



STATE OF THE ART ACOUSTIK INC.

Specification of Works

APPENDIX B TO ANNEX A

Dialog McRobie Department of Finance 90 Elgin Conference Floor

90 Elgin, Ottawa, Ontario

AV Specification

Audio Visual Systems – Division 17

October 29, 2013

AV Systems 90 Elgin – Finance Conference Floor

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Audio Visual

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DIVISION 01. GENERAL REQUIREMENTS
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1.1 INTRODUCTION

The Department of Finance is moving to a new building at 90 Elgin Street. The Conference Floor will occupy half of the 2nd floor. The previous Finance Conference Floor had a limited AV system, and this new AV system as described in the specifications will represent a major upgrade in usability and functionality to the department.

This tender specification includes the audio visual requirements for the project as determined through meetings with the Department of Finance. Areas included in this project are to be complete and fully functional a move in date of September 2014. The AV design includes a Main Conference Room with a Technicians Booth and Interpretation Booth, a Media Room, a Telepresence Room, AV monitoring and support in a Business Office, and another Meeting Room. Most rooms will be outfitted with general presentation systems, including projectors, screens, laptop presentation connections, microphones, touchpanel control systems, podiums. The Main Conference Room and Telepresence room will have videoconferencing and the Media room is to be capable of being equipped with video-conferencing in the future.

1.2 CONTRACT DOCUMENTATION

.1 Definitions:

- .1 The term "AV Consultant", as it is used in this specification, refers to State of the Art Acoustik Inc., the author of this specification.
- .2 The term "AV Contractor", as it is used in this Specification, refers to that contractor directly responsible for the supply and installation of the audio visual systems described in this specification. References to other contractors in this specification will in no way modify the responsibility of the AV Contractor to perform all of the work required by the project contract documents.
- .3 The term "Engineer", as it is used in this specification, refers to Ron Engineering Limited.
- .4 The term "Architect", as it is used in this specification, refers to Dialog McRobie Architects.
- .5 The term "Owner" or "Client", as it is used in this specification, refers to the Department of Finance, and its appointed representatives on this project.

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- .6 The term "Technical Authority" and "Contracting Authority", as it is used in this specification, refers to SSC or Shared Services Canada.
- .2 The Contract documents include the client's request for Proposal, this specification and the Audio/Visual drawings as follows:

Drawing Number	Subject	Drawing Type
AV001	Room 0254 Video	Schematic Wiring Diagram
AV002	Room 0254 Audio	Schematic Wiring Diagram
AV003	Room 0254 Control	Schematic Wiring Diagram
AV004	Room 0255 Video & Audio	Schematic Wiring Diagram
AV005	Room 0257 Video	Schematic Wiring Diagram
AV006	Room 0257 Audio	Schematic Wiring Diagram
AV007	Room 0257 Control	Schematic Wiring Diagram
AV008	Room 0266 Video	Schematic Wiring Diagram
AV009	Room 0266 Audio	Schematic Wiring Diagram
AV010	Room 0266 Control	Schematic Wiring Diagram
AV011	Room 0266 Media Panel	Schematic Wiring Diagram
AV012	Room 0267 Video	Schematic Wiring Diagram
AV013	Room 0267 Audio	Schematic Wiring Diagram
AV014	Room 0267 Control	Schematic Wiring Diagram
AV015	Room 0269 Video	Schematic Wiring Diagram
AV016	Room 0269 Audio	Schematic Wiring Diagram
AV017	Room 0269 Control	Schematic Wiring Diagram
AV018	Room 0270 Vid & Aud & Ctrl	Schematic Wiring Diagram
AV019	Room 0272 Vid & Aud & Ctrl	Schematic Wiring Diagram
AV020	Room 0273 Vid & Aud & Ctrl	Schematic Wiring Diagram

- .4 Any discrepancies apparent between the AV drawings and drawings provided by the Electrical Engineer in terms of sizes for AV wallplates must be reported to the Technical Authority and Electrical Engineer immediately upon discovery. The AV Consultant will be contacted as required.
- .5 Drawings and specifications are complementary, items shown or mentioned in one and not in the other are deemed to be included in the contract work.

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- .6 The Contract documents also include of the following documents which are not attached but available from the Owner:

Architectural Drawings from Dialog McRobie Architects
Electrical and Mechanical Drawings from Goodkey Weedmark

1.3 MINIMUM STANDARDS

- .1 The AV Contractor will work in accordance with current best trade practices; will install all items according to manufacturers' specifications and recommendations as well as the specifications herein.
- .2 Materials will be new and work will conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada 2005 (NBC) and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement will apply.
- .3 It is the responsibility of the AV Contractor to provide a complete and working system to the intent of this Specification of Works. All equipment, labour and material required to install, document, complete and test the AV systems must be provided by the AV Contractor, except as noted in the Specification of Works, within the time specified. Unless stated otherwise, all specifications or features contained in this Specification of Works are to be interpreted as mandatory requirements.
- .4 Acceptances of Audio-Visual system design and performance changes must be at the discretion of the Owner and the Technical Authority.
- .5 The work will be deemed substantially complete when it performs all functions described in the Specification of Works, has been tested and commissioned, is ready for operation by the Owner and the system manuals have passed review by the Technical Authority, the Owner and the AV Consultant.
- .6 The AV Contractor must coordinate and consult with Owner for work by other trades in order to complete the installation as specified and within the time frame as stated by the Owner.
- .7 Any equipment, material or labour not enumerated in this Specification of Works but required to fulfill the functionality of the system as described in this Specification of Works must be furnished as part of this contract. Materials and equipment required for a complete system but not specified herein as to manufacturer or quality must be of high commercial standard and quality. List any such equipment, material or labour at the end of Product Bid List.

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- .8 All equipment supplied under this Specification of Works must be new stock. The Owner may supply used or new equipment to be integrated into the system.
- .9 The AV Contractor will review the site with the Owner prior to commencement of work on the AV system regarding the location of conduits, raceways, floor boxes, wall boxes and ceiling boxes to ensure that it meets the needs of the AV system. This is also required to confirm all equipment location and mounting/attachment means. Refer to the project drawings.
- .10 All equipment must be installed so as to represent no safety hazards to operating personnel or equipment or to other trades. All equipment must be adequately ventilated when operating under worst case power dissipation. i.e (any installers tools that or product that as a harmful odor).
- .11 As time is of the essence, any conflicts, queries or coordination is expected to be reported to the Technical Authority and the Owner within 24 hours of discovery.

1.4 EXAMINATION OF DRAWINGS. SPECIFICATIONS

- .1 Examine all drawings and specifications for information affecting the work of this contract.
- .2 Defects in work prepared by others affecting the work of this contract shall be reported to the Owner. Failure to report or commencement of further work over the defect shall mean acceptance of the condition.

1.5 ALTERNATIVE PRODUCTS

Product/System Options

- 1. Products that are equivalent in form, fit, function and quality to the item(s) specified in the bid solicitation package will be considered where the Bidder provides supporting documentation in accordance with SACC manual Clause B3000T as stated in the Request for Proposal document (RFP).

1.6 AMENDMENTS OR WITHDRAWAL OF THE SPECIFICATION OF WORKS

- .1 Corrections or clarification to the Specification of Works shall be issued in the form of a written amendment and will be made available to all AV Contractors by the contracting Authority via the Buy and Sell website. No interpretation, correction, clarification or amendment to the Specification of Works shall be binding on the Owner unless it is by way of an amendment. The AV Contractors must acknowledge receipt of all amendments in their bid.

1.7 SITE SUPERVISION

- .1 The AV Contractor shall employ a competent supervisor and necessary assistants who shall be in attendance at the place of work while the work is being carried out. If the supervisor is found to be inadequate for the work, the Owner reserves the right to request and obtain an alternate supervisor supplied within 48 hours of notification to the AV Contractor.

1.8 CONTRACTOR'S SYSTEMS CERTIFICATION REQUIREMENTS

- .1 **Control Systems Programming Certification**
Minimum of "Certified" level of control systems training is required for this project. The bid shall include copies of the certificates of the highest level of certification achieved by the programmers from the AV equipment manufacturer and a list of certified programmers that will be working on this project.

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1.9 DIVISION OF RESPONSIBILITY

.1 The scope of work of the AV Contractor is described in the following table.

ITEM OF WORK	AV CONTRACTOR
Cable and connectors for AV systems	Supply, install terminate and commission
Power Systems for AV	Supply and install all required power bars and DC power supplies and distribution. Provide all AC extension and power cords from duplex outlets to AV equipment.
AV Systems associated hardware	Supply, install, terminate and commission
Millwork	Install all A/V, power and network boxes into boardroom tables, podium, etc. <u>Owner is to sub-contract their own Millwork Contractor for any cutting and patching of tables, cabinetry, credenzas or similar.</u>
AV System labeled panels with connectors	Supply, install, terminate and commission
AV System equipment and components	Supply, install, terminate and commission
AV Fixed and Motorized Projection Screens	Supply, install, terminate and commission. <u>Owner is to sub-contract their own contractor for any drywall cutting and patching associated with installing the fixed and motorized projection screens.</u>
Ceiling Speakers	Supply, install, terminate and commission. AV Contract is do all locating and cutting. <u>Owner is to sub-contract their own contractor for all patching of holes.</u>
Cabling for internal connections within rooms, cabinets and racks	Supply, install, terminate and commission.
Cabling between rooms	All cabling including fibre between rooms to be supplied and installed by AV Contractor.

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Portable AV Systems cables	Supply, install and commission
Portable AV Systems equipment	Supply, install and commission
Table cabling including AV to all tables, power and network to all tables and interconnection to floor boxes	Supply, install and commission

1.10 COORDINATION

- .1 The systems affect some pieces of furniture and drywall finishes with responsibilities listed in the following table.

Department of Finance – 90 Elgin Conference Floor			
Item/Task	AV Contractor	OWNER or General Contractor	Millwork/Furniture
Mount AV interfaces and all back boxes into furniture for AV, power, AC, phone and data wiring.	Within the scope of the tender, supply samples and exact dimensions of all items to be built in to furniture or tables to Millwork Contractor. Coordinate, supply and install connector plates, connectors, locate units, cable, prepare cable harnesses to interconnect furniture to floorboxes. Dress all cables neatly and label all connectors and cables. Fasten all cables neatly to underside of furniture, and allow for furniture removal via connectors at floor level.	Supply of all items listed as NIC on AV diagrams.	Provision of all cutouts for AV devices.

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<p>Rack and equipment mounting</p>	<p>Mount all racks and equipment. Provide all power distribution inside rack. Dress all cables neatly and label all connectors and cables. Fasten all cables neatly inside rack, and allow for rack removal via connectors at wall/floor level. Use cable supports supplied by the rack manufacturer if necessary. All rack components must be supplied by a single rack manufacturer. Provide all cabling whether in or out of conduit for the entire AV system. Coordinate location of rack, wiring, conduits and boxes with the Owner.</p>	<p>Provision of power outlets for rack. Provision of any new back boxes and conduits required for rack connections. Provision of Ethernet connections at rack location.</p>	
<p>Floor and wall mounted controls, connector plates and devices in wall.</p>	<p>Coordinate, supply and install connector plates, connectors, locate units in walls, ceilings and regular and raised floors, wire all devices, prepare cable harnesses. Dress all cables neatly and label all connectors and cables. Report</p>	<p>Supply and install all electrical back-boxes and conduits as specified on the Electrical drawings. Patch any damages to wall or floor finishes.</p>	

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	any damages to wall or floor finishes for the Client to patch.		
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1.11 SAMPLES

- .1 Definition of "Samples": examples of materials, equipment, quality, finishes, workmanship
- .2 Where colour, pattern or texture is a criterion, submit full range of samples to the Architect for review and approval.
- .3 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified by the AV consultant.
- .4 The AV Contractor will submit equipment samples of adapted or substituted products to the AV Consultant, as may be requested for the purpose of verifying performance or suitability.
- .5 The AV Contractor will provide samples and dimensions to the millwork/furniture or general contractor for all built-in or integrated products within this specification and coordinate the provision of samples of equipment supplied by the Owner.
- .6 The AV Contractor will provide samples to the AV Consultant for approval of all custom connector plates/bulkheads before installation.

1.12 FIRE SAFETY REQUIREMENTS

- .1 Comply with the National Building Code of Canada 2005 (NBC) and Ontario Building Code (OBC) for fire safety in construction and the National Fire Code of Canada 2005 (NFC) for fire prevention, firefighting and life safety in building in use. All equipment supplied as part of this contract is to comply with Canadian Standards Association (CSA) or Underwriters Laboratories of Canada (ULC).

1.13 TEMPORARY UTILITIES

- .1 Existing services required for the work may be used by the AV Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility.
- .2 Notify the Owner of any expected interruption of services and obtain requisite permission.

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1.14 PROTECTION

- .1 Protect finished work against damage until take-over
- .2 Protect adjacent work against the spread of dust and dirt beyond the work areas.
- .3 Protect users of the site from all hazards.

1.15 USE OF SITE AND FACILITIES

- .1 The AV Contractor will provide all necessary scaffolds, ladders and means of installation for installing the AV system.
- .2 Closures: Protect work temporarily until permanent enclosures completed.
- .3 After the scheduled finish of the work, access to the site will only be granted at the Owner's discretion.
- .4 The AV Contractor will coordinate access to the site for all employees and representatives with the Owner and follow all security procedures and meet the security requirements set out by the Owner.

1.16 CUT, PATCH AND MAKE GOOD

- .1 The AV Contractor will coordinate with others all cutting and patching related to the specified work and will make good all damages to the site caused by his activities.

