall above the boardroom entrance, and one on each sidewall in the audience area of the boardroom. Front and rear cameras shall be installed adjacent to existing VTC Cameras. Existing VTC Cameras shall be utilized for simple VTC meetings and controlled by the Crestron Control System via the VTC system.

The audio system will utilize DSP technology to distribute audio and mix-minus signals to all system speakers, recording devices, VTC systems, processing incoming audio VTC signals, as well as local computers, and television production audio. The District shall provide programming for the DSP system.

Devices shall be operated via a Crestron Control System and Crestron Touch Panels. All Cameras, DSP systems, microphone mute functions, boardroom displays, video data projectors, digital audio recorders, and existing projection Screens will be controlled via RS232, RS422, and/or IP control protocols. The District shall provide programming for Crestron Control Systems and Panels.

Four remote areas in the building will have dual displays for displaying Graphic/Content and Camera/Video pictures. HD-SDI signals will be cabled to each location and converters will be utilized to convert HD-SDI signals to HDMI signals for display inputs. The Staff Breakroom, the Director's Office, and the American Elm Conference Room will have owner provided displays installed. The Laural Oaks Conference Room will utilize an existing display and video data projector.

## II.    THEORY OF OPERATION

### A.  VIDEO SYSTEMS

The approach to this system utilizes Television Broadcast principles with Audio-Visual components.  The primary purpose is for a fully functional boardroom system, with live Television Production, meeting documentation recording, and internet streaming.

Television Broadcast Technology devices are utilized for conversion of all HDMI signals to HD-SDI 1080P Serial Digital Video. HD-SDI to HDMI conversions will be utilized for displays and VTC transmit signals.

All HD-SDI sources are connected to an HD-SDI router.  Video outputs of the router feed the production switcher, VTC systems, displays, and recording devices.

HD-SDI to HDMI converters are utilized for VTC systems, video display monitors, projectors, and any signal destination that requires an HDMI input.  The router shall be controlled via the Crestron Control System and programmed to operate from Crestron control panels.

Each dais and staff position will have a personal video display. Signals distributed to personal displays will be converted to HDMI and distributed within the dais and staff tables via HDMI distribution amplifiers. Dais displays will normally display the video graphics ("Content") signal. However, any graphic or video source can be routed to all displays.

Computer HDMI outputs will be transmitted to the equipment rack via HDbaseT transmitters and receivers. HDMI Signals will be converted to HD-SDI signals by converters located in the equipment rack.

Camera output signals shall be HD-SDI 1080P.  Cameras shall be controlled via RS-422 by Crestron, and IP Control by a Camera Controller located in the Production Control Room.

The Television Production System will utilize a Panasonic HD-SDI Production Switcher, Panasonic Camera Controller, and an Atomos Dual Digital Video Recorder. A Wohler Audio Panel and Closed Captioning Equipment will be located in the Production Control Room.

### B.  AUDIO SYSTEMS

The approach for the audio system was to utilize Audio-Visual devices and DSP techniques to control audio signals within the system and controlling speaker mix-minus audio to create a feedback-controlled environment.

Each dais and staff position will have a personal speaker installed with a unique mix-minus signal developed for each board member and staff member location.

Television Broadcast audio embedders are utilized to insert audio signals into HD-SDI signals and De-embedders to extract audio signals from HD-SDI signals.

Dais and staff table microphones, wireless microphones, ceiling microphones, computer audio signals, video conferencing audio signals, and production audio signals will be connected to the DSP system. Ceiling microphone locations will be determined by the DSP programmer.

VOIP connections shall be provided by the District and utilized within the DSP for audio conferencing and phone call participation during meetings.

"All Audio Mix" and "Record/VTC Mix-Minus" outputs will be created within DSP programming and will be returned as inputs to the DSP. The production system will be able to choose "All Audio Mix" when recording meetings or "VTC transmit Mix-Minus" audio when operating as a functional live broadcast production system during meetings.

DSP outputs will be processed within the DSP to create mix-minus signals for personal dais speakers, amplified ceiling speakers, and for "All Audio Mix", and "VTC Mix-Minus Transmit" audio signals.

Each personal dais speaker and staff table position will have a unique mix-minus signal. Amplified ceiling speaker zones will have preset mix-minus signals to provide the DSP programmer expanded control of amplified audio within the boardroom.

Microphone muting will be provided by the Crestron custom 5 button single gang panels located at each dais and staff position.

