



FACILITIES MANAGEMENT

OPEN CALL FOR BIDS FOR

**FACULTY OF MEDICINE
AUDIO VISUAL UPGRADES TO
1M101 & 1M102
#M-166-22**

Request for Open Call Number:

TFM-082-23(A)

Issued: **February 8, 2024**

Submission Deadline: **Thursday, February 29, 2024**

@ 3:00PM NST

REQUEST FOR OPEN CALL FOR BIDS INFORMATION SHEET

Request for Open Call			
Title:	FACULTY OF MEDICINE AV UPGRADES TO 1M101 &1M102		
Open Call #:	TFM-082-23(A)	Issue Date:	February 8, 2024
Non Mandatory Site Visit:	Location:		
Questions Deadline:	Eight (8) days prior to closing time, at 3:00 pm NST	Closing Date & Time:	Thursday February 29, 2024 @ 3:00 pm NST
		Bid Submission Format:	opencalls@mun.ca
		Opening Date, Time & Location:	Thursday , February 29, 2024 @ 3:30 pm NST There will be no extension granted for the closing date. Via Conference line: 1-416-915-6530 (toll free) Access Code: 2772 470 1469 Attendee ID: Please press Pound(#)
Bids Irrevocable Period after Submission Deadline:			45 days (See section 1.6)
Bid Submission: Responses to this solicitation must be submitted by email to opencalls@mun.ca Email subject line must read: BID SUBMISSION: TFM-082-23(A) FACULTY OF MEDICINE AUDIO VISUAL UPGRADES TO 1M101 &1M102			
Inquiries and Communication:			
<p>Inquiries and communication: Strategic Procurement Office, Memorial University of Newfoundland, opencalls@mun.ca. Inquiries accepted only via email. No phone calls will be accepted. Please reference open call Title and Open Call # from above, ie: TFM-082-23(A) FACULTY OF MEDICINE AUDIO VISUAL UPGRADES TO 1M101 &1M102 in subject line. Emails not containing this requirement information in the subject line will NOT receive a response.</p> <p align="center"><u><i>Bids submitted by fax, mail, courier, drop off or by any other means of delivery other than by email stated above shall not be accepted.</i></u></p>			

ABOUT MEMORIAL UNIVERSITY

As Newfoundland and Labrador's only university, Memorial has a special obligation to the people of this province. Established as a memorial to the Newfoundlanders who lost their lives on active service during the First and Second World Wars, Memorial University draws inspiration from these shattering sacrifices of the past as we help to build a better future for our province, our country and our world.

We are a multi-campus, multi-disciplinary, public university committed to excellence in teaching and learning, research and scholarship, and to public engagement and service. We strive to have national and global impact, while fulfilling our social mandate to provide access to university education for the people of the province and to contribute to the social, cultural, scientific and economic development of Newfoundland and Labrador and beyond.

The Memorial experience goes beyond academics; it invites a discovery of self, community and place. At Memorial, we celebrate our unique identity through the stories of our people – the work of scholars and educators, the ingenuity of students, the achievements of alumni – and the impact we collectively make in the province, the country and the world. Memorial is the natural place where people and ideas become.

Memorial University has more than 18,500 students and 3,600 faculty and staff spread across four campuses and nearly 100,000 alumni active throughout the world. From local endeavors to research projects of national importance, Memorial's impact is felt far and wide.

Mission, Vision and Values

Vision

Memorial University will be one of the most distinguished public universities in Canada and beyond, and will fulfill its special obligation to the people of Newfoundland and Labrador.

Mission

Memorial University is an inclusive community dedicated to innovation and excellence in teaching and learning, research, scholarship, creative activity, service and public engagement.

Memorial welcomes and supports students and scholars from all over the world and contributes knowledge and expertise locally, nationally and internationally.

Values

Excellence: Encouraging and promoting excellence through innovation and creativity, rigor and pragmatism.

Integrity: Being honest and ethical in all interactions, maintaining the highest ethical standards in teaching, research, public engagement and service.

Collegiality: Engaging others with respect, openness and trust in pursuit of a common purpose, having regard for individuals, ideals and the institution as a whole.

Inclusiveness and diversity: Embracing and acting on responsibility to guarantee diversity and equity.