1.17 MATERIALS CONTROL AND SECURITY

- .1 The AV Contractor is responsible for the receiving and storage of all equipment, materials and tools to prevent damage or theft until the system is signed over to the Owner.
- .2 The AV Contractor is responsible to deliver all equipment and materials to the site. Products are not to be delivered to the site prior to the time they are required for installation.
- .3 After the scheduled finish of the work, access to the site will only be granted at the Owner's discretion.
- .4 The AV Contractor must coordinate access to the site for all employees and representatives with the Owner and follow all security procedures set out by the Owner.
- .5 The Owner will not pay for products delivered to the site but not installed.

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1.18 CLEAN-UP

- .1 Clean-up work area as work progresses. At end of each work period, or more often if ordered by Owner or General Contractor, remove debris from site, neatly stack material for use, clean up all packing materials, cable, connectors and other installation materials, and clean up generally.
- .2 Upon completion, remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.
- .3 Clean areas under contract to a condition at least equal to that previously existing and to approval of AV Consultant.

1.19 DUST CONTROL

- .1 Provide dust tight screens or partitions to localize dust-generating activities.
- .2 Protect all furnishings within work area with a 0.1mm thick polyethylene film during construction.

1.20 SCHEDULING

- .1 Take necessary measures to complete work within scheduled time. Do not change schedule without notifying the Technical Authority.
- .2 Carry out work during "regular hours" Monday to Friday from 07:00 to 18:00 hours. Work to be done on Saturdays, Sundays and statutory holidays is to be made by prior arrangement only. Work to be done "Off hours" Monday to Friday from 18:00 to 07:00 hours is to be made by prior arrangement only.
- .3 All major loading and unloading of equipment, materials, and waste must be coordinated during times that are acceptable to the Owner.
- .4 All noise generating installation activities (such as impact hammers, percussion tools, ramsets) and any other installation work that could impact on the normal work in adjacent occupied spaces and floors must be carried out before 08:00 and after 17:30 hours.

1.21 FEES, PERMITS AND CERTIFICATES

- .1 Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

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1.22 SYSTEM DRAWINGS

- .1 The AV Contractor must submit any proposed revisions to the System Diagrams prepared by the AV Consultant prior to commencement of the installation and not later than three (3) weeks after the award of the contract. These drawings must be approved by the Technical Authority prior to commencement of installation. The Owner and AV Consultant will be consulted as required to evaluate revisions.

1.23 SHOP DRAWINGS

- .1 Submit for the Technical Authority's review, three (3) electronic copies of each shop drawing.
- .2 The review is for the sole purpose of ascertaining conformance with the general design concept, and does not mean approval of the design details inherent in the shop drawings, responsibility for which must remain with the AV Contractor. Such review must not relieve the AV Contractor of the responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents.
- .3 Do not commence manufacturing or order materials before shop drawings are reviewed.
- .4 All shop drawings must include AV Contractor's stamp, signed by AV Contractor's authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents.

1.24 AS-BUILT DRAWINGS

- .1 Three sets of as-built drawings described in Section 3.1 Technical Standards, are required to be submitted and reviewed by the AV Consultant and the Owner prior to the approval of the AV Contractor's final invoice.

1.25 OPERATION AND MAINTENANCE (O&M) MANUALS

- .1 The AV Contractor must prepare and submit two sets of English and French manuals, one PDF hardcopy and one electronic copy, including as-built drawings, training, instruction and operating information and all software code for review by the Technical Authority, as a part of the commissioning process. Submit manuals one (1) week prior to commissioning.
- .2 The AV Contractor will maintain at their office a copy of the manual for future reference and updating.

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- .3 The submission of manuals is a mandatory requirement for the final acceptance of the work.

1.26 TRAINING

- .1 Training shall be available in either official language and provided in the language of the choice of the Owner/Technical Authority at the time of training. Training is to be at the conclusion of commissioning Phase I and after the correction of any deficiencies found during Phase I are complete. Training shall consist of at least four (4) half-days (4 hours per half day) of instruction, stressing systems functional procedures, user controls and system operation for the user group. The training will also include a separate 1-day (8 hours) system description/operation training for the technical representatives of the Owner, for a total of 3 days of training.
- .2 The AV Contractor shall coordinate directly with the Owner and users concerning scheduling, and prepare training materials for distribution at the training sessions.
- .3 Training materials and a summary of the training provided will be included in the O&M manuals as described herein.

1.27 GUARANTEE/WARRANTY AND SERVICE

- .1 The AV Contractor must be capable of servicing or have serviced all products supplied as a results of a contract. Details of the bidder's service and repair capability must be addressed in the bid documents.
- .2 All equipment shall be capable of servicing within two (2) business days of notice. Where equipment requires longer than two business days to service, supply temporary equipment to keep the system operational during the servicing period.
- .3 Warrant all parts and labour to be free of defective components, faulty workmanship or improper adjustment for a **period of one (1) year** from the date of Owner acceptance. Replace items showing evidence of defective design, materials or workmanship (including installation workmanship) within fifteen (15) days of notification and make replacements without cost to the Owner.
- .4 Where the manufacturer's warranty on individual pieces of equipment exceeds one (1) year, the equipment will be repaired within the manufacturers' warranty period for only the cost of removal and replacement from the site.
- .5 The AV Contractor must rectify conditions that might present a hazard to life or property within 48 hours of notification by the Owner.

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- .6 Identify within the manuals to be provided the warranty periods exceeding two years on individual pieces of equipment.
- .7 After any failure, guarantee system return to functionality within 3 business days of notice. **Identify any items in the Product List that cannot be repaired within a 2 business day period.**
- .8 Warranty period shall begin at the point of Owner acceptance of the system as defined in Section 3 of this Specification.

1.28 EXTRA WORK

- .1 The AV Contractor must receive written authorization from the Technical and Contracting Authority to proceed with any work outside the scope of work described in this Specification. Contemplated change orders (CCO) will be issued by the Technical and Contracting Authority, after consultation with the Owner and AV consultant as required. Change orders (CO) will then be issued to the AV Contractor by the Contracting Authority.

END OF PART 1

DIVISION 17. AUDIO VISUAL SYSTEMS

2.1 GENERAL

- .1 The product list may contain products to be supplied and installed as a part of this contract. Products marked as “install only or NIC” are to be installed as a part of this contract and fully wired and controlled by the touchpanel control system.

2.2 ROOM DESCRIPTIONS

ROOM	DESCRIPTION
0254	Technician’s Booth for Main Conference Room 0257. Equipment for rooms 0257 located, controlled, and maintained here.
0255	Interpretation Booth for Main Conference Room 0257
0257	Main Conference Room (SDA Room)
0266	Media Room (Opening to Meeting Room 0269)
0267	AV Closet. Equipment for rooms 0266 and 0269 located, controlled, and maintained here.
0269	Meeting Room (Opening to Media Room 0266)
0270	AV Closet. Equipment for rooms 0269 and 0266 located, controlled, and maintained here.
0272	Business Office. Remote Control & Monitoring Station.
0273	Telepresence Room.

2.3 AV CONTRACTOR SUPPLIED TEST EQUIPMENT

The AV Contractor shall provide the following equipment for on-site testing and provide confirmation that the equipment is on site prior to arranging commissioning.

Line#	Description	Provide Equipment On-Site for Testing
1	Extron VTG400DVI test generator	Yes
2	Oscilloscope with sufficient bandwidth to measure bandwidth performance.	Yes
3	CAT-5/6/7 Cable Tester	Yes

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	Agilent WireScope Pro LAN or equivalent	
4	Swept audio frequency response measuring system with 20 Hz to 20 kHz bandwidth for measuring electrical performance of all audio equipment and signal distribution.	Yes
5	A computer with a 1900 x 1200 at 60 Hz and 1024 x 768 at 85 Hz DVI/HDMI and RGBHV output. The computer shall be equipped with DisplayMate or equivalent video test software.	Yes
6	DVD and Blu-ray discs for verifying performance of playback devices. Extron DVE Professional AV Test DVD set. Blank DVD-R for testing recording functions.	Yes
7	1/3-octave real time analyzer with printout capability and calibrated microphone to measure and equalize loudspeaker response.	Yes
8	A portable monitor with stereo audio, DVI/HDMI and VGA to confirm that any audio/video/VGA outputs are functional.	Yes
9	Quantum Data 780 generator and HDMI analyzer with the optional Auxiliary Channel Analyzer utility for monitoring the DDC (HDCP and EDID)	Yes
10	Extron Fiber Optic Test Set (Part #: 70-962-01)	Yes
11	Extron EDID Manager Software	Yes

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2.4 EQUIPMENT LISTS

.1 Room Equipment Lists

0254 Technicians Booth							
Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Video	1	Crestron	DM-MD32x32	32x32 Video Matrix Switcher Frame	Yes	
2		2	Crestron	DM-MD8x8	8x8 Video Matrix Switcher Frame	Yes	
3		24	Crestron	DMC-C	Video Matrix Switcher Card - DM Input	Yes	
4		12	Crestron	DMC-HD	Video Matrix Switcher Card - HDMI Input	Yes	
5		2	Crestron	DMC-VID-BNC	Video Matrix Switcher Card - Audio Input	Yes	
6		3	Crestron	DMCO-30	Video Matrix Switcher Card - 2xHDMI Output	Yes	
7		3	Crestron	DMCO-33	Video Matrix Switcher Card - 4xHDMI Output	Yes	
8		1	Crestron	DMCO-50	Video Matrix Switcher Card - 2xDM Output	Yes	
9		2	Crestron	DMCO-55	Video Matrix Switcher Card - 4xDM Output	Yes	
10		1	Denon	DBP-2012UDCI	Blu-Ray Player	Yes	
11		1			Operator PC	Yes	
12		1			Cable Set top box	Yes	
13		2	Panasonic	TH-42LFE6U	Operator Booth LCD Monitor	Yes	
14		2	Chief	MWHUB	LCD Monitor Mount	Yes	
15	Audio	1	Crestron	HD-DA-2	HDMI DA	Yes	
16		2	Crestron	AMP-2210S	Power Amplifier	Yes	
17		3	Extron	MDA 3A	Audio DA	Yes	
18		1	ClearOne	Converge Pro 880	Audio Mixer and DSP	Yes	
19		1	ClearOne	Converge Pro VH20	VOIP Interface	Yes	
20		1	ClearOne	Converge Pro 8i	Input Expansion Module	Yes	
21		1	Univox		Assistive Listening System (Induction Loop System)	Yes	
22		1	Univox	SLS-100 XF	Super Loop Induction System Amplifier	Yes	
23		1	Univox		Copper Foil (\$4/m)	Yes	

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24		2	JBL	LSR 4326P	Powered Speakers	Yes	
25		2	Shure	ULXD4Q	Wireless Microphone Quad Receiver	Yes	
26		1	Shure	MX418S	Wired Microphone and Table stand	Yes	
27	Control	1	Crestron	TSW-1050	Touchpanel (for wall and operator) - DM	Yes	
28		1	Crestron	PRO3	Control Processor - DM	Yes	
29		2	Crestron	C3COM-3	RS232 Card for Pro3	Yes	
30		3	Crestron	ST-PC	Dual Power Control Module for Knifing	Yes	
31		2	Crestron	CEN-SWPOE-16	16 Port Network Switcher	Yes	
32		1	Crestron	DIN-8SW8	Secure Light Indicator Control Switch	Yes	
33		1	XANTECH	Connection Block	IR Repeater	Yes	
34		1			Key Lock Switch	Yes	
35	Connectivity	5	Crestron	HD-RX3-C	HD Receiver (Cost included in HD-EXT3-C package in 0257)	Yes	
36		14	Crestron	DM-TX-201-S	Fibre Transmitter	Yes	
37		4	Crestron	DM-RMC-100-S	Fibre Receiver	Yes	
38		3	Crestron	DM-RMC-150-S	Fibre Receiver with analog audio	Yes	
39		1	Black Box	LH2001A-SC-R3	Ethernet to Fibre Extender	Yes	
40	Video Conferencing	1	Cisco	C60 Package	High End HD Videoconferencing Package	Yes	
41		1			HD Codec	Yes	
42		1			1080p Premium Resolution	Yes	
43		1	Crestron	DVPHD-8	High Definition Video Processor	Yes	
44	Conferencing & Interpretation System	1	Taiden	HCS-5300MB/20	Digital IR Wireless Conference System Main Unit	Yes	
45		1	Taiden	HCS-5300CE_G	Digital IR Wireless Chairman Unit	Yes	
46		39	Taiden	HCS-5301D_G	Digital IR Wireless Delegate Unit	Yes	
47		40	Taiden	HCS-5300BAT	Lithium-Ion Rechargeable Battery Pack	Yes	

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48		2	Media Vision USA	MVUSA-CART32	Charging Cart	Yes	
49		8	Taiden	HCS-5300TD-WW	Digital Infrared Transceiver	Yes	
50		4	Taiden	HCS-4385U-50	Fully Digital Congress System Interpreter Unit	Yes	
51		10	Taiden	HCS-5100RA-04	4 (1+3) Channels Digital Infrared Receiver	Yes	
52		15	Taiden	HCS-51PA	Headphone	Yes	
53		1	Taiden	HCS-5100KS	Infrared Receiver Storage Case (100 pcs/case)	Yes	
54		2	Taiden	HCS-5352	Cable Splitter	Yes	
55		8	Taiden	CBL5300-30	Dedicated Transceiver Cable (30 m)	Yes	
56		1	Taiden	CBL6PS-03	6-Pin Extension Cable (3 m)	Yes	
57		1	Taiden	CBL6PS-20	6-Pin Extension Cable (20 m)	Yes	
58	Other	2	Middle Atlantic	WRK-44-32	Equipment Rack (including Side Panel)	Yes	
59		1	Crestron	DM-PSU-16	Power Supply for PoDM to DM-MD 32x32	Yes	
60		1	Van San	3260L-40	40" wide podium ADA Compliant with real wood veneer with clock and light		
61		1	Van San	1700LG-32	32" wide podium with real wood veneer with clock and light		