An Assistive Listening System will be installed in the equipment rack and the "All Audio Mix" audio signal will be connected for both RF transmission and Listen-Technologies cell phone app operations.

C. CONTROL SYSTEMS

Functional control will be provided via a Crestron PRO3 Control System, utilizing Crestron programmed touch panels. The Crestron PRO3 will control all controllable devices within the system. Two Crestron Control Panels will be utilized for manual operator control. One panel will be located at Staff Table 1 (Reception Desk) and one panel in the Production Control Room.

1. Cameras will be controlled via RS-422 by Crestron and IP Control by a Camera Controller located in the Production Control Room.

2. Displays within the boardroom will be controlled via IR. (Off/On & Input Selection only)

3. Two Projectors, the audio recorder, and the video recorder will be controlled via RS-232 and/or IP protocol as needed.

4. Existing projection screens will be controlled utilizing existing control cable connections and controlled via relay contacts. Two existing manual remote plates will be utilized, located at Staff Table 1.

5.  The DSP system, the HD-SDI Router, and the Video Conferencing System will be controlled via IP connected to the District Data Network.

6.  The HD-SDI Router and the Digital Video Recorder will be controlled by RS-232 and IP as required by the owner.

7.  Projectors will be connected to utilize IP setup and for firmware updates.

D.  BROADCAST PRODUCTION SYSTEMS

Eight outputs of the SDI Router will be dedicated to inputs of the Production Switcher. The normalized sources will be the Four PTZ Cameras, VTC Send and Receive Video, Podium PC, and the Staff PC.  The Switcher Program out will feed Audio Embedders to embed selected audio mixes for both Digital Video Recorders A & B, along with Production Program Distribution to the Steaming Encoding System and the Staff PC. The Production Program output will also be returned to the HD-SDI Router for signals to Remote Room Displays. The Owner will provide all Production Control Room furniture.

E.  REMOTE ROOM SIGNALS

Routed HD-SDI signals will be embedded with the "All Audio Mix" for remote location monitoring within the building, including the American Elm conference room, the Laural Oaks Conference Room, the Staff Breakroom, and the Director's office. The two embedded HD-SDI signals will be known as "Content with audio" and "Video with audio".  These signals will be distributed through HD-SDI distribution amplifiers. These signals will be connected to pairs of displays in each remote location.  Crestron control <u>will not</u> control remote room displays. Belden 4855R will be utilized for cable runs to the Laural Oaks Conference Room, Staff Breakroom & the Director's Office. All other video cables will be Belden 1695A.

III.    **SCOPE OF WORK**

A.  AV CONTRACTOR

The AV Contractor shall be responsible for all commissioning of devices and systems included, but not limited to PTZ Cameras, Data Projectors, Conversion Equipment, HDBaseT devices, Assistive Listening System, Dais Speakers, Audio Amplifiers, and Ceiling Speakers.

*(The contracted consultant will provide commissioning assistance to the AV Contractor for Broadcast Equipment, Device Frame Communications, and Conversion Card configurations. Crestron PRO3 Control programming and Biamp DSP programming shall be provided by the District.*

The AV Contractor shall be responsible for the installation and termination of all cables and connections within the system, including modifications of existing cables and connectors as needed.

The AV Contractor shall be responsible for the removal of existing equipment and cables not being reused in the upgraded system.

The AV Contractor shall remove and provide to the owner the following existing equipment and cables.

1. Two existing video projectors and hardware above the Boardroom audience seating area.
2. One existing video projector in the American Elm Conference Room
3. Two existing hanging displays and hardware in the Staff Breakroom
4. All equipment and cables in existing equipment racks not being reused for the upgraded system. *(One TOA T60 shall be reused in the upgraded system currently located in the system rack.)*
5. All existing RGB 3&5 BNC component cables, Composite video cables. Some cables will be discarded at the owner's request, including existing cables to displays, dais, and staff positions.

***Note:*** *Existing Remote Room Video and Audio Cables do not need to be removed from cable existing cable paths unless they need to be removed to gain access through existing wall penetrations. Cable ends can be stored neatly in the above-ceiling areas as needed.*

The AV Contractor can re-utilize, but is not required to reuse the following existing cables:

1. Microphone cables from dais and staff positions.
2. Existing projection screen relay control cabling
3. RS-232 control cables
4. IR control cables
5. Zone 9 Speaker cables

The AV Contractor shall install two Video Data Projectors at existing projector locations above the Boardroom audience area. The AV Contractor shall install projectors at the best location. The AV Contractor shall determine mounting methods, and shall provide mounting hardware, and all mounting accessories required for safest and best installation.  The AV Contractor shall submit a projector mounting method in writing to the owner before the installation of projectors for Consultant and Owner approval.