Responsiveness: Being receptive to individuals and communities.

Accountability: Accepting responsibility for achievement of common goals and objectives.

Freedom and Discovery: Supporting the freedom to pursue knowledge that is based on individual and collective intelligence, curiosity, ingenuity and creativity.

Recognition: Acknowledging, tangibly, all aspects of university enterprise including teaching and learning, research, scholarship, creative activity and public engagement.

Responsibility to place: Valuing and fulfilling the special obligation to the people of Newfoundland and Labrador by supporting and building capacity for excellence that:

- addresses needs and opportunities for Newfoundland and Labrador;
- engages the university community on matters of national and international significance;
- produces and delivers academic programs of national and international calibre; and,
- Recognizes the dynamic opportunities presented by a multi-campus institution.

Responsibility to learners: Recognizing students as a first priority and providing the environment and support to ensure their academic and personal success.

Interdisciplinary collaboration: Supporting overarching themes in all pursuits that cut across academic units and address significant opportunities and challenges for which Memorial is particularly well positioned to build nationally and internationally recognized capacity.

Sustainability: Acting in a manner that is environmentally, economically and socially sustainable in administration, academic and research programs.

Memorial's exceptional staff and students contribute to the vitality and positive

environment of the university through active community engagement. Memorial University has always been a publicly engaged institution. Since the founding of the University in 1949, the work of many of Memorial's students, faculty and staff has emphasized the importance of strong, sustained partnerships with members of the public of Newfoundland and Labrador and beyond.

Faculty and Staff

Memorial is one of the largest employers in the province, with approximately 3,600 faculty and staff. Memorial has been recognized as an Employer of Distinction by the Newfoundland and Labrador Employers' Council, which is reflective of its investment in comprehensive benefits, services such as childcare and recreation facilities, emphasis on work-life balance, and its vibrant work environment.

Governance and Administration

The management, administration and control of the property, revenue, business and affairs of the University are vested in a Board of Regents. The Board is appointed under the *Memorial University Act* and is responsible for the management, administration, and control of the property, revenue, business and affairs of the university. Matters of an academic character are in general charge of the Senate of the University.

For more information on Memorial University of Newfoundland, please visit Memorial's home page: <http://www.mun.ca>

Territory Acknowledgements at Memorial:

We acknowledge that the lands on which Memorial University's Campus are situated are in the traditional territories of diverse Indigenous groups and we acknowledge with respect the diverse histories and cultures of the *Beothuk, Mi'kmaq, Innu, and Inuit* of this province

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PART 1 – SUBMISSION INSTRUCTIONS

1.1 Bids to be Submitted on Time

Bids must be submitted as set out above on or before the Submission Deadline. Bids submitted after the Submission Deadline will be rejected. Onus and responsibility rest solely with the bidder to submit its bid to the email indicated in the Open Call for Bids on or before the Submission Deadline. The Owner does not accept any responsibility for any bids submitted by means other than the email listed above. Bidders making submissions near the deadline do so at their own risk due server availability. The time for the closing will be determined according to the inbox, time stamp on opencalls@mun.ca.

Bids received after the closing time based on this time stamp, will NOT be considered.

1.2 Bids to be Submitted in Prescribed Format

- Bidders should submit **one (1)** email submission in PDF format.
- **Please note: File size cannot exceed 15 MB. Otherwise server may reject bid submission due to size.**
- **Bids submitted by fax, mail, courier, drop off or by any other means of delivery other than by email stated above shall not be accepted.**

1.3 Amendment of Bids

Bidders may amend their bids after they have been submitted if, and only if, the amendment is emailed prior to the Submission Deadline marked **BID SUBMISSION AMENDMENT** followed by open call number and name.

Bidders may revise their bid by email: opencalls@mun.ca

The Owner does not accept any responsibility for amendments submitted by means other than the email listed above. Bidders making submission near the deadline do so at their own risk due to service availability. The time for the closing will be determined according to the inbox, time stamp on opencalls@mun.ca. Amendments to bids received after the closing time base on this times stamp, will NOT be considered.