0255 Interpretation Booth

Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Video	2	Panasonic	TH-42LFE6U	Interpreter Booth LCD Monitor	Yes	
2		2	Chief	MWHUB	LCD Monitor Mount	Yes	
3	Audio					Yes	
4	Connectivity	2	Crestron	DM-RMC-SCALAR-C	CAT5 HD Video & Audio Receiver	Yes	
5	Conferencing & Interpretation System		Interpreter Units Included in Audio Conferencing Package on 0254 Tech Booth list			Yes	

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0257 Main Conference Room							
Line #	Category	Qty			Description	Supply/Install	Install Only
1	Video	6	Panasonic	PT-RZ370U	Projector	Yes	
2		6	Chief	RPAU	Projector Mount	Yes	
3		6	Chief	CMS0406	Projector Mount Extension Column	Yes	
4		6	Chief	CMA115	Projector Mount Ceiling Plate	Yes	
5		2	Draper	102300	Electric Projection Screens (119" diagonal image size)	Yes	
6		2	Draper	LVC-III	Low Voltage Controller for Projection Screen	Yes	
7		2	Draper	LVC-S	Wall Switch	Yes	
8		4	Draper	253097	Fixed Projection Screens	Yes	
9		4	Sharp	LC-80LE632U	80" LCD Screen	Yes	
10		4	Chief	PCSU	LCD Mount	Yes	
11		4	Chief	CMS0203	LCD Mount Extension Column	Yes	
12		4	Chief	CMA115	LCD Mount Ceiling Plate	Yes	
13		1			Podium PC	Yes	
14		1	Smart	Smart Podium 524	Annotation Touchscreen	Yes	
15	Audio	26	JBL	266CT	Ceiling Speakers	Yes	
16		4	BOSE	MA12EX	Wall mounted Line Array Speakers	Yes	
17		4	Shure	ULXD 2-SM86	Wireless Handheld Microphones	Yes	
18		4	Shure	ULXD 1-83 & ULXD WL1-83	Wireless Lavalier Microphone	Yes	
19		4	Shure	MS-10C	Microphone Stand	Yes	
20		1			Assistive Listening System (Induction Loop System) (Included in 0254 Budget)	Yes	
21	Control	2	Crestron	TSW-1050	Touchpanel (for wall and table) - DM	Yes	
22		1	Crestron	TSW-1050-TTK	Touchpanel table top kit	Yes	
23		1	Emergilite	Special Wording Sign	Secure Light Indicator	Yes	

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24		0	XANTECH	IR Receiver	Cable TV IR Control (price in equipment room)	Yes	
25	Connectivity	10	Crestron	DM-RMC-SCALAR-C	CAT5 HD Video & Audio Receiver	Yes	
26		15	Crestron	DM-TX-201C	CAT5 Audio & HD Video Transmitters (for content from Digital Devices) - DM	Yes	
27		5	Crestron	HD-EXT3-C	CAT5 HD Video Transmitters & Receivers (for content from cameras) - DM	Yes	
28	Video Conferencing	5	Panasonic	AW-HE120	HD 1080p Cameras	Yes	
29	Conferencing & Interpretation System		Delegate Units Included in Audio Conferencing Package Price on 0254 Tech Booth Budget			Yes	
30	Other	12			Laptop Connector Surface Access Enclosure Accessories	Yes	
31		12			HDMI Connector	Yes	
32		12			VGA & Audio Connector	Yes	

0266 Media Room

Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Video	2	Panasonic	PT-RZ370U	Projector	Yes	
2		2	Chief	RPAU	Projector Mount	Yes	
3		2	Chief	CMS0406	Projector Mount Extension Column	Yes	
4		2	Chief	CMA115	Projector Mount Ceiling Plate	Yes	
5		2	Draper	102300	Electric Projection Screens (119" diagonal image size)	Yes	
6		2	Draper	LVC-III	Low Voltage Controller for Projection Screen	Yes	
7		2	Draper	LVC-S	Wall Switch	Yes	
8		1			Podium PC	Yes	
9		1	Smart	Smart Podium 524	Annotation Touchscreen	Yes	

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10	Audio	8	JBL	266CT	Ceiling Speakers	Yes	
11		4	BOSE	MA12EX	Wall mounted Line Array Speakers	Yes	
12		1			Assistive Listening System (Induction Loop System for media and meeting room) (Included in AV Closet 0267 Budget)	Yes	
13		4	Shure	ULXD 2-SM86	Wireless Handheld Microphones	Yes	
14		2	Shure	ULXD 1-83 & ULXD WL1-83	Wireless Lavalier Microphone	Yes	
15		4	Shure	MS-10C	Microphone Stand (used for both 0266 & 0269)	Yes	
16	Control	2	Crestron	TSW-1050	Touchpanel (for wall and table) - DM	Yes	
17		1	Crestron	TSW-1050-TTK	Touchpanel table top kit	Yes	
18		0	XANTECH	IR Receiver	Cable TV IR Control (price in equipment room)	Yes	
19	Connectivity	2	Crestron	DM-RMC-SCALAR-C	CAT5 HD Video & Audio Receiver	Yes	
20		7	Crestron	DM-TX-201-C	CAT5 Audio & HD Video Transmitters (for content from Digital Devices) - DM	Yes	
21	Conferencing & Interpretation System			Delegate Units Included in Audio Conferencing Package Price on AV Closet 0267 Budget		Yes	
22	Other	6	Extron	HSA 400	Tilt-Up HSA - Hideaway Surface Access Enclosure	Yes	
23		6	Extron	Part # 70-616-02	One HDMI Female to Female Barrel	Yes	
24		6	Extron	Part # 70-161-11	Interface AAP	Yes	
25		1	Van San	3260L-40	40" wide podium ADA Compliant with real wood veneer with clock and light	Yes	
26		1	Van San	1700LG-32	32" wide podium with real wood veneer with clock and light	Yes	
27		1			Media Panel (In Media Room)	Yes	

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0267 AV Closet							
Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Video	1	Crestron	DM-MD32x32	32x32 Video Matrix Switcher Frame	Yes	
2		14	Crestron	DMC-C	Video Matrix Switcher Card - DM Input	Yes	
3		6	Crestron	DMC-HD	Video Matrix Switcher Card - HDMI Input	Yes	
4		2	Crestron	DMC-VID-BNC	Video Matrix Switcher Card - Audio Input	Yes	
5		4	Crestron	DMC-F	Video Matrix Switcher Card - Fibre Input	Yes	
6		1	Crestron	DMCO-33	Video Matrix Switcher Card - 4xHDMI Output	Yes	
7		1	Crestron	DMCO-44	Video Matrix Switcher Card - 4xFibre Output	Yes	
8		1	Crestron	DMCO-50	Video Matrix Switcher Card - 2xDM Output	Yes	
9		1	Crestron	DMCO-55	Video Matrix Switcher Card - 4xDM Output	Yes	
10		1	Denon	DBP-2012UDCI	Blu-Ray Player	Yes	
11		1			Cable Set top box	Yes	
12	Audio	2	Crestron	AMP-2210S	Power Amplifier	Yes	
13		1	ClearOne	Converge Pro 880	Audio Mixer and DSP	Yes	
14		1	ClearOne	Converge Pro VH20	VOIP Interface	Yes	
15		1	Univox		Assistive Listening System (Induction Loop System)	Yes	
16		1	Univox	SLS-100 XF	Super Loop Induction System Amplifier	Yes	
17		1	Univox		Copper Foil (\$4/m)	Yes	
18		2	Shure	ULXD4Q	Wireless Microphone Quad Receiver	Yes	
19		2	Shure	UA221	Passive Coax Splitter	Yes	
20		4	Extron	DA6A	Stereo Audio 1x6 Distribution Amplifier	Yes	
21	Control	1	Crestron	PRO3	Control Processor - DM	Yes	
22		2	Crestron	C3COM-3	RS232 Card for Pro3	Yes	
23		1	Crestron	ST-PC	Dual Power Control Module for Assitive Listening System	Yes	
24		1	XANTECH	Connection Block	IR Repeater	Yes	
25		1	Crestron	CEN-SWPOE-16	16 Port Network Switcher	Yes	

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26	Connectivity	2	Crestron	HD-RX3-C	HD Receiver (Cost included in HD-EXT3-C package in AV Closet 0270)	Yes	
27		14	Crestron	DM-TX-201-S	Fibre Transmitter	Yes	
28		3	Crestron	DM-RMC-150-S	Fibre Receiver with analog audio	Yes	
29	Conferencing & Interpretation System	2	Taiden	HCS-5300MB/20	Digital IR Wireless Conference System Main Unit	Yes	
30		1	Taiden	HCS-5300MX	Room Combiner	Yes	
31		2	Taiden	HCS-5300CE_G	Digital IR Wireless Chairman Unit	Yes	
32		38	Taiden	HCS-5301D_G	Digital IR Wireless Delegate Unit	Yes	
33		40	Taiden	HCS-5300BAT	Lithium-Ion Rechargeable Battery Pack	Yes	
34		1	Media Vision USA	MVUSA-CART32	Charging Cart	Yes	
35		8	Taiden	HCS-5300TD-WW	Digital Infrared Transceiver	Yes	
36		2	Taiden	HCS-5352	Cable Splitter	Yes	
37		8	Taiden	CBL5300-30	Dedicated Transceiver Cable (30 m)	Yes	
38		2	Taiden	CBL6PP-02	6-Pin Extension Cable (2 m)	Yes	
39		2	Taiden	HCS-4385U-50	Fully Digital Congress System Interpreter Unit		
40	Other	1	Middle Atlantic	WRK-44-32	Equipment Rack (including Side Panel)		
41		1	Crestron	DM-PSU-16	Power Supply for PoDM to DM-MD 32x32		

0269 Meeting Room

Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Video	2	Panasonic	PT-RZ370U	Projector	Yes	
2		2	Chief	RPAU	Projector Mount	Yes	
3		2	Chief	CMS0406	Projector Mount Extension Column	Yes	
4		2	Chief	CMA115	Projector Mount Ceiling Plate	Yes	

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5		2	Draper	102300	Electric Projection Screens (119" diagonal image size)	Yes	
6		2	Draper	LVC-III	Low Voltage Controller for Projection Screen	Yes	
7		2	Draper	LVC-S	Wall Switch	Yes	
8		1			Podium PC	Yes	
9		1	Smart	Smart Podium 524	Annotation Touchscreen	Yes	
10	Audio	8	JBL	266CT	Ceiling Speakers	Yes	
11		2	BOSE	MA12EX	Wall mounted Line Array Speakers	Yes	
12		1			Assistive Listening System (Induction Loop System for media and meeting room) (Included in AV Closet 0267 Budget)	Yes	
13		4	Shure	ULXD 24-SM86	Wireless Handheld Microphones (Shared with 0266)	Yes	
14		2	Shure	ULXD 14-83	Wireless Lavalier Microphone (Shared with 0266)	Yes	
15	Control	2	Crestron	TSW-1050	Touchpanel (for wall and operator) - DM	Yes	
16		1	Crestron	TSW-1050-TTK	Touchpanel table top kit	Yes	
17		0	XANTECH	IR Receiver	Cable TV IR Control (price in equipment room)	Yes	
18	Connectivity	2	Crestron	DM-RMC-SCALAR-C	CAT5 HD Video & Audio Receiver	Yes	
19		7	Crestron	DM-TX-201-C	CAT5 Audio & HD Video Transmitters (for content from Digital Devices) - DM	Yes	
20	Conferencing & Interpretation System		Delagate Units Included in Audio Conferencing Package Price on AV Closet 0267 Budget			Yes	
21	Other	6	Extron	HSA 400	Tilt-Up HSA - Hideaway Surface Access Enclosure	Yes	
22		6	Extron	Part # 70-616-02	One HDMI Female to Female Barrel	Yes	
23		6	Extron	Part # 70-161-11	Interface AAP	Yes	

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24		1	Van San	3260L-40	40" wide podium ADA Compliant with real wood veneer with clock and light	Yes	
25		1	Van San	1700LG-32	32" wide podium with real wood veneer with clock and light		

0270 AV Closet

Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Video	1	Denon	DBP-2012UDCI	Blu-Ray Player	Yes	
2		1			Cable Set top box	Yes	
3	Audio	2	Crestron	AMP-2210S	Power Amplifier	Yes	
4		1	ClearOne	Converge Pro 880	Audio Mixer and DSP	Yes	
5		1	ClearOne	Converge Pro VH20	VOIP Interface	Yes	
6	Control	1	XANTECH	Connection Block	IR Repeater	Yes	
7		1	Crestron	CEN-SWPOE-16	16 Port Network Switcher	Yes	
8		1	Crestron	PRO3	Control Processor - DM	Yes	
9	Connectivity	2	Crestron	HD-EXT3-C	CAT5 HD Video Transmitters & Receivers - DM		
10		3	Crestron	DM-RMC-150-S	Fibre Receiver with analog audio		
11	Conferencing & Interpretation System	1	Media Vision USA	MVUSA-CART32	Charging Cart		
12	Other	1	Middle Atlantic	WRK-44-32	Equipment Rack (including Side Panel)		

0272 Business Office

Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Video	2	Panasonic	TH-42LFE6U	LCD Monitor	Yes	
2		2	Chief	MWHUB	LCD Monitor Mount	Yes	
3		1	Crestron	DM-MD8x8	8x8 Video Matrix Switcher Frame	Yes	
4		2	Crestron	DMC-F	Video Matrix Switcher Card - Fibre Input	Yes	

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5		2	Crestron	DMC-C	Video Matrix Switcher Card - DM Input	Yes	
6		1	Crestron	DMCO-30	Video Matrix Switcher Card - 2xHDMI Output	Yes	
7	Audio	2	JBL	LSR4326P	Powered Speakers	Yes	
8	Control	1	Crestron	TPCS-4SMD	Touchpanel Processor	Yes	
9		1	Crestron	CEN-SW-POE-5	5-Port PoE Switch	Yes	
10	Connectivity	1	Black Box	LH2001A-SC-R3	Ethernet to Fibre Extender	Yes	
11	Other	1	Middle Atlantic	DTRK-1018	Half Size Rack for under desk	Yes	

0273 Telepresence Room

Line #	Category	Qty	Manufacturer	Model	Description	Supply/Install	Install Only
1	Telepresence System	1	Cisco	TX9000	Telepresence System with Three Screens	Yes	
2		1			Table Top Finish	Yes	
3		1			One Year Warranty with Software Upgrades (included in system price)	Yes	
4					Licenses and Network Connectivity (Provided by SSC)	Yes	
5	Connectivity	2	Crestron	DM-RMC-100-S	Fibre Receiver	Yes	

- .2 Equipment listed in section 2.4.1 is based performance and functionality specifications. Other equipment which is equivalent in performance and provides all the functionality described in this specification for the overall system are acceptable.
- .3 If any items required to make a fully functional system have not been listed in section 2.4.1, the AV Contractor is to identify all such items and include them along with any related installation costs in their bid using additional line numbers for each room as required.
- .4 Entire system is based on conversion of AV and control signals to a HD digital transport format over twisted pair cable or fibre and switching/routing is to be performed in this format.