The AV Contractor shall connect projectors to the District Data Network and utilize IP GUI of projectors to update and optimize projector operations as needed.  The AV Contractor shall save all data files relative to projector operations on the Utility PC and provide copies of all configuration files to the owner.

The AV Contractor shall install personal desk-mount speakers, at each dais, and staff position. The owner and consultant shall determine the exact location for personal speaker mounting before or during the installation.

AV Contractor shall fabricate and provide mounting devices and mounting methods for under-desk/dais devices, including Video Converters, HDMI Distribution Amplifiers, and RDL "Stick-on" devices. Methods for mounting these devices shall be approved by the Owner and Consultant before the installation of devices. All under desk/dais cabling shall be laced and secured to the bottom of furniture, utilizing existing cable chases when possible. Screw-down cable ties are acceptable. Stick-on cable tie mounts will not be accepted under furniture.

AV Contractor shall install all equipment in the Broadcast Production Control Room. A/V Contractor shall work with Owner and District Staff for proper mounting of all Displays, Rack Equipment and Device within the Control Room.

The AV Contractor shall provide an installation technician during the commissioning and programming and testing phases of the installation. The Onsite AV Technician shall coordinate with the Owner, the Consultant, and the System Programmer for participation in the testing process.

B. AV INSTALLATION METHODS

All work shall conform to the (NEC) National Electrical Code and the (NFPA) National Fire Protection Association. The A/V Contractor is responsible for Firestopping all wall penetrations per local codes.

The existing equipment rack is equipped with vertical lace-bars and vertical power strips. The AV Contractor shall provide a clean and professional installation of equipment and cabling within the rack space. Every effort shall be made to create separate lacing bundles by type cables. Audio, Video, Control, and Network cables shall be laced in separate bundles.

The AV Contractor shall provide under-floor cable management. All cables should lay neatly underneath raised flooring without tangles and excess cable. Prefabricated cables shall be neatly tied at all locations.

The Utility PC shall be installed with adequate length service loops on all connected cables.

All power cords shall be neatly strapped with cable ties and attached to lace bars, rack structure, and furniture in a clean and orderly method. Loose power cords and cables will not be accepted.

All audio cables connected by screw-down and phoenix connectors shall be dressed with shield/drain wire tubing and shrink tubing over the overall jacket, covering the end of the jacket and tubing. All three-piece BNC connectors shall be terminated utilizing manufacturer-approved strippers and crimp tools, using industry-standards and methods.

All wall penetrations shall comply with all state and local codes. Penetrations shall utilize conduit cable paths and shall be finished with approved fire and smoke protection methods and materials meeting all state and local codes. Existing wall penetrations shall not be used if

they do not meet local and state codes. New wall penetrations shall be created. The AV Contractor shall report any existing wall penetrations that need to be updated to the owner and consultant before using existing wall penetrations.

All Installation Procedures shall follow the AV and Television Broadcast standards provided by InfoComm, BISCI, NEC, NSCA ISO/IEC, and other AV Organizations that pertain to this project. Procedures and Methods shall follow all State, County, and City Regulations.

All equipment types, equipment types, connectivity, and specifications that are provided in this specification. It is the AV Contractor's responsibility to verify all Quantities, Connectivity, and Functionality. Any questions related to this design package shall be directed to the Owner.

The AV Contractor shall maintain a clean work environment at all times. AV Contractor shall remove all trash items, keep neat storage areas, tools, boxes, cable, and related equipment. Arrangements for on-site storage shall be coordinated with the owner.

The AV Contractor shall be responsible for all J-Hooks, and related material for cables in ceiling areas. Plenum cables ties shall be used with all ceiling areas. J-Hooks shall be placed at locations meeting all codes and standard practices. All network cables shall be tested to meet data standards for each particular cable being utilized.

The AV Contractor shall utilize qualified Audio/Visual technicians on this project. A CTS certified Audio/Visual technician is required to be present at all times during the installation and testing.

It is the responsibility of the AV Contractor to review all related documents and drawings of this project. Any uncovered technical issue shall be reported to the Owner and Consultant.