Email inquiries and requests for clarification shall be accepted up to eight **(8) days (3:00pm NST)** prior to the closing time. Inquiries and requests for clarification received after this date shall not be addressed. The Strategic Procurement Office will be the only official source of information regarding this Open Call for Bids and information from any other source shall be considered unofficial and may not be correct.

1.4 Amendment of Open Call for Bid Documents

To ensure consistency and quality in the information provided to bidders the Owner shall provide, by way of amendment to this Open Call for Bids, in the form of an addendum, any relevant information with respect to the Open Call inquiries received in writing without revealing the source of those inquiries. Bidders are cautioned that it is their responsibility to ensure that they receive all information relevant to this Open Call. The Owner shall not be

responsible for bidders who fail to inform themselves regarding the scope and nature of the work. The Owner shall publish all amendments on Memorial University's current service providers: MERX: www.merx.com, BIDS: www.bids.ca and PODS: www.pods.net. In addition, all amendments will be published on https://www.mun.ca/finance/strategic_procurement/. Bidders should check on a regular basis for Open Call updates. Bidders are solely responsible for ensuring they are aware of and have complied with all amendments by tender closing time. In the event there is a discrepancy between MERX, BIDS, and PODS and the official website https://www.mun.ca/finance/strategic_procurement/ website, the https://www.mun.ca/finance/strategic_procurement/ is the official website. Bidders are welcome to register their email address through opencalls@mun.ca to receive addendum notifications from Open Calls as a matter of courtesy. This does not relieve any Bidder of their responsibility to ensure all addenda has been received.

1.5 Withdrawal of Bids

Bidders may withdraw their bids prior to the Submission Deadline. To withdraw a bid, a notice of withdrawal must be sent to the opencalls@mun.ca email address prior to the Submission Deadline. The Owner is under no obligation to return withdrawn bids.

1.6 Bids Irrevocable after Submission Deadline

Bids shall be irrevocable for a period of **45** days running from the moment that the Submission Deadline passes.

1.7 Delivery

Delivery of all materials and services must be DAP (delivered at place) or DDP (delivered duty paid (all locations) and local environs).

1.8 Signature

Memorial University, in consideration of section 11 of the Electronic Commerce Act, confirms its acceptance of electronic signatures, or other acceptable form of electronic consent, in satisfaction of the signature requirement for bid submissions. The electronic form of signature or consent must be directly related to the relevant bid submission at issue and must be reliable, in a manner as determined by Memorial University, for the purpose of identifying the person submitting the bid response. By submitting a bid under this process, the bidder confirms that the signatory has the appropriate and proper authority to bind the bidder to its submission, a confirmation upon which Memorial University relies in the processing of the bid submission.

Bidders must complete Appendix B –Submission Form. Any bids received without Appendix B completed will be deemed non-complaint.

1.9 Closure

In the event that the University is closed earlier than normally expected prior to a scheduled open calls closing for that day, or for the full day, the closing date for those open calls will be extended to the next business day for the University at the same time as listed originally.

1.10 Corporations Act

The Corporations Act of Newfoundland and Labrador requires that an extra-provincial company be registered before it begins or carries on business in the Province. If your company is not registered, please apply for the appropriate forms and procedures to:

Commercial Registrations Division

Dept of Government Services, PO Box 8700 St John's, NL Canada A1B 4J6

Phone: 709-729-3317, Fax: 709-729-0232

Website: http://www.gs.gov.nl.ca/registries/companies/corp_art_inc.html

[End of Part 1]

PART 2 – EVALUATION AND AWARD

2.0 Stages of Evaluation

The Owner will conduct the evaluation of bids in the following stages:

2.1.0 Stage I – Mandatory Submission Requirements

Stage I will consist of a review to determine which bids comply with all of the mandatory submission requirements. Bids that do not comply with all of the mandatory submission requirements as of the Submission Deadline will, subject to the express and implied rights of the Owner, be disqualified and not evaluated further.

2.1.1 Stage II – Mandatory Technical Requirements

Stage II will consist of a review to determine which bids comply with all of the mandatory technical requirements. Bids that do not comply with all of the mandatory technical requirements as of the Submission Deadline will, subject to the express and implied rights of the Owner, be disqualified and not evaluated further. The mandatory technical requirements are listed in Appendix A - Specifications.