2.5 FUNCTIONAL DESCRIPTION

1 General Room Description for Main Rooms

.1 0257 Main Conference Room

- .1 Dual Language Projection: Yes, 6 projectors and screens, 2 LCD screens
- .2 Simultaneous Interpretation: Yes
- .3 Digital AV (laptops, tablets, iPads, cellphones) Connections: Yes
- .4 Video Conferencing: Yes
- .5 Wireless IR Microphone Units for Conferencing: Yes
- .6 Audio Playback wall line array speakers and ceiling speakers: Yes
- .7 Media Connections: No
- .8 Podium Presentation: Yes

.2 0266 Media Room

- .1 Dual Language Projection: Yes, 2 projectors and screens
- .2 Simultaneous Interpretation: No, but able to add temporary SI Booth
- .3 Digital AV (laptops, tablets, iPads, cellphones) Connections: Yes
- .4 Video Conferencing: Yes (infrastructure only)
- .5 Wireless IR Microphone Units for Conferencing: Yes
- .6 Audio Playback wall line array speakers and ceiling speakers: Yes
- .7 Media Connections: Yes
- .8 Podium Presentation: Yes, or panel table

.3 0269 Meeting Room

- .1 Dual Language Projection: Yes, 2 projectors and screens
- .2 Simultaneous Interpretation: No
- .3 Digital AV (laptops, tablets, iPads, cellphones) Connections: Yes
- .4 Video Conferencing: Yes when partition is open (infrastructure only)
- .5 Wireless IR Microphone Units for Conferencing: Yes
- .6 Audio Playback wall line array speakers and ceiling speakers: Yes
- .7 Media Connections: No
- .8 Podium Presentation: Yes

.4 0273 Telepresence Room

- .1 Dual Language Projection: No
- .2 Simultaneous Interpretation: No
- .3 Digital AV (laptops, tablets, iPads, cellphones) Connections: Yes
- .4 Video Conferencing: Yes, Telepresence system
- .5 Wireless IR Microphone Units for Conferencing: No
- .6 Audio Playback wall line array speakers and ceiling speakers: No, system audio playback
- .7 Media Connections: No
- .8 Podium Presentation: No

2. Main Conference Room 0257

.1 Computer and Video Playback and Signal Routing

- .1 Within the conference room the video system is to be completely digital, except at digital AV (laptops, tablets, iPads, cellphones) connection points where the user will have the choice of HDMI (digital) or VGA (analog).
- .2 Digital AV connections will be located at the floor for routing to 6 podium locations and to various table locations depending on the specific arrangements of the room. There will be 12 table AV connections for this room.
- .3 The 12 transmitter boxes mounted under the table sections for the digital AV connections will be powered over Ethernet. Power for these boxes will be provided by a Ethernet power supply in the AV Closet connected the main AV Switcher.
- .4 There will be two types of moveable presenter podiums. Both podiums will have motorized adjustable height and finished in real wood veneer. Coordinate finish with the Owner. The first will be a simple AV podium with a microphone, digital AV connection (for laptops or other devices) a gooseneck light and digital clock. The second will be a high-end AV podium that is ADA compliant which will contain a microphone, digital AV connection, computer, annotation touchscreen, keyboard, mouse, and a gooseneck light and digital clock. Each podium will be able to be connected at one of six podium locations via floorboxes, however only one podium will be able to be used at one time at one of the six possible podium floor locations within the room. An Annotation Touchscreen in the high-end AV podium will allow the user to be able to annotate the current presentation on the projection screens and take screen shots or area captures of third-party content to include in the interactive whiteboard file. Save all of the work to a single file as a PPT, PDF or image file on a network, computer hard drive or USB drive.
- .5 Six video projectors and screens shall be supplied and installed in order to provide adequate audience coverage with one screen per language. Multiple screens are required due to the long length and low height of the room. The projectors are to be high definition format (Full HD) and shall operate at 16:9 aspect ratio or 1920x1080 native resolution. The projectors shall be installed on fixed ceiling mounts. HDMI signals routed to the projector shall be converted to network type CAT5/6 cable which reduces wiring complexity and conduit requirements. Video will be distributed with the use of CAT5/6 extenders at each input and output (projectors/displays). There are to be three projectors for English

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- language content and three projectors for French language content to provide dual language displays. There will be two main screens on the front wall and two pairs of auxiliary screens on the side walls. The two main screens on the front wall will be angled and motorized, such that they can be hidden in the ceiling when not in use. The four remaining auxiliary screens on the side walls will have fixed wall mounting. Screen sizes are determined by optimizing legibility while considering height limitations.
- .6 Four sidewall 80" LCD flatscreens shall be supplied and installed each on fixed ceiling mounts with an extended shaft in front of the columns. The first two are to be on the columns closest to the front of the room and angled towards the head of the table to permit the persons at the front end of the room to view presentations without having to turn around. The second two are to be on the columns closest to the back of the room and angled towards the additional seating. The LCD flatscreens are to be full high-definition format (Full HD 1080p) and shall operate at a 16:9 aspect ratio, or 1920x1080 native resolution.
 - .7 A Blu-ray player will be installed in an AV rack located in the attached technician's booth for the presentation of any media content on a CD, DVD, or Blu-ray disc.
 - .8 Cable TV will be brought into the room and be able to be viewed on any of the projection screens and flatscreens. The system will use the standard cable TV remote via an IR extender. Control through the use of the remote will occur when pointed at the IR extender located between the two front screens on the front wall. Control will also occur through use of the touchpanel.
 - .9 One 32x32 video and audio matrix switcher with independent audio breakaway shall be supplied and installed in the racks in the technician's booth. Any video input will be able to be routed to any video output in the room. This is the central element which allows the display of any input such as a laptop to any output such as a projector or LCD flatscreen. A description of the signal routing outside of the main conference room will be described in section 2.8.

.2 Audio

- .1 Audio from the digital AV (laptops, tablets, iPads, cellphones) connections at the conference table and podiums will be converted to CAT5/6 and will be sent to the AV racks in the technician's booth.
- .2 All audio shall be reproduced via two sets of stacked stereo line array loudspeakers hung on wall mounts at the front of the room and via ceiling speakers. The line arrays will provide the best sound coverage of the entire room by carefully controlling the coverage pattern over the entire audience area. These front

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mounted speakers will be used for reproducing any content/presentation sounds associated with the presentation on the projection screens. The ceiling loudspeakers will be used for amplifying speech and providing local sound reinforcement in the room, whether for an audio or video conferencing system. The volume levels of the speakers will be able to be adjusted via a touchpanel.

- .3 There will be an assistive Listening system supplied to those who require it in this space. This consists of an induction loop system which will be installed underneath the raised floor. Both program and voice audio will be heard through this assistive listening system. The system will provide very sharp cut off at the boundary of the room and shall be designed in collaboration with the manufacturer including 3D coverage mapping.
- .4 The ceiling loudspeaker system shall be organized into multiple zones. The multiple zones will allow speakers above active microphones to be turned on or off to reduce feedback from the system through selection of zones determined through selection of meeting mode on the touchpanel. Ceiling speakers shall be wired via a 70V distribution system.
- .5 There will be a digital audio signal processor (DSP) which will be programmed to provide all the audio routing and mixing as well as quality adjustments such as equalization. The processor will provide an acoustic echo cancelling (AEC) function for the microphone signal received from the conference system when connected to an external site which will improve the quality of all conferencing connections. The audio signals will come from either the audio video matrix switcher or the other sources directly. The processor will be located in the racks in the technician's booth. The processor will be capable of reducing feedback within the room due to speakers being turned on above microphones. The eight wireless RF microphones will be routed to DSP input extender connected to the main audio DSP.
- .6 The amplifiers for the loudspeakers are to be located in the technician's booth.

.3 Control System

- .1 Three touchpanels shall be supplied. The first is to be located in the technician's booth, the second is to be located on the wall of the conference room with a locked cover to limit access and the last one is to be located on the tables to connect to one of the 12 table connections or one of the 6 podium connections.
- .2 The system shall be powered in such a way that a system reset from a touchpanel shall reset all devices for correct operation.
- .3 The control touchpanel will control the majority of the A/V devices being supplied in the Conference room, and is capable of remote

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- control via an RS232, LAN, infrared, contact closure or other remote means.
- .4 The system is to be programmed in such a way that non-technical users shall make the Conference room function by interacting with a touchpanel without the presence of any technical personnel. This will include the selection of overall room modes depending on the room configuration. Control can also be accomplished from a control panel in the business office. Another method of control is through a remote desktop. This function is not currently part of the system but can be added at a later date.
 - .5 It will be possible to choose any audio source independent of any video source using the touchpanel via audio breakaway or audio follow video (default). The touchpanel will identify the active audio and video sources.
 - .6 The touchpanels will be programmed to select: any video to send to any display device; remote functions for displays; and control over the video cameras' zoom/pan/tilt functions & on/off. The touchpanels shall include up/down buttons for volume control for the audio system in the room along with mute buttons and a button labeled DIM for -20dB. Separate volume control shall be supplied for the overall microphone gain. Provide a master volume control and mute buttons that shall appear on all main control pages.
 - .7 The touchpanel display shall be "ICIA Dashboard for Control" compliant. The layout and functions on the touchpanels shall be developed in conjunction with the Owner. The AV Contractor shall provide screen shots and brief explanations of the programming at the project completion stage for feedback from the AV Consultant and the client.
 - .8 Two 16 port PoE Ethernet switches shall be installed in the racks in the technician's booth. All AV equipment controlled over LAN and touchpanels shall connect to these switches. The switches shall also connect to the control processor for control. Coordinate all network connections with the Owner. All touchpanel connections located at the table (12 connections) or at a podium (6 connections) will be connected to these switches and powered by the switches.
 - .9 All control signals will be routed to and from a central control processor. This control processor will be able to connect to the control processors of all other rooms for linking of rooms.
 - .10 The Business Office control system will be able to connect and control the AV system in the Main Conference Room via touchpanel in the Business Office connected to the Ethernet switches.

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.4 Audio Conferencing/Interpretation System

- .1 A digital wireless infrared (IR) conferencing/interpretation system shall be used to accommodate multiple furniture configurations. This system audio over IR must not be picked up outside the room. The system will be capable of routing and controlling multi-language audio between main conferencing/interpretation units located in different rooms.
- .2 Floor and Interpreted audio from 0255 will be routed to 0266 and 0269 over fibre for listeners in these rooms to hear the Floor and Interpreted audio from 0255 by connecting headphones to the conferencing units or wireless IR headphones through channel selection of Floor, English and French options. Interpreted audio from 0266 will be routed to 0257 for listeners in 0257 to hear the Floor and Interpreted audio from 0266 by connecting headphones to the conferencing units or wireless IR headphones through channel selection of Floor, English and French options. Listeners in 0257 will be able to hear Floor and Interpreted audio either from 0255 or 0266 but not both at the same time. The choice of which room's Floor and Interpreted audio is to be programmed so that it can be selected by a touchpanel.
- .3 There are to be 39 battery powered wireless delegate microphone units, and 1 chairman unit. The units will connect via IR to the main conferencing unit via ceiling mounted infrared transceivers. Each unit will have a built in loudspeaker and a pluggable microphone with a dual channel selector for interpretation language selection when the headphones are plugged into the unit. The delegate units can be placed on any table or podium and may be used in any room with the same IR audio conferencing system.
- .4 The digital IR wireless conference system main unit routes the microphone signals to the loudspeakers in the delegate units and to and from the interpreter consoles.
- .5 Lithium ion battery charging carts are included to charge the delegate unit batteries which can operate for 14 hours continuously.
- .6 The interpreted audio will be routed to the table IR microphone units to 100 wireless IR headphones for people not at the table in the room to hear.
- .7 Additional encrypted wireless microphones will be supplied to use within this room only, including lapel and handheld microphones. The additional microphones consist of 4 encrypted wireless handheld microphones that can also be put on supplied mic stands and 4 lapel encrypted wireless microphones. Receivers for all 8 microphones shall share two antennas mounted in the Main Conference Room. When the room is in secure mode, these microphones receivers will be powered down.

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- .8 Audio from RF microphones and any other audio from the matrix switcher will be routed into the conferencing/interpretation main unit via the audio DSP. This will allow any audio source such as sources from laptops, videoconference, etc to be interpreted.