C.  AV CONTRACTOR WARRANTY AND SERVICE

All equipment shall be provided by an authorized dealer with full warranty and service guarantees. Full warranty for all equipment shall begin at the sign-off of completion of the installation and testing**.**

The AV Contractor shall provide a minimum of two years' warranty on all workmanship related to the installation of equipment, cabling, and connections. The AV Contractor shall provide an extended warranty on all equipment that has less than a two-year factory warranty for a full two-year warranty provided by the AV Contractor.

The AV Contractor shall provide response time within one business day for any issues related to the installation or malfunctions of the installed system throughout the two-year warranty period. The AV Contractor shall work with the owner to facilitate, manage, and replace all failed equipment.

D. AV CONTRACTOR QUALIFICATIONS

The AV Contractor shall Have a minimum of 5 years of experience installing systems of similar scope, scale, and complexity of the technology of this system. The AV Contractor shall be a current member and in good standing with Infocomm International, National Association of Broadcasters, National System Contractors Association, or a related Audio/Visual Association. The AV Contractor shall employ CTS Certified Technicians to work on this project.

IV.    **AV CONTRACTOR PROVIDED EQUIPMENT**

A. VIDEO EQUIPMENT

| QTY: 1 | AJA KUMO1616  16x16 HD-SDI Router |
| QTY: 22 | AJA HI5-Plus Mini Converter - SDI to HDMI Mini Converter |
| QTY: 6 | AJA OG-ROI-HDM Open Gear HDMI to 3G-SDI Scan Converter |
| QTY: 3 | AJA OG-Hi5-4K-Plus Open 3G-SDI to HDMI 2.0 Converter |
| QTY: 2 | AJA OG-X-FR Open Gear Frame with Network Connectivity |
| QTY: 3 | AJA OG-3GDA-1x9 1x9 HD-SDI Distribution Amplifier |
| QTY: 4 | AJA OG-3G-AMA HD-SDI Audio Embedder |
| QTY: 3 | Cobalt Digital 9933-EMDA-ADDA HD-SDI Audio DeEmbedder |
| QTY: 3 | Cobalt Digital RM20-9933-EMDE-B-HDBNC Rear Module for  9933 DeEmbedder |
| QTY: 1 | Cobalt Digital RM20-991OAV-B Rear Module for 9910 VDA |
| QTY: 2 | ETS ETS PV992 3G HD-SDI 1x2 Splitter |
| QTY: 3 | Crestron HD-EXT3 HDbaseT Extender Kit |
| QTY: 1 | ESE ES-219A RS-170A Black Burst Generator with 4 Outputs |

B. AUDIO EQUIPMENT

| QTY: 2 | Biamp Server I/O Server I/O Chassis with 1 DSP Card & 1 AVB Card |
| QTY: 8 | Biamp SEC-4 Audio Input Card with AEC |
| QTY: 2 | Biamp SIC-4 Audio Input Card |
| QTY: 8 | Biamp SOC-4 Audio Output Card |
| QTY: 2 | Biamp SVC-2 VOIP Connection Card |
| QTY: 6 | Biamp CM1-6WS Supercardioid Ceiling Microphone |
| QTY: 6 | Biamp JB-CM1 Connection Junction Box for CM1-6WS |
| QTY: 19 | RDL ST-PA18 18 watt Audio Amplifier |
| QTY: 19 | RDL PS-24AS 24V 500ma Power Supply for ST-PA18 |
| QTY: 9 | RDL STD-600 Passive Audio 600 ohm Combiner/Splitter |

QTY: 1      RDL STR-19B Stick-On Series Racking System

QTY: 1      Henry MatchboxHD Balanced to Unbalanced/Unbalanced to Balanced Audio Converter

QTY: 13     (Pairs)Daton Audio  Desktop Mountable Speaker - Total 24

QTY: 1      Crown 875 8 Channel Audio Amplifier

QTY: 1      Crown XFMR-8 8 Channel 8ohm to 70V Line Transformer

QTY: 1      Shure ULXD4D Dual Wireless Microphone Receiver

QTY: 2      Shure ULXD1 Wireless Microphone Transmitter

QTY: 3      Shure MX184B  Supercardoid Lavalier Microphone(1 spare)