2.1.2 Stage III – Pricing

Stage III will consist of a scoring of the submitted pricing of each compliant bid in accordance with the evaluation method set out in the Pricing Form (Appendix C). The evaluation of price will be undertaken after the evaluation of mandatory requirements has been completed.

2.2 No Amendment to Forms

Other than inserting the information requested on the mandatory submission forms set out in the Open Call, a bidder may not make any changes to any of the forms. Any bid containing any such changes, whether on the face of the form or elsewhere in the bid, shall be disqualified.

2.3 Selection of Lowest Compliant Bidder as Preferred Supplier

Subject to the Owner's reserved rights, the compliant bidder with the lowest pricing will be the preferred supplier, and will be selected to enter into the Agreement in accordance with the following section. In the event of a tie, the preferred supplier will be determined by way of a coin toss, in accordance with the Public Procurement Policy. Provincial suppliers, suppliers with a place of business in Newfoundland and Labrador, will be given provincial supplier preference provision. This mandates an allowance of ten percent for provincial suppliers for all procurement below trade agreement thresholds.

Please note, the supplier preference does not apply when the estimated value of the commodity is above the trade agreement threshold shown in the following table.

Public Body	Thresholds			
	Goods	Services	Public Works	Lease of Space
Memorial University	\$121,200	\$121,200	\$302,900	\$100,000

2.4 Notice to Bidder and Execution of Agreement

Notice of selection by the Owner to the preferred supplier shall be in writing. The preferred supplier shall execute the Agreement, the form and content of which will be mutually agreed upon between the parties and satisfy any other applicable conditions of this open call within fifteen (15) days of notice of selection. This provision is solely for the benefit of the Owner and may be waived by the Owner.

2.5 Failure to Enter into Agreement

If a selected bidder fails to execute the Agreement or satisfy the pre-conditions of award listed in the Open Call Particulars within fifteen (15) days of notice of selection the Owner may, without incurring any liability, proceed with the selection of another bidder and pursue all remedies available to the Owner.

2.6 Payment Terms

The University's standard payment terms are net 30 days after delivery of goods, or net 15 days after successful completion of installation as applicable. In the case of services, payment terms are also net 30 days after successful completion of the service. These terms shall also apply in the case of sub-contracted items. Prepayments will not be considered unless the supplier provides an irrevocable standby letter of credit, or the supplier provides a credit reference from its banker (in conjunction with a 50% materials and labour bond and a 50% performance bond) satisfactory to the Director of Financial and Administrative Services.

[End of Part 2]

PART 3 – TERMS AND CONDITIONS OF THE OCB PROCESS

3.1 Open Call Incorporated into Bid

All of the provisions of this Open call are deemed to be accepted by each bidder and incorporated into each bidder's bid. A bidder who submits conditions, options, variations or contingent statements to the terms as set out in this Open call, either as part of its bid or after receiving notice of selection, unless otherwise indicated, shall be disqualified.

3.2 Bidders to Follow Instructions

Bidders should structure their bids in accordance with the instructions in this Open call. Where information is requested in this Open Call, any response made in a bid should reference the applicable section numbers of this Open Call.

3.3 Bids in English

All bids are to be in English only.

3.4 No Incorporation by Reference

The entire content of the bidder's bid should be submitted in a fixed form, and links to the content of websites or other external documents referred to in the bidder's bid but not attached will not be considered to form part of its bid.

3.5 References and Past Performance

In the evaluation process, the Owner may consider information provided by the bidder's references and may also consider the bidder's past performance or conduct on previous contracts with the Owner or other institutions.

3.6 Information in Open Call Only an Estimate

The Owner and its advisors make no representation, warranty or guarantee as to the accuracy of the information contained in this Open Call or issued by way of addenda. Any quantities shown or data contained in this Open Call or provided by way of addenda are estimates only, and are for the sole purpose of indicating to bidders the general scale and scope of the Deliverables. It is the bidder's responsibility to obtain all the information necessary to prepare a bid in response to this Open Call.

3.7 Bidders to Bear Their Own Costs

The bidder will bear all costs associated with or incurred in the preparation and presentation of its bid, including, if applicable, costs incurred for interviews or demonstrations.