.5 Video Conferencing

- .1 An HD video conferencing Codec will be installed in the racks in the technician's booth for videoconferencing. Videoconferencing will typically require a technician but must also be capable of being connected by the users within the room.
- .2 Five PTZ HD 1080p cameras will be installed in the room for a selection of five inputs to send to the far end of the videoconferencing system. These cameras will be used for video conferencing. All cameras will be ceiling mounted. All 5 cameras will be routed to an HD video processor which holds the last image until switching has occurred, directly connected to the videoconferencing codec for seamless switching. The camera signals are also routed directly to the matrix switcher via a DA.
- .3 Program video and audio, such as from a laptop in the room shall be connected to the codec via the matrix switcher to send to the far end. The technician/user will decide what video and audio signals are delivered to the far end.
- .4 High definition content sharing can be provided for sharing graphics, presentations and other video content with HD and non-HD remote systems.

.6 VOIP System

- .1 A VOIP interface is to be supplied to connect with the building VOIP system to provide floor audio for VOIP calls. Coordinate with Owner.

.7 Knifing System

- .1 The AV knifing system will disconnect the AV system completely through software controlled power switching connected to a key lock switch matching Client's security requirements within the main conference room.
- .2 Video and Audio signals linking the rooms will be sent over fibre cables for security purposes. All connections linking the rooms will be connected to the knifing system to disable these connections when required.
- .3 Knifing will include disconnecting any signals or powering down related interfaces entering/leaving the Main Conference Room, the RF wireless devices and the assistive listening system.

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- .4 A bilingual secure indicator light will be supplied for users in the room to know when the room is in secure (SDA) mode. The touchpanel should also have a permanent indication of secure mode.

.8 Linking Rooms

- .1 Video and Audio content from the Main Conference Room will be able to be displayed and heard in the Media Room and Meeting Room for those rooms to act as overflow rooms. The Main Conference Room will also be able to display content and listen to audio from the Media Room and Meeting Room so that it can act as an overflow room as well.
- .2 Video and Audio content from the Main Conference Room will also be routed to the Business Office for monitoring and support and to Telepresence room for viewing and hearing Main Conference Room content.
- .3 Linking will be achieved through connecting the matrix switcher of the Main Conference Room to the matrix switcher of the Media and Meeting Room. Four signals over fibre from the Main Conference Room will be sent to the Media and Meeting Room switcher and four signals over fibre from the Media and Meeting Room switcher will be sent back to the Main Conference Room. Two signals per room are sent to display French and English content as observed in the original room.

3. Media Room

.1 Room Layout

- .1 The media room will have multiple layouts. The primary function of the room will be as a meeting room with seating for 20 people when the Skyfold moveable partition is closed. Another possibility is when the Skyfold is open to have one large meeting room with the media and meeting room combined. When the room is to be used as a media room, there will be alternate layouts. One will consist of a panel of multiple persons at the front of the room and an audience area in the centre of the room with a platform at the rear of the room (against Skyfold) for the media cameras with the Skyfold closed. This layout can be expanded to include the adjacent meeting room when the Skyfold is up. Other layouts will include the use of the podium and/or tabletop connections.

.2 Computer and Video Playback and Signal Routing

- .1 Within the media room the video system is to be completely digital except at digital AV (laptops, tablets, iPads, cellphones) connection points where the user will have the choice of HDMI (digital) or VGA (analog).

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- .2 Digital AV connections will be located at the floor for routing to various table locations depending on the specific arrangements of the room. There will be 4 table AV connections for this room.
- .3 The 4 transmitter boxes mounted under the table sections for the digital AV connections will be powered over Ethernet. Power for these boxes will be provided by a Ethernet power supply in the AV Closet connected the main AV Switcher.
- .4 A digital AV connection for a moveable presenter podium will be on the front wall closest to the windows.
- .5 There will be two types of moveable presenter podiums. Both podiums will have motorized adjustable height and finished in real wood veneer. Coordinate finish with the Owner. The first will be a simple AV podium with a microphone, digital AV connection (for laptops or other devices) a gooseneck light and digital clock. The second will be a high-end AV podium that is ADA compliant which will contain a microphone, digital AV connection, computer, annotation touchscreen, keyboard, mouse, and a gooseneck light and digital clock. Each podium will be able to be connected at one of six podium locations via floorboxes, however only one podium will be able to be used at one time at one of the six possible podium floor locations within the room. An Annotation Touchscreen in the high-end AV podium will allow the user to be able to annotate the current presentation on the projection screens and take screen shots or area captures of third-party content to include in the interactive whiteboard file. Save all of the work to a single file as a PPT, PDF or image file on a network, computer hard drive or USB drive.
- .6 Two video projectors and motorized screens shall be supplied and installed in order to provide adequate audience coverage with one screen per language. The projectors are to be high definition format (Full HD) and shall operate at 16:9 aspect ratio or 1920x1080 native resolution. The projectors shall be installed on fixed ceiling mounts. HDMI signals routed to the projector shall be converted to network type CAT5/6 cable which reduces wiring complexity and conduit requirements. Video will be distributed with the use of CAT5/6 extenders at each input and output (projectors/displays). There is to be one projector for English language content and one projector for French language content to provide dual language displays located at the front of the room.
- .7 A Blu-ray player will be installed in an AV rack located in 0267 AV Closet booth for the presentation of any media content on a CD, DVD, or Blu-ray disc.
- .8 Cable TV will be brought into the room and be able to be viewed on any of the projection screens and flatscreens. The system will use the standard cable TV remote via an IR extender. Control through the use of the remote will occur when pointed at the IR

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- extender located between the two front screens on the front wall. Control will also occur through use of the touchpanel.
- .9 The infrastructure for two HD cameras will be installed, but no cameras will be supplied or installed at this point. This allows for future video conferencing cameras to be added at a later date.
 - .10 One 32x32 video and audio matrix switcher with independent audio breakaway shall be supplied and installed in the rack in AV Closet 0267 and shared with the Meeting Room. Any video input will be able to be routed to any video output in both of these rooms. This is the central element which allows the display of any input such as a laptop or camera to any output such as a projector or the recording system. The matrix is to function as two independent matrices when the Skyfold is closed, and as one single matrix when the Skyfold is open.

.3 Audio Playback

- .1 Audio from the digital AV (laptops, tablets, iPads, cellphones) connections at table and podium, and Blu-ray player will be converted to CAT5 and will be sent to the AV rack in the AV Closet 0267.
- .2 All audio shall be reproduced via two sets of stacked stereo line array loudspeakers hung on wall mounts at the front of the room and via ceiling speakers. The line arrays will provide the best sound coverage of the entire room by carefully controlling the coverage pattern over the entire audience area. These front mounted speakers will be used for reproducing any content/presentation sounds associated with the presentation on the projection screens. The ceiling loudspeakers will be used for amplifying speech and providing local sound reinforcement in the room, whether for an audio or video conferencing system. The volume levels of the speakers will be able to be adjusted via a touchpanel.
- .3 There will be an assistive Listening system covering the entire floor area of the Media and Meeting rooms combined which is supplied to those who require it in this space when the skyfold is up. This consists of an induction loop system which will be installed underneath the raised floor. Both program and voice audio will be heard through this assistive listening system. The system will provide very sharp cut off at the boundary of the room and shall be designed in collaboration with the manufacturer including 3D coverage mapping.
- .4 The ceiling loudspeaker system shall be organized into multiple zones. The multiple zones will allow speakers above active microphones to be turned on or off to reduce feedback from the system through selection of zones determined through selection of

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- meeting mode on the touchpanel. Ceiling speakers shall be wired via a 70V distribution system.
- .5 There will be two digital audio signal processors (DSP) which are linked which will be programmed to provide all the audio routing and mixing as well as quality adjustments such as equalization for both the media and meeting room. The DSP will provide an acoustic echo cancelling (AEC) function for the microphone signal received from the conference system when connected to an external site which will improve the quality of all conferencing connections. One DSP will be located in the rack in 0267 AV Closet and the other in the rack of 0270 AV Closet. They function as one processor with the Skyfold is up, and as two processors when the Skyfold is down.
 - .6 The amplifiers for the loudspeakers are to be located in the 0267 AV Closet.
 - .7 No permanent interpretation booth is to be provided as part of the AV system. The audio conferencing/interpretation main unit is to be identical to that in the Main Conference Room so that it can be used for interpretation and overflow.
- .4 Control System**
- .1 Two touchpanels shall be supplied to operate the AV system. The first touchpanel will be located on the wall at the front of the media room, with a locked cover to limit access. The second touchpanel will be located on the tables and will be able to connect to one of the 4 table touchpanel connections and a podium touchpanel connection. Touchpanels for 0269 Meeting Room will be able to be used to control the AV system for the combined 0266 & 0269 room when the Skyfold is up.
 - .2 The system shall be powered in such a way that a system reset from a touchpanel shall reset all devices for correct operation.
 - .3 The control touchpanels will control every A/V device being supplied in the media room and will be capable of remote control via an RS232, LAN, infrared, contact closure or other remote means.
 - .4 The systems are to be programmed in such a way that non-technical users shall make the media room function by interacting with the touchpanel without the presence of any technical personnel. This will include the selection of overall room modes depending on the room configuration.
 - .5 There will be one control processor for the media room, which will be linked to the control processor in the meeting room to allow the rooms to operate either as separate rooms or one combined room. Control can also be accomplished from a control panel in the business office connected to the control processor via CAT5. Another method of control is through a remote desktop. This

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- function is not currently part of the system but can be added at a later date.
- .6 It will be possible to choose any audio source independent of any video source using the touchpanel via audio breakaway or audio follow video (default). The touchpanel will identify the active audio and video sources.
 - .7 The touchpanel will be programmed to select: any video to send to any display device; remote functions for displays; and control over the video cameras' zoom/pan/tilt functions & on/off. The touchpanel shall include up/down buttons for volume control for the audio system in the room along with mute buttons and a button labeled DIM for -20dB. Separate volume control shall be provided for the overall microphone gain. Provide a master volume control and mute buttons that shall appear on all main control pages.
 - .8 The touchpanel display shall be "ICIA Dashboard for Control" compliant. The layout and functions on the touchpanel shall be developed in conjunction with the Owner. The AV Contractor shall provide screen shots and brief explanations of the programming at the project completion stage for feedback from the AV Consultant and the client.
 - .9 A 16 port PoE Ethernet switch shall be installed in the rack in the AV Closet. All AV equipment controlled over LAN and touchpanels shall connect to this switch. The switch shall also connect to the control processor for control signals. Coordinate all network connections with the Owner. All touchpanel connections located at the table (4 connections) or at a podium (1 connection) will be connected to the switch and powered by the switch.
 - .10 All control signals will be routed to and from a central control processor. This control processor will be able to connect to the control processors of all other rooms for linking of rooms.
 - .11 The Business Office control system will be able to connect and control the AV system in the Media and Meeting room with the Skyfold up or down via touchpanel in the Business Office connected to the Ethernet switch.

.5 Audio Conferencing System

- .1 A digital wireless infrared (IR) conferencing system shall be used to accommodate multiple furniture configurations. The system will be capable of routing and controlling multi-language audio between main conferencing units located in different rooms.
- .2 Floor and Interpreted audio from 0266 will be routed to 0257 over fibre for listeners in 0257 to hear the Floor and Interpreted audio from 0266 by connecting headphones to the conferencing units or wireless IR headphones through channel selection of Floor, English and French options. Floor and Interpreted audio from

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- 0255 will be routed to 0266 for listeners in 0266 to hear the Floor and Interpreted audio from 0255 by connecting headphones to the conferencing units or wireless IR headphones through channel selection of Floor, English and French options. Listeners in 0266 will be able to hear Floor and Interpreted audio either from 0255 or 0266 but not both at the same time. The choice of which room's Floor and Interpreted audio is to programmed so that it can be selected by a touchpanel.
- .3 There are to be 19 battery powered wireless delegate microphone units and 1 chairman unit, for a total of 20 wireless IR microphones. The units will connect wirelessly via four infrared transceivers to a room conferencing switching/linking unit, which will connect to two main units, one located in AV Closet 0267 and the other in AV Closet 0270. IR transceivers in the meeting room will also connect to the room switcher so that all 8 IR transceivers and all units within the media room and meeting room can be used together when the Skyfold is up. When the Skyfold is down, two separate audio conferencing sessions are to be able to occur simultaneously with their own IR transceivers and units.
 - .4 Each unit will have a built in loudspeaker and a pluggable microphone with a dual channel selector for interpretation language selection when the headphones are plugged into the unit. The delegate units can be placed on any table or podium and may be used in any room with the same type of IR audio conferencing system.
 - .5 The digital IR wireless conference system main unit routes the microphone signals to the loudspeakers in the delegate units.
 - .6 Lithium ion battery charging carts are included to charge the delegate unit batteries which can operate for 14 hours continuously.
 - .7 Additional encrypted wireless microphones will be supplied to use within this room and the Meeting room, including lapel and handheld microphones. The additional microphones consist of 4 encrypted wireless handheld microphones that can also be put on supplied mic stands and 2 lapel encrypted wireless microphones. 2 Handheld and 1 lapel microphone will be dedicated to each room (Media and Meeting room) when the Skyfold is down and should be labeled accordingly. When the Skyfold is up all 6 wireless RF microphones will be useable. Receivers for all 6 microphones shall share two pairs of antennas mounted in the Media and Meeting Room via antenna combiners into the receivers.

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- .8 Audio from RF microphones and any other audio from the matrix switcher will be routed into the conferencing/interpretation main unit via the audio DSP. This will allow any audio source such as sources from laptops, etc to be interpreted. This is the same for both Media and Meeting Room.

.6 Video and Tele Conferencing

- .1 This room will be designed to have the capability for HD videoconferencing in the future. The infrastructure will be in place but no HD codec or HD cameras will be installed.
- .2 There is to be a VOIP teleconferencing phone unit sitting on the table and connected directly to the building's phone system. The VOIP teleconferencing phone is to be supplied by the owner. A VOIP connection from the audio DSP will be connected to the owner-supplied VOIP teleconferencing phone.