QTY: 2      Shure ULXD2 Handheld SM58 Wireless Microphone Transmitter

QTY: 1      Listen Technologies LCS-121-0 WIFI/RF Advanced System Kit

LCS-121-0 Includes:
1. QTY: 1  LW-100P-02 LE 2 Channel Wifi Server
2. QTY: 1  LW-202 LE Venue Awareness Kit
3. QTY: 1  LT-800-072-01 Stationary RF Transmitter (72 MHz)
4. QTY: 1  LA-304 Assistive Listening Notification Signage Kit
5. QTY: 1  LA-122 Universal Antenna Kit (72 MHz)
6. QTY: 1  LA-326 Universal Rack Mount Kit
7. QTY: 2  LPT-A107-B Dual RCA to Dual RCA Cable 6.6 FT. (2 M)
8. QTY: 2  LR-4200-072 Intelligent DSP RF Receiver (72 MHz)
9. QTY: 2  LA-401 Universal Ear Speaker
10. QTY: 2  LA-430 Intelligent Ear Phone/Neck Loop Lanyard
11. QTY: 2  LA-423 4-Port USB Charger

C. CONTROL EQUIPMENT

QTY: 1      Crestron PRO3 Series 3 Control System

QTY: 1      Crestron C3COM-3 AV3 3 Com Port Expansion Card

QTY: 2      Crestron TS1542-TILT-B-S 15" Touch Control Panel Black

QTY: 2      Crestron PWE-4803RU POE+ Injector

QTY: 4      Crestron HDDA44KZE 1x4 HDMI Distribution Amplifier

QTY: 2      Crestron HDDA24KZE 1x2 HDMI Distribution Amplifier

QTY: 22     Crestron HZKPCN Horizon Custom Mic Mute Button Panels

QTY: 22     FSR DSKB-1G 1 Gang Desktop Mountable Box

QTY: 2      Crestron CNPWS-75 75 Watt Cresnet Power Supply

QTY: 1      Crestron CNTBLOCK Cresnet Distribution Block

QTY: 3        Crestron HD-EXT3-C-B_System

QTY: 5        Crestron IRP2 IR Emitter

D.   DISPLAY EQUIPMENT

QTY: 2        NEC P525UL 5200 Lumen Laser Data Projector

QTY: 2        Projector Mount Adapter Plate As Required – Model Determined by AV Contractor

QTY: 2        Extension Pole/Mount As Required - Model Determined by AV Contractor

E.   UTILITY COMPUTER

QTY: 1        SL-1U-LLH310M-LA Rack-Mountable Windows 10 Utility PC

QTY: 1        SL-RMKB-RKP117e 1U Rackmount 17" LCD Keyboard Display Drawer

F.   PRODUCTION EQUIPMENT

QTY: 1        Panasonic AV-HS410J HD/SD Switcher with 9+ Inputs - D-Ship

QTY: 1        Panasonic TBD - Premium 4-year warranty for AV-HS410

QTY: 4        Panasonic AWHE42WPJ HD Integrated PTZ Camera (White)

QTY: 1        Panasonic TBD Premium 4 year warranty AWHE42WP

QTY: 4        Panasonic FEC40WMW Wall mount for HE40 Camera (White)