3.8 Bid to be Retained by the Owner

The Owner will not return the bid or any accompanying documentation or samples submitted by a bidder.

3.9 Trade Agreements

Bidders should note that procurements falling within the scope of the Canadian Free Trade Agreement, and/or the Canada-European Union Comprehensive Economic Trade Agreement are subject to those trade agreements but that the rights and obligations of the parties will be governed by the specific terms of this Open Call.

3.10 No Guarantee of Volume of Work or Exclusivity of Contract

The Owner makes no guarantee of the value or volume of work to be assigned to the preferred supplier. The Agreement will not be an exclusive contract for the provision of the described Deliverables. The Owner may contract with others for goods and services the same as or similar to the Deliverables or may obtain such goods and services internally.

3.11 Communication After Issuance of Open Call

Bidders shall promptly examine all of the documents comprising this Open Call, and

- (a) shall report any errors, omissions or ambiguities; and
- (b) may direct questions or seek additional information in writing by email to opencalls@mun.ca on or before the Deadline for Questions. All questions or comments submitted by bidders by email to the Open Call Contact shall be deemed to be received once the email has entered into the Open Call Contact's email inbox. No such communications are to be directed to anyone other than the Open Call Contact, and the Owner shall not be responsible for any information provided by or obtained from any source other than the Strategic Procurement Office. The Owner is under no obligation to provide additional information. It is the responsibility of the bidder to seek clarification from the Open Call Contact on any matter it considers to be unclear. The Owner shall not be responsible for any misunderstanding on the part of the bidder concerning this Open Call or its process.

3.12 All New Information to Bidders by Way of Addenda

This Open Call may be amended only by addendum in accordance with this section. If the Owner, for any reason, determines that it is necessary to provide additional information relating to this Open Call, such information will be communicated to all bidders by addenda. Each addendum forms an integral part of this Open Call and may contain important information, including significant changes to this Open Call. Bidders are responsible for obtaining all addenda issued by the Owner. In the Submission Form (Appendix B), bidders MUST confirm their receipt of all addenda by setting out the number of each addendum in the space provided.

3.13 Addenda and Extension of Submission Deadline

Any addendum issued within four (4) calendar days of the Open Call for Bids closing (Including on closing day) will extend closing by a reasonable period to be determined by Memorial University. **Time is of the essence and there will be no extension of closing date.**

When evaluating bids, the Owner may request further information from the bidder or third parties in order to verify, clarify or supplement the information provided in the bidder's bid. The response received by the Owner shall, if accepted by the Owner, form an integral part of the bidder's bid.

3.14 Notification to Other Bidders

In accordance with section 30 of the *Public Procurement Regulations*, once the Agreement is awarded by the Owner, the outcome of the Open Call will be publicly posted at https://www.mun.ca/finance/strategic_procurement/. There will be no issuing of regret letters.

3.15 Debriefing

In accordance with the Public Procurement Act and Regulations, unsuccessful bidders may request a debriefing within ten (10) business days after the award has been posted. The request must be sent in writing to the Open call contact. The intent of the debriefing information session is to provide the bidder an overview of their bid and why it was unsuccessful and to help the bidder in presenting a better bid in subsequent procurement opportunities. The debriefing process is not for the purpose of providing an opportunity to challenge the procurement process or its outcome. A debriefing shall not disclose information regarding another bidder's bid.

3.16 Supplier Complaint Process

If a bidder wishes to register a complaint with respect to the Open Call process, the complaint should be provided in writing and within the parameters established by section 25 of the Public Procurement Regulations, as amended. The notice must provide a detailed explanation of the bidder's concerns with the procurement process or its outcome, in addition to such other information as may be required by the *Regulations*. Bidders should note that these complaint procedures are separate and distinct from any dispute resolution processes that may be provided for under applicable trade agreements. If a bidder wishes to dispute a matter under an applicable trade agreement, the bidder must follow the process set out in the trade agreement.

3.17 Conflict of Interest and Prohibited Conduct

The Owner may disqualify a bidder for any conduct, situation or circumstances, determined by the Owner, in its sole and absolute discretion, that constitutes a conflict of interest.

The Owner reserves the right to disqualify any bidder that in the Owner's sole opinion has an actual or potential conflict of interest or an unfair advantage.