.7 Media Audio & Video Connections

- .1 There will be two media panels to provide media connections directly from the AV rack in 0267 AV Closet and to the media's trucks outside the building.
- .2 One media panel will be supplied for 6 sets of media connections between the media room and the media's trucks outside the building. This electrical box will have a pre-installed conduit and pull boxes. All cables, connectors and panels to be supplied and installed by the AV Contractor. The conduit is between the media room and the outside of the building near the media trucks location. The following signals are provided for each of the 6 media connections: Two audio tie-lines, two intercom lines, one HD-SDI video over coax, one fibre connection and one Cat6 tie-line. Provide cable suitable for broadcast quality audio and HD 1080p video to match 85 m distance between the panels.
- .3 The second media panel will be installed to provide 24 floor audio connections from the audio DSP all via individual DAs in 0267 AV Closet to the media to connect to their recording devices.

.8 Media Lighting & Videoconference Lighting

- .1 There will be no permanent, special stage lighting installed.

.9 Linking Rooms

- .1 See section describing Linking Rooms in Main Conference Room for functionality.
- .2 An operable Skyfold will be installed between the media and meeting room. When the Skyfold is down the rooms will be able to operate independently and simultaneously. When the Skyfold is up, the video and audio will be combined so that it will operate as

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- one room. The media room projection screens will be considered the primary screens for when the rooms are combined.
- .3 The Skyfold will send two control signals (one for up, one for down) to the control processor in AV closet 0267 to detect whether the screen is fully up or down, which will change the room operating mode in the AV control system.

4. Meeting Room

.1 Room Layout

- .1 The meeting room shall have one square table layout for 20 people. The room is separated from the Media Room by the skyfold and when it is open the Meeting room will become part of the Media room. Further detail on this is described in the Media Room description section 2.5.3.1.

.2 Computer and Video Playback and Signal Routing

- .1 Within the meeting room the video system is to be completely digital except at digital AV (laptops, tablets, iPads, cellphones) connection points where the user will have the choice of HDMI (digital) or VGA (analog). These digital AV connections are for a person to connect a device (such as a laptop) to the AV system to have the content of that device shown on the projection screens for presentations. There will be a total of 4 table AV Connections for this room.
- .2 A digital AV connection for a moveable presenter podium will be on the front wall closest to the windows.
- .3 The 4 transmitter boxes mounted under the table sections for the digital AV connections will be powered over Ethernet. Power for these boxes will be provided by a Ethernet power supply in the AV Closet connected the main AV Switcher.
- .4 There will be two types of moveable presenter podiums. Both podiums will have motorized adjustable height and finished in real wood veneer. Coordinate finish with the Owner. The first will be a simple AV podium with a microphone, digital AV connection (for laptops or other devices) a gooseneck light and digital clock. The second will be a high-end AV podium that is ADA compliant which will contain a microphone, digital AV connection, computer, annotation touchscreen, keyboard, mouse, and a gooseneck light and digital clock. Each podium will be able to be connected at one of six podium locations via floorboxes, however only one podium will be able to be used at one time at one of the six possible podium floor locations within the room. An Annotation Touchscreen in the high-end AV podium will allow the user to be able to annotate the current presentation on the projection screens and take screen shots or area captures of third-party

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- content to include in the interactive whiteboard file. Save all of the work to a single file as a PPT, PDF or image file on a network, computer hard drive or USB drive.
- .5 Two video projectors and motorized screens shall be supplied and installed in order to provide adequate audience coverage, with one screen per language. The projectors are to be high definition format (Full HD 1080p) and shall operate at 16:9 aspect ratio or 1920x1080 native resolution. The projectors shall be installed on fixed ceiling mounts. HDMI signals routed to the projector shall be converted to network type CAT5/6 cable which reduces wiring complexity and conduit requirements. Video will be distributed with the use of CAT5/6 extenders at each input and output (projectors/displays). There is to be one projector for English language content and one projector for French language content to provide dual language displays located at the front of the room.
 - .6 A Blu-ray player will be installed in an AV rack located in 0270 AV Closet for the presentation of any media content on a CD, DVD, or Blu-ray disc.
 - .7 Cable TV will be brought into the room and be able to be viewed on any of the projection screens and flatscreens. The system will use the standard cable TV remote via an IR extender. Control through the use of the remote will occur when pointed at the IR extender located between the two front screens on the front wall. Control will also occur through use of the touchpanel.
 - .8 One 32x32 video and audio matrix switcher to be shared between the Media Room and Meeting Room is described in section 2.5.3.2.9. This is the central element which allows the display of any input such as a laptop or camera to any output such as a projector.
- .3 Audio Playback**
- .1 Audio from the digital AV (laptops, tablets, iPads, cellphones) connections and Blu-ray player will be converted to CAT5 and will be sent to the AV rack in the AV Closet 0270.
 - .2 All audio shall be reproduced via two stereo line array loudspeakers hung on wall mounts at the front of the room and via ceiling speakers. The line arrays will provide the best sound coverage of the entire room by carefully controlling the coverage pattern over the entire audience area. These front mounted speakers will be used for reproducing any content/presentation sounds associated with the presentation on the projection screens. The ceiling loudspeakers will be used for amplifying speech and providing local sound reinforcement in the room. The ceiling speakers will connect with the media room ceiling speakers, to be used together when the skyfold partition is up.

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- The volume levels of the speakers will be able to be adjusted via a touchpanel.
- .3 There will be an assistive Listening system covering the entire floor area of the Media and Meeting rooms combined which is supplied to those who require it in this space only when the Skyfold is up. This consists of an induction loop system which will be installed underneath the floor. Both program and voice audio will be heard through this assistive listening system.
 - .4 The ceiling loudspeaker system shall be organized into multiple zones. The multiple zones will allow speakers above active microphones to be turned on or off to reduce feedback from the system through selection of zones determined through selection of meeting mode on the touchpanel. Ceiling speakers shall be wired via a 70V distribution system.
 - .5 There will be two digital audio signal processors (DSP) which are linked which will be programmed to provide all the audio routing and mixing as well as quality adjustments such as equalization for both the media and meeting room. The DSP will provide an acoustic echo cancelling (AEC) function for the microphone signal received from the conference system when connected to an external site which will improve the quality of all conferencing connections. One DSP will be located in the rack in 0267 AV Closet and the other in the rack of 0270 AV Closet. They function as one processor with the Skyfold is up, and as two processors when the Skyfold is down.
 - .6 The amplifiers for the loudspeakers are to be located in the AV Closet 0270.

.4 Control System

- .1 Two touchpanels shall be supplied to operate the AV system. The first touchpanel will be located on the wall at the front of the media room, with a locked cover to limit access. The second touchpanel will be located on the tables and will be able to connect to one of the 4 table touchpanel connections and a podium touchpanel connection. Touchpanels for 0266 Media Room will be able to be used to control the AV system for the combined 0266 & 0269 room when the Skyfold is up.
- .2 The system shall be powered in such a way that a system reset from a touchpanel shall reset all devices for correct operation.
- .3 The control touchpanel will control every A/V device being supplied in the meeting room, capable of remote control via an RS232, LAN, infrared, contact closure or other remote means.
- .4 The systems are to be programmed in such a way that non-technical users shall make the meeting room function by interacting with the touchpanel without the presence of any technical personnel.

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- .5 There will be a control processor for the meeting room in AV Closet 0270 that will be linked to the control processor in AV Closet 0267 to allow the rooms to operate either as separate rooms or one combined room. Control can also be accomplished from a control panel in the business office. Another method of control is through a remote desktop. This function is not currently part of the system but can be added at a later date.
- .6 It will be possible to choose any audio source independent of any video source using the touchpanel via audio breakaway or audio follow video (default). The touchpanel will identify the active audio and video sources.
- .7 The touchpanel will be programmed to select: any video to send to any display device; remote functions for displays; and control over the video cameras' zoom/pan/tilt functions & on/off. The touchpanel shall include up/down buttons for volume control for the audio system in the room along with mute buttons and a button labeled DIM for -20dB. Separate volume control shall be supplied for the overall microphone gain. Provide a master volume control and mute buttons that shall appear on all main control pages.
- .8 The touchpanel display shall be "ICIA Dashboard for Control" compliant. The layout and functions on the touchpanel shall be developed in conjunction with the Owner. The AV Contractor shall provide screen shots and brief explanations of the programming at the project completion stage for feedback from the AV Consultant and the client.
- .9 A 16 port PoE Ethernet switch shall be installed in the rack in the AV Closet. All AV equipment controlled over LAN and touchpanels shall connect to this switch. The switch shall also connect to the control processor for control signals. Coordinate all network connections with the Owner. All touchpanel connections located at the table (4 connections) or at a podium (1 connection) will be connected to the switch and powered by the switch.
- .10 All control signals will be routed to and from a central control processor. This control processor will be able to connect to the control processors of all other rooms for linking of rooms.
- .11 The Business Office control system will be able to connect and control the AV system in the Media and Meeting room with the Skyfold up or down via touchpanel in the Business Office connected to the Ethernet switch.

.5 Audio Conferencing System

- .1 A digital wireless infrared (IR) conferencing system identical to the one in the Main Conference Room shall be used to accommodate multiple furniture configurations. The system will be capable of

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- routing and controlling multi-language audio between main conferencing units located in different rooms.
- .2 Floor and Interpreted audio from 0255 will be routed to 0269 over fibre for listeners in 0239 to hear the Floor and interpreted audio from 0255 by connecting headphones to the conferencing units or wireless IR headphones through channel selection of Floor, English and French options. Since there is no interpretation in 0266, when the Skyfold is down, this is the only Floor and Interpreted audio coming into 0266 conferencing units and wireless IR headphones. When the Skyfold is up, the user will have to select from the touchpanel if the Floor and Interpreted audio heard is from 0266 or 0257.
 - .3 There are to be 19 battery powered wireless delegate microphone units and 1 chairman unit, for a total of 20 wireless IR microphones. The units will connect wirelessly via four infrared transceivers to a room conferencing switching/linking unit, which will connect to two main units, one located in AV Closet 0267 and the other in AV Closet 0270. Further explanation on the use of these units when the Skyfold partition is up is given in section 2.5.3.5.2.
 - .4 Each unit will have a built in loudspeaker and a pluggable microphone with a dual channel selector for interpretation language selection when the headphones are plugged into the unit. The delegate units can be placed on any table or podium and may be used in any room with the same type of IR audio conferencing system.
 - .5 The digital IR wireless conference system main unit routes the microphone signals to the loudspeakers in the delegate units.
 - .6 Lithium ion battery charging carts are included to charge the delegate unit batteries which can operate for 14 hours continuously.
 - .7 Additional encrypted wireless microphones, listed and described in the media room section 2.5.3.5.7, will be supplied to use within the meeting room, such as when a lapel microphone is required, or a microphone on a mic stand.
 - .8 Audio from RF microphones and any other audio from the matrix switcher will be routed into the conferencing/interpretation main unit via the audio DSP. This will allow any audio source such as sources from laptops, etc to be interpreted. This is the same for both Media and Meeting Room.

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.6 Video and Tele Conferencing

- .1 There will be no video conferencing system in this room.
- .2 There is to be a VOIP teleconferencing phone unit sitting on the table and connected directly to the building's phone system. The VOIP teleconferencing phone is to be supplied by the owner. A VOIP connection from the audio DSP will be connected to the owner-supplied VOIP teleconferencing phone.

.7 Linking Rooms

- .1 Refer to Linking Rooms section for Media Room.
- .2 Signals for Meeting Room are routed via conduits through AV Closet 0270 to AV Closet 0267 to allow common matrix switcher.

5. Telepresence Room

.1 Telepresence Video Conferencing System

- .1 A complete fully integrated telepresence system including 4 codecs, microphones, speakers, 4 LCD displays (3 65" main, 1 content), 3 HD video cameras, touch control user interface, and table will be supplied in this room. System shall be capable of seating up to 6 people on supplied integrated furniture, not including chairs with integrated lighting.
- .2 System shall include a H.264 codec to enable HD video conferencing. The system is to have 1080p 30 fps resolution.
- .3 Far end camera video shall be displayed on the LCD displays, and presentation content displayed on tabletop content monitors.
- .4 The control user interface will control all videoconferencing functions such as making a call, ending a call, adjusting audio levels, and content sharing controls.
- .5 One analog and digital computer/device connection shall be supplied to share content from the digital AV (laptops, tablets, iPads, cellphones) to the far end. When there is no call in progress, the content shall also be displayed on the LCD screens.
- .6 Five LAN connections will be required from the owner to connect the entire system to the LAN.
- .7 Multipoint/Multisite capability is to be included with the video codec in order to allow connection to four sites.

.2 Linking Rooms

- .1 Two signals over fibre from the Main Conference Room can be viewed on the Telepresence system.

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6. Business Office

.1 Video Monitoring System

- .1 There will be two flatscreens to view any two video inputs from the Main Conference Room, Media Room or Meeting Room without interrupting any ongoing functions within the rooms themselves. This is for monitoring and support.

.2 Audio Monitoring System

- .1 There will be two speakers located on the desk for reproducing any audio inputs from the Main Conference Room, Media Room or Meeting Room without interrupting any ongoing functions within the rooms themselves. All audio from the IR wireless audio conferencing/interpretation units is considered as one signal per room. This is for monitoring and support.
- .2 The volume levels of the speakers will be able to be adjusted via a touchpanel.