QTY: 1        Panasonic AW-RP150GJ5 Advance Full PTX Camera Controller w/7" LCD

QTY: 1        Panasonic TBD Premium 4 year warranty AW-RP150GJ5

QTY: 1        Panasonic XLRMF10 4-Pin XLR Power Supply Cable FOR RP150GJ5

QTY: 1        Atomos SHOGUN STUDIO Dual Digital Video Recorder

QTY: 1        Wohler AMP1-2SDA Rackmount Audio Monitor

QTY: 1        Osprey Talon Pro Streaming Encoder

G.   PREFABRICATED HDMI CABLES

QTY: 28       Extron 26-614-02 HDMI to DVI-D/6 6FT Cable

QTY: 1        Extron 26-650-25 HDMI to HDMI Pro/25 25FT Cable

QTY: 6        Extron 26-663-02 HDMI to HDMI Ultra/1.5 – 1.5 FT Cable

QTY: 15       Extron 26-663-03 HDMI to HDMI Ultra/3 - 3FT Cable

QTY: 35       Extron 26-663-06 HDMI to HDMI Ultra/6 - 6FT Cable

H.  CABLES AND CONNECTORS

| | |
|---|---|
| Lot | Belden 4855R Black 4K UHD Precision Video Cable, RG-59 Mini, 75 Ohm, 23 AWG |
| Lot | Belden 1695A- Black RG6 Serial Digital Coax, Flamarrest Jacket |
| Lot | Belden 4694P 12 GHz, 4K UHD Precision Video Coax, Plenum-CMP, 75 Ohm RG6 18 AWG |
| Lot | Belden 1694A Belden RG6 Serial Digital Coax, |
| Lot | Belden 9451- Red Audio Cable - 2 Cond 22 AWG TC, Shielded, Riser |
| Lot | Belden 9451P- Black Control Cable 2 Cond 22 AWG TC, Shielded, Plenum |
| Lot | Belden 1862A - Speaker Cable, 2 Conductor 16 AWG BC, Unshielded, CMP |
| Lot | Belden 6299UE Speaker Cable, 2 Conductor 16 AWG BC, Unshielded, CMP |
| Lot | Belden 2412A – Blue Category 6+ Enhanced Cable, 4 Pair, U/UTP, CMR |
| Lot | Belden 2183R 4K  UHD Media Cable, 4 Pair 23awgPBC Jacket |
| Lot | Crestron Cresnet-P-TL Cat6A Cresnet Cable |
| Lot | Kings BNC Connector for Belden 4855R |
| Lot | Kings BNC Connector for Belden 1694A |
| Lot | Kings BNC Connector for Belden 1695A |
| Lot | Kings BNC Connector for Belden 4855R |
| Lot | RCA Audio Connectors |
| Lot | RJ-45 EOL Connectors |

V.  **OWNER AND CONSULTANT**

Commissioning of the Video Production Switcher and Digital Video Recorder will be provided by the Owner and the Consultant. Closed Captioning Systems will be commissioned by the owner.

The Owner shall provide one 24 port managed network switch for the new system. The District I.T. Department shall provide IP Address assignments for all system devices. The Owner shall provide required cables and connectors to connect the AV Network switch to interconnect with the District Data Network.  The AV Contractor shall provide Cat6 cables and connectors required for all device connections documented on system line drawings.

The Owner will provide all the electrical requirements for this project.

VI.  **OWNER FURNISHED EQUIPMENT**

A.  EQUIPMENT TO REMAIN IN PLACE

The owner shall provide the following equipment that will remain in place:

1.  21 Dais and Staff Table Dell Graphic Display Monitors

2.  23 Dais Staff Table Microphones

3.  2 Sony KDL-46EX500 46" Hanging Displays

4.  2 Samsung 32" Wall Mounted Displays

5.  1 Toshiba 32" Wall Mounted Display

6.  1 Middle Atlantic 14RU Equipment Rack

7.  Production Control Room Furniture, Electrical Power & Rack Equipment

B.  REUTILITZED EQUIPMENT

The owner shall provide the following equipment that will be reutilized in the upgraded system.

1.  1 TOA T60 Audio Amplifier and Input Modules

2.  1  Polycom RPG700 Video Conferencing System

3.  1  Marantz Digital Audio Recorder

4.  23 Sound Advance Ceiling Tile Speakers

5.  1 Middle Atlantic 12RU Equipment Rack

6.  2 Videotek ADA16 Audio Distribution Amplifier with Videotek Rack Mount

7.  1 Spectrum Cable Set-top Receiver

8.  Wall Mounted Displays and Projectors in Remote Rooms

8.  Production Control Room Furniture

## VII.    SYSTEM DOCUMENTATION

The consultant has provided a detailed design at "Build" level engineering for a complete and working system.  Any variations to this design must be approved by the owner and the consultant. System drawings have been provided for all aspects of the system installation.  The Consultant will provide a cable Run-list Excel Spreadsheet to the AV Contractor before installation.  The installation contractor <u>will not</u> be required to provide engineering for this system or provide as-built drawings. The consultant will document all necessary corrections or changes to this design and will provide as-builts to the owner upon project completion.

## VIII.    CABLE AND EQUIPMENT LABELING

Each system cable will be labeled with a unique cable label.  Labels shall be applied on each end of every cable. Labels shall be Brady M-143-427 1" x 1.25" x .5", Black on Semi-clear wrap-around labels.  The format for printed labels is illustrated on drawing #AV-101-E/7.

Equipment Labels shall be provided on all equipment including conversion devices at displays and dais devices. Labels shall be Brady MC-500-595-WT-BL .5" printed tape labels.  Each label shall include the equipment short device name, and unique system name as shown on system line drawings. Example: "HD-SDI Router- SDIRTR-01".  Labels for Custom I/O Panels will have engraved double-stick labels.

IX.     **EQUIPMENT SUBSTITUTIONS**

All equipment substitutions shall be preapproved by the Owner and the Consultant before Bid Submittals. All substitutions must have exact technical abilities and operational functions.