.3 Control System

- .1 One table-mounted touchpanel will be supplied to choose any video and audio signals from the Main Conference Room, Media Room or Meeting Room to be sent to the flatscreens and speakers in the business office for monitoring.
- .2 This touchpanel will have a built-in control processor to be able to perform switching of the audio and video inputs within the Main Conference Room, Media Room or Meeting Room to assist the users within these rooms if required.
- .3 In order to perform the functions listed in sections 2.5.4.3.1 and 2.5.4.3.2, the touch panel with the built-in control processor will connect to the control processor in the main conference room through a fibre connection using fibre to ethernet extenders and to the control processor for the media room and meeting room over CAT5.
- .4 An Ethernet switch is to be supplied and installed to link all the control processors together.

7. Interpretation & Technicians Booths

.1 Computer and Video Playback

- .1 Interpreters are required to have line of sight to the delegates and projection screens. Since the interpreters are a long distance away from the front of the room, there will be two additional displays within the interpreter's booths to reproduce the content show on the projection screens. One screen will be for French content and one screen will be for English content. These displays are to be high definition format (Full HD 1080p) and shall operate at 16:9 aspect ratio or 1920x1080 native resolution. The displays

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shall be installed so that they do not interfere with direct line of sight.

- .2 Within the technician's booth there shall be a computer with a native output resolution of 1920x1080 to display content from this computer on the projection screens or LCD displays in the main conference room.
- .3 The Blu-ray player for the main conference room shall be located in the racks located in the technician's booth and shall have a direct connection the video matrix switcher.
- .4 There will be two video displays in the technician booth to verify signals from the matrix switcher as shown on the projection screens or LCD displays in the main conference room.

.2 Interpretation System Audio

- .1 There shall be 4 digital interpreter microphone units for the interpreters to speak into. The interpreter shall be able to select what output channel their audio is sent to. It should be clear to the interpreter and receiver of the audio what language channel they are on. Each unit will have a built in loudspeaker and a pluggable microphone and a headphone connection. It will have automatic feedback prevention when listening to their own interpretation.
- .2 The audio from the interpreter can be sent to the conferencing system, and thus connected to the delegate units or to the wireless receiver packs via infrared. The wireless receiver packs will be for listening purposes only for people within the room who do not have access to a delegate unit. The receiver shall include a separate headphone to connect to the receiver to listen to the audio. The user of the receiver shall be able to easily select which language they want to listen to.

.3 Technician Booth Audio

- .1 Audio from the technician's computer shall be sent to the audio DSP mixer to send to speakers within the main conference room if the input is selected.
- .2 There will be speakers for the technician to hear any audio signal in the entire conference floor in the technicians booth.
- .3 There will be a microphone in the technician's booth for the technician to communicate with the conference floor.

.4 Audio/Video Routing

- .1 Audio/Video routing discussed in section 2.5.2.

.5 Control System

- .1 Control Systems discussed in section 2.5.2.

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.6 Racks

- .1 Two AV configured racks shall be supplied and installed with equipment in the Technician's Booth. The racks will have the video systems, audio and control systems of the associated room. Install all power distribution accessories. Supply and install vent panels for empty rack spaces. Install support for all cabling. Bundle and tie back all cabling neatly and securely with supplied cable management accessories. Supply all side panels and top panels as required for thermal management.
- .2 All UTP cables for the room coming into the technician's booth shall first go to a patch panel located near the top of each rack.
- .3 Supply sufficient thermal management means in all racks containing equipment to keep the temperature inside the racks lower than a temperature of 27 degrees Celsius (85 °F). Arrange equipment, vent and solid panels, covers and fans to maintain the temperature in the racks below 27 °C. Refer to Middle Atlantic White Paper, "Controlling the Temperature Inside Equipment Racks" for thermal management design. Provide a digital thermometer in each rack that is capable to storing the current, maximum and minimum temperature.
- .4 Ensure all equipment in the racks that are mounted with rack mounting brackets and screws. Do not leave any equipment free or attached with Velcro or other similar non-permanent means. Supply and install all required brackets, mounts and hardware using manufacturer supplied mounting hardware whenever available.

8. AV Closets 0267 & 0270 Serving 0266 Media Room and 0269 Meeting Room

.1 Audio/Video Routing

- .1 Audio/Video routing discussed in sections 2.5.3 and 2.5.4.

.2 Control System

- .1 Control Systems discussed in sections 2.5.3 and 2.5.4.

.3 Racks

- .1 One AV configured rack shall be supplied and installed with equipment in 0267 AV Closet and one rack for 0270 AV Closet. The racks will have the video systems, audio and control systems of the media and meeting rooms. Install all power distribution accessories. Supply and install vent panels for empty rack spaces. Install support for all cabling. Bundle and tie back all cabling neatly and securely with supplied cable management accessories. Supply all side panels and top panels as required for thermal management.

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- .2 All UTP cables for the room coming into the AV Closets shall first go to a patch panel located near the top of each rack.
- .3 Supply sufficient thermal management means in all racks containing equipment to keep the temperature inside the racks lower than a temperature of 27 degrees Celsius (85 °F). Arrange equipment, vent and solid panels, covers and fans to maintain the temperature in the racks below 27 °C. Refer to Middle Atlantic White Paper, "Controlling the Temperature Inside Equipment Racks" for thermal management design. Provide a digital thermometer in each rack that is capable to storing the current, maximum and minimum temperature.
- .4 Ensure all equipment in the rack that are mounted with rack mounting brackets and screws. Do not leave any equipment free or attached with Velcro or other similar non-permanent means. Supply and install all required brackets, mounts and hardware using manufacturer supplied mounting hardware whenever available.

END OF PART2

PART 3. EXECUTION

3.1 TECHNICAL STANDARDS

3.1.1 System Drawings

- .1 System drawings are defined as those drawings necessary to build the job to the standards and detail as outlined in this Specification of Works. The AV Contractor must provide:
 - .1 Block diagrams showing the interconnection of all equipment if there are substantive changes to the design. The block diagrams will be provided for video, audio, control.
 - .2 Schematic Diagrams showing detailed interconnection of all equipment if there are substantive changes to the design. These schematics must be organized in the same form as the block diagrams and must include video, audio, control.
 - .3 Equipment rack layouts including all equipment location and identification.
 - .4 All equipment, bulkheads, panels, wires and cables are to have unique individual alpha-numeric labels which correspond to labels on the schematics.

3.1.2 As-Built Drawings

- .1 As built drawings must include System Drawings as noted above, revised to reflect as-built changes, other drawings as noted in the Specification of Works, any other diagram or information required for a complete description of the system. Match all cable and equipment labeling in As-built drawings to that of the actual installation.
- .2 The drawing format for all drawings must be AutoCAD. Disc format of all files is to be *.Dwg format. Provide all necessary auxiliary files (fonts, blocks, etc.) to allow accurate reproduction and future editing.
- .3 As-Built drawings are to be in English.

3.1.3 Operation and Maintenance Manuals

- .1 The manuals shall be supplied in 3 ring binders with consistent labeling on spine and face, and indexed tabs for the hardcopy. The electronic copy must be in PDF format. The manual content shall contain the following sections:

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- .1 Cover page identifying the project as “Department of Finance – 90 Elgin Conference Floor”
- .2 Table of contents.
- .3 Contact page containing the names, addresses, phone numbers and contact names of all contracting and consulting companies involved in any aspect of the system supply and implementation.
- .4 Functional description of the system as per the specification including any modifications.
- .5 Equipment list including:
 - a) reference designation matching that on the system diagrams,
 - b) manufacturer,
 - c) model,
 - d) serial number,
 - e) warranty end date,
 - f) rack number and
 - g) room number.
- .6 User operating instructions including operation of the equipment and systems defining start-up, shut-down, and emergency procedures allowing users to reset all components of the system. This will be in the form of printed copies of the touchpanel menu displays with explanation of each page. For the computer control system, paper copies of each of the display screens including menus shall be integrated into the operational information with numbered and labeled figures.
- .7 Reset procedure including designations and settings of all equipment, controls and final settings for all equipment, including but not limited to DSP processors, control systems, switchers, codecs and projectors. Reset procedures must be included, even if the procedure is as simple as turning off a power bar.
- .8 Training materials and information. This section will include topics not covered in the user operating instructions that may have been presented during the training sessions. An example would include an FAQ (Frequently Asked Questions) section.
- .9 System diagrams, schematics and equipment location diagrams in 11 x 17 format, printed in colour.
- .10 System wiring/installation diagrams with all as-built equipment, cable and bulkhead labels in D size minimum format, printed in colour.
- .11 Cable run lists for the system.

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- .12 Computer based format copies of all technical drawings in AutoCAD format including all cable labeling and equipment labeling as per installation and all text documents.
- .13 Equipment manufacturers operating instructions and maintenance manuals for each piece of equipment in the system.
- .14 Performance data on the completed system as specified under performance testing. Include results and procedures (including test equipment used) of all testing showing results as per Section 3 for each test conducted.
- .15 Control system and all other programmable equipment software copies: any licensing information, compiler software and manuals and project specific source code, executables and libraries, configuration design or script files in uncompiled form; setup files in computer based format and a printed paper listing of all code: for maintenance or modification by the Owner. Include control system operation manuals.
- .16 All manuals shall be updated after the required re-programming to reflect the final status of the system.
- .2 Written documentation such as training, instruction and operating manuals is to be in English, and is to be provided in paper and PDF computer based format. Computer based format is to be confirmed with the Owner.
- .3 All binders shall be identical.

3.1.4 Cabling and Labeling

- .1 Labeling
 - .1 All cabling both in and out of conduit, bulkheads, as well as all patch cables, panels, connectors are to be labeled. Use numbered/lettered plastic tags for cable and permanent labeling for panels, racks, bulkheads and individual connectors. The AV Contractor is to incorporate all such labeling on the final video, audio and control system drawings.
 - .2 The AV Contractor shall also provide a list of all labeled equipment and devices mentioned above in both a paper and computer based format in the manuals.
- .2 Utilize cables for all audio and video that shall not limit bandwidth.
- .3 HDMI and DVI Cables
 - .1 HDMI and DVI cables are to be pre-fabricated with 24 AWG copper for runs shorter than 12 feet and with 22 AWG copper for runs longer than 12 ft. All HDMI and DVI cables are to be specified for use up to 1920x1200 resolution at 60 Hz. Performance is to be equivalent to or better than Extron SL and DL Pro cables for DVI and to HDMI M-M Pro cables for HDMI.

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- .2 Where a connection from a DVI device to an HDMI device is required, use pre-fabricated HDMI to DVI cables, equivalent to Extron HDMI M-DVI-D M cables.
- .4 HD-SDI Cables
 - .1 HD-SDI cables are to be capable of 3.0 Gb/s at up to 120 m, according to SMPTE 424M for 3G-SDI, equivalent to Belden RG11 model 7731A.
- .5 UTP & STP Cables
 - .1 Use manufacturer approved UTP/STP cable for all UTP/STP devices and provide shielded UTP cable as required for each device.
 - .2 Unless specified, All UTP cable is to be CAT6.
- .6 Fibre Cables
 - .1 Fibre optic cable for AV systems are to be compatible with manufacturer's for AV interfaces.
 - .2 Fibre optic cable for Media patch panels are to be compatible with SMPTE 304M and Lemo EDW.3K.93C SMPTE Fiber HDTV connectors.
- .7 Audio Cables
 - .1 Minimum standard for audio cable is BELDEN 9451 single shielded twisted pair or 8723 for dual shielded twisted pair (or their plenum rated equivalents).
 - .2 Size all speaker wire gage such that the maximum power loss due to wire resistance is less than 5% anywhere in the system. Do not use speaker wire thinner than 18 gage.
- .8 The AV Contractor must provide proof that cable being used shall meet this specification before installation or fabrication commences. If any wire or cable is shown during testing to limit the bandwidth, the AV Contractor shall replace it with a more suitable type at no charge.
- .9 Utilize standard industry practice for arranging and dressing cables in the entire installation. All similar signals are to be bundled together, using color coded wiring and cabling. All visible wiring to be bundled, dressed and sheathed in a colour that is unobtrusive. Where power, control and network signals are run over separate twisted pair cabling, utilize multiple colours to differentiate between signal types. Maintain the same colour scheme for cables and labels for the entire project. Each room will not have their own colour scheme.
- .10 All terminations of shielded cables not inside shielded connectors must consist of a Teflon or PVC sleeve covering the drain wire, and an overall heat shrink or elastomeric neoprene sleeve covering the end of the cable jacket and drain wire sleeve.

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- .11 All wiring entering the racks/cabinets must have a service loop or slack of sufficient length to allow easy equipment service, including roll-out rack movement range. Support all cables and wires in racks/cabinets. All runs are to be continuous. No splices in cables shall be made. No tape shall be used. Use only matching connectors to extend cables/wires. Loop all spare cables/wires behind racks/cabinets and inside boxes with sufficient length for future use and label both ends. Fasten all spare cables/wires to make a neat installation. All spare cables are to be labeled and identified as spare cables as the Owner requires that no cables be left unlabeled.
- .12 All bulkheads/connector panels are to be backed up with metal electrical boxes, and cable from all boxes is to be run in conduit. No cables are to extend outside of boxes, as connectors must be used, with the exception of connections above the ceiling, where cables may loop down to the device being connected. All equipment is to be connected in such a manner as to make it removable for service without cutting or soldering cables. Leave sufficient cable slack to allow removal.
- .13 All wiring in plenum is to have FT6 plenum rated cable meeting national building code and fire code requirements.
- .14 All cabling that runs outside of conduits for a length longer than 1m must be routed in Panduit plastic wiring ducts with clip-on covers. Select wiring ducts to be similar to the surface colour.

3.1.5 Connectors

- .1 All analog video connectors to be crimp-on 75 ohm BNC by Amphenol, King or Canare.
- .2 All RCA phono connectors to be crimp-on Canare RJ-RU.
- .3 All XLR connectors are to be Neutrik.
- .4 Use isolated ground connectors or equivalent bushings, such as Canare IU-7/16, as required to achieve a noise free system.
- .5 Only use solder on connectors if there are no crimp-on connectors available.
- .6 Use only 75-ohm BNC barrels for linking analog video cables.
- .7 For through-hole RCA connections use an RCA to BNC bulkhead connector, Canare RJ-BCJR, with colour coded rings (IU-7/16) selected to match signal type.
- .8 Use thru-panel BNC-BNC connectors on all panels, Canare BCJ-JR, with colour coded rings (IU-7/16) selected to match signal type.
- .9 Use captive screw type connectors with captive screws and tails such as Extron 100-455-01 for connections to switching equipment as required. Do not let un-insulated wire extend more than 3 mm past connector housing.

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- .10 UTP cable must be terminated using CAT-6 connectors unless specified otherwise. Terminate cable according to manufacturer's specification.
- .11 All CAT-6 connectors must be colour coded according to signal type and indicated on as-built drawings.
- .12 DVI connectors to be part of pre-fabricated cables
- .13 HDMI connectors to be part of pre-fabricated cables.
- .14 HD-SDI connectors to be Neutrik for RG 11 cable.
- .15 All pre-made fibre optical cable must have LC or SC connectors unless the cable is associated with an Ethernet signal.
- .16 Fibre connectors for the Media Panel are to be LEMO's EDW.3K.93C SMPTE Fiber HDTV connectors. Fibre connectors for the AV system are to be SC or LC type connectors compatible with the Fibre interfaces.

3.1.6 Connector Plates and Bulkheads

- .1 Supply and install all panels & connectors for wall, ceiling and floor boxes that contain AV connectors. Supply blank plates for any unused AV boxes. Do not leave any boxes uncovered.
- .2 All connector panels/bulkheads to be black finish. All AV plates must be of a high level of finish, and plates are to be provided for all rooms. The finish of plates is to be prefabricated 1/8" thick black anodized aluminum with engraved marking as per a manufacturer such as Panel Crafters or Panel Authority or similar. Provide shop drawings for all panels before fabrication for approval. Provide sample for Client approval of finish and engraving before ordering.
- .3 Use manufacturer's architectural adapter plates where possible to match manufacturer's finish on wall plates.
- .4 All connector panels/bulkheads to be numbered as on wiring diagrams and all connectors to be labeled on panels.
- .5 On plates use only D or Double D shaped panel mount holes for all connectors as required to eliminate connector rotation. No round holes are acceptable for connectors that have D hole shapes.
- .6 Install a lock washer with all connectors or screws.

3.1.7 Marking

- .1 Equipment operating controls, switches, jacks, plugs must be permanently marked in a clear logical manner using engraved or screened letters. Dymo or similar label strips or hand printed labels are not acceptable. A sample panel showing finish and labeling is to be submitted for approval by the Owner.

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- .2 All system cables, without exception are to be individually, logically and permanently marked by the AV Contractor at all terminations with slip-on or other permanent type marking at both ends. All wiring must be properly identified in junction boxes and at terminal blocks and wherever accessible.

3.1.8 Mounts, Hangers and Inserts

- .1 Supply and install all mounts, hangers and inserts required for the work.
- .2 Mount all equipment using devices that are properly rated for the load with the design factor taken into account.
- .3 Use only mounts for the purpose recommended by the manufacturer.
- .4 Provide the services of a structural engineer to verify the appropriateness of any mounting system for a load not specified by the manufacturer.
- .5 All equipment is to be suspended using load rated fittings and fasteners.
- .6 Ensure that all mounts are fitted with the appropriate cabling to meet safety standards such as safety cables.

3.1.9 Power

- .1 The AV Contractor is to provide all necessary AC distribution from wall plates to/and inside racks, millwork, furniture and tables, panels & bulkheads, connectors, ceiling and wall supports and mounts for the complete installation of all equipment.
- .2 The AV Contractor is to verify on site to ensure that adequate power exists for all locations with AV equipment. The AV Contractor is to coordinate any additional power installation with the Owner.
- .3 The AV Contractor is to provide all power bars required to power all AV equipment.
- .4 All racks, panels, equipment, bulkheads etc., are to be grounded according to appropriate electrical codes. The grounding will be arranged so as to eliminate hum and ground loops.
- .5 Power is to be provided for all AV equipment including DC power supplies as required where not specifically identified in previous sections as being supplied by others. All DC power supply wiring to each device is to be provided as a part of this contract.

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3.1.10 Grounding

- .1 The AV Contractor is to ensure that the system is free from interference on all audio lines by using proper low noise grounding techniques.
- .2 The AV Contractor is to provide allowance for installing audio hum isolating devices such as transformers, balanced lines, ground bars and ground loop isolators.

3.1.11 System Performance:

- .1 Video Integrity:
The system once fully installed and tested shall be free of the following problems:
 - .1 Pixel/Noise and Sparkle Problems: Random pixels of various colours appearing on the display that are not part of the signal.
 - .2 HDCP Errors: Blank/snow/green on screen
 - .3 EDID Errors: Incorrect resolution or scaling.
 - .4 Bending: Top portion of displayed image hooks, bends or tears to one side.
 - .5 Blooming: Bright and defocused image on the data display.
 - .6 Convergence: The image on the data display is outlined by one or more of the basic colors (red green blue).
 - .7 Ghosting/Reflection: The image being displayed has an identical image following it on the right hand side.
 - .8 Ground Loop/ Hum Bars: Lines traveling through the screen from bottom to top.
 - .9 Horizontal double Images: The data display is split down the middle, left to right, and there are two identical images on the screen.
 - .10 Jitter: An unstable video image, moving rapidly either up and down or left to right.
 - .11 Pixel Loss: Loss or insufficient amount of high frequency vertical information reaching the display.
 - .12 Retrace Problem: Missing characters or video information on the left hand side of the screen.
 - .13 Signal Loss: Faint or missing video information.
 - .14 Vertical double Images: the data display is split through the middle top to bottom and there are two identical images on the screen.
 - .15 Wrap around: Left hand video information is on the right hand side of the screen and vice-versa.

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- .2 Digital Video Bandwidth and Colour Space (DVI, HDMI, video over UTP/STP or fibre) and analog VGA:
 - .1 The majority of signal routing is digital over HDMI and DVI. The resolution is 1920x1200 pixels at 60 fps. The video data signal routing system (cable/wiring, distribution amplifiers, interfaces, switcher and other devices in the signal path) will not limit the bandwidth of the display devices. This means that equipment in the signal path will have a bandwidth exceeding that of the display devices. Use RGB colour space for all devices.
 - .2 The connection of a laptop and desktop computer are to accept a minimum of 1920x1200 at 60 fps.
- .3 Audio Bandwidth and noise
 - .1 All audio distribution is to have a bandwidth of 20-20,000 Hz plus/minus 1.0 dB, with a signal to noise ratio of 80 dBA when measured in a 20 kHz bandwidth. The entire system is to be free of hum and other spurious noises. Use isolated ground connectors as required to achieve a quiet system. All RCA phono connectors to be crimp-on Canare RJ-RU.
 - .2 Loudspeaker frequency response is to be adjusted for + or – 3dB over the manufacturer’s specified bandwidth. Each loudspeaker or group of loudspeakers as appropriate shall be equalized individually. All loudspeakers or groups are to have their levels matched once equalized to provide uniform sound coverage +/- 3 dB. Provide documented proof of individual speaker frequency response measured in the room. Provide list of equalization settings at all frequencies for all equalized channels as well as level settings for all loudspeakers in the entire building.

3.1.12 System Off-Site Assembly and On-Site Installation:

- .1 Off-site assembly and pre-test:

The entire system is to be partially pre-assembled and tested at the AV Contractors’ site as this is a remote location, and time at the installation site is to be minimized:

 - .1 Install all equipment in racks.
 - .2 Wire all equipment both in and out of racks.
 - .3 Perform functional testing and program system to provide required functionality. Correct deficiencies.
 - .4 Arrange with the Owner for a meeting to demonstrate system functions of a sample rack at the AV Contractor’s site including all Crestron and Biamp Programming.

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- .5 Prepare a list of items to be changed in terms of programming while the Owner is on site.
- .6 Make changes to the system to reflect any changes required to the programming and to any operational deficiencies found.
- .7 Prepare the system for transport to site
- .2 On-site installation:
 - .1 The entire system is transported to the Owner's site and is to be re-assembled and re-tested at the Owner's site as per requirements outlined in this specification.
 - .2 Coordinate schedule with the Owner.

3.2 COMMISSIONING

3.2.1 General:

- .1 Commissioning shall proceed in two phases, with Phase 1 being functional commissioning demonstrating system operation and signal routing capabilities, and Phase 2 commissioning demonstrating that any deficiencies found in phase 1 have been corrected. After Phase 1 commissioning, a deficiency list shall be prepared. The AV Contractor shall correct the deficiencies while on site. Once the deficiencies are corrected, Phase 2 commissioning shall take place. System shall not be considered delivered or complete until all deficiencies have been corrected. The role of the AV Consultant during commissioning is only to verify that the AV Contractor has provided a functional system as outlined in the Specification of Works, not to correct any problems found on site or to debug the system.
- .2 The entire system shall be ready to be commissioned such that the AV Consultant shall travel a maximum of two times for Phase 1 Commissioning and a maximum of two times for Phase 2 Commissioning, plus one final visit to verify that all deficiencies have been corrected. Any additional required visits by the AV Consultant for commissioning shall be at the cost of the AV Contractor being \$1250 per day.
- .3 The AV Contractor is to supply a test log or test matrix documenting all of the signal routing and operation for the system. The test log shall be supplied to the Owner at least 7 days prior to commissioning Phase 1. The test log will consist of an Excel format matrix or equivalent showing point-to-point signal routing from each input to each output, system functionality and signal integrity for the AV System. The system functionality section of the test log will demonstrate that the control system can perform the functions as set out in Part 2. The AV Consultant will

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- verify the test log upon commissioning Phase 1. Include results from the video test equipment including EDID and HDCP results and results from audio test equipment.
- .4 The AV Contractor is to supply a list of products, similar to the Product List in Section 2 of this specification, and confirm in the list each product installed and its operational status. This list must be submitted with the test log/matrix prior to commissioning Phase 1.
 - .5 Commissioning shall not take place until 95% of the test log/test matrix and product list is functional.
 - .6 The AV Contractor shall have to demonstrate that the system installation meets the requirements and performance as set out in this Specification of Works by performing all adjustments and a series of tests documenting compliance.
 - .7 During commissioning, the AV Contractor must have on site the technical representative and the Crestron programmer for the system. The AV Contractor shall operate all equipment and make all connections to demonstrate to the Owner the complete operation of the system.
 - .8 All equipment and materials required for testing are to be provided at the AV Contractor's expense.
 - .9 The AV Consultant may elect to perform additional tests over and above the AV Contractor's tests, using the equipment provided by the AV Contractor.
 - .10 The AV Contractor must advise the Owner of the time required for testing and arrange scheduling.
 - .11 The results of all tests must be documented individually for each room as well as a separate section of between-room signal routing, as applicable.
 - .12 Results of all tests and methodology, test equipment used, conditions, etc., must be included in the O&M manuals described herein.

3.2.2 Testing of Fibre Cables

- .1 All fibre optic cables are to be tested between all room connection points to the endpoints of the signal routing including all patch/interconnection cables. Clean all fibre connections prior to testing.
- .2 All tests are to be made using a light source and power meter for testing fibre optic cable equal or greater to Extron's Fibre Optic Test Set.
- .3 Provide results of testing in a report.

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3.2.3 Testing of Video Systems:

- .1 All DVI/HDMI/HD video shall be tested between all room connection points to the endpoints of the signal routing. All interfaces shall be adjusted to optimize performance.
- .2 Video from the DVD & Blu-ray to all display devices shall be verified.
- .3 All tests are to be made using an Extron VTG-400 test generator

3.2.4 Testing of Audio Systems:

- .1 Signal bandwidth must be measured from all connection points to the loudspeaker outputs of the left and right channels.
- .2 Signal bandwidth must be measured from representative audio inputs to the final audio output.
- .3 The signal to noise ratio must be measured between representative connection points and the loudspeaker input.
- .4 Loudspeaker equalization and level shall be adjusted for all systems and provide frequency response charts.

3.2.5 Testing of Control Systems

- .1 The AV Contractor must demonstrate control of all room functions as described in Section 2 and any Addenda are operational on the touchpanel display.

3.2.6 Room Controller Re-Programming

- .1 Thirty days after training is complete, the AV Contractor shall coordinate with the Owner for any required modifications to the programming of the room control systems. The Owner shall provide a list of additional requirements and/or changes to the programming and the AV Contractor shall provide at no charge up to 36 hours of programming to effect these modifications. Modifications shall be complete 30 days after the Owner's request. If the required initial modifications do not utilize the 36 hours of time included for additional programming, the AV Contractor shall provide the balance of these services on an as required basis over a period of one year. Identify price for this work separately.

3.2.7 Owner Acceptance

- .1 Any malfunctions in equipment, installation, control or software programming are to be adjusted and corrected in accordance with this Specification of Works prior to acceptance of the system.

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- .2 After the AV Consultant has received and inspected the AV Contractor's report on all the testing and adjustment specified under Testing , an acceptance session shall be scheduled, during which the AV Contractor may be required to demonstrate any of the tests described herein. This session may be simultaneous with final commissioning after all deficiencies have been corrected. Written acceptance by the AV Consultant shall be required prior to holdback release.
 - .3 If the system does not fulfill all aspects of this Specification of Works, the AV Contractor must make any adjustments or any other changes required to bring the installation into conformance with the Specification of Works.
 - .4 Prior to final acceptance of the system, the Owner may require the use of the system for testing, training or any other purpose. This temporary use of the system does not constitute acceptance nor affect the start of the warranty period.
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END OF PART 3