For the purposes of this Open Call, the term "Conflict of Interest" includes, but is not limited to, any situation or circumstance where in relation to the Open Call process, the bidder has an unfair advantage or engages in conduct, directly or indirectly, that may give it an unfair advantage, including but not limited to: (i) having, or having access to, confidential information of the Owner in the preparation of its bid that is not available to other bidders, (ii) communicating with any person with a view to influencing preferred treatment in the Open Call process (including but not limited to the lobbying of decision makers involved in the Open Call process), or (iii) engaging in conduct that compromises, or could be seen to compromise, the integrity of the open and competitive Open Call process or render that process non-competitive or unfair.

Bidders are required to disclose, to the Open Call Contact, any potential or perceived conflict of interest issues prior to Open Call closing date and time.

3.18 Disqualification for Prohibited Conduct

The Owner may disqualify a bidder, rescind a notification of selection or terminate a contract subsequently entered into if the Owner determines that the bidder has engaged in any conduct prohibited by this Open Call.

3.19 Bidder Not to Communicate with Media

Bidders must not at any time directly or indirectly communicate with the media in relation to this Open Call or any agreement entered into pursuant to this Open Call without first obtaining the written permission of the Open Call Contact.

3.21 No Lobbying

Bidders must not, in relation to this Open Call or the evaluation and selection process, engage directly or indirectly in any form of political or other lobbying whatsoever to influence the selection of the successful bidder(s).

3.22 Illegal or Unethical Conduct

Bidders must not engage in any illegal business practices, including activities such as bid-rigging, price-fixing, bribery, fraud, coercion or collusion. Bidders must not engage in any unethical conduct, including lobbying, as described above, or other inappropriate communications; offering gifts to any employees, officers, agents, elected or appointed officials or other representatives of the Owner; deceitfulness; submitting bids containing misrepresentations or other misleading or inaccurate information; or any other conduct that compromises or may be seen to compromise the competitive process provided for in this Open Call.

3.23 Past Performance or Past Conduct

The Owner may prohibit a supplier from participating in a procurement process based on past performance or based on inappropriate conduct in a prior procurement process, including but not limited to the following:

- (a) illegal or unethical conduct as described above;
- (b) the refusal of the supplier to honor submitted pricing or other commitments; or
- (c) any conduct, situation or circumstance determined by the Owner, in its sole and absolute discretion, to have constituted a Conflict of Interest.
- (d) performance on other contracts, including the efficiency and workmanship as well as the extent to which the Bidders performed the Work in accordance with the contractual clauses and conditions, is sufficiently poor to jeopardize the successful completion of the project being bid on, by way of previous contractor performance evaluations.

In addition, the Owner may suspend the bidding privileges of a supplier with regard to non-compliant or substandard performance in accordance with section 26 of the *Public Procurement Regulations*.

3.24 Confidential Information of the Owner

All information provided by or obtained from the Owner in any form in connection with this Open Call either before or after the issuance of this Open Call:

- (a) is the sole property of the Owner and must be treated as confidential;
- (b) is not to be used for any purpose other than replying to this Open Call and the performance of the Agreement;
- (c) must not be disclosed without prior written authorization from the Owner; and
- (d) must be returned by the bidder to the Owner immediately upon the request of the Owner.

3.25 Confidential Information of Bidder

This procurement process is subject to the *Access to Information and Protection of Privacy Act, 2015 (ATIPPA, 2015)*. A bidder must identify any information in its bid or any accompanying documentation supplied in confidence for which confidentiality is requested to be maintained by the Owner. The confidentiality of such information will be maintained by the Owner, except as otherwise required by law or by order of a court or tribunal. Bidders are advised that their bids will, as necessary, be disclosed, on a confidential basis, to advisers retained by the Owner to advise or assist with the Open Call process, including the evaluation of bids.

The Bidder agrees that any specific information in its submission that may qualify for an exemption from disclosure under subsection 39(1) of the *ATIPPA, 2015* has been identified in its submission. If no specific information has been identified it is assumed that, in the opinion of the proponent, there is no specific information that qualifies for an exemption under the subsection 39(1) of the *ATIPPA, 2015*. The Bidder acknowledges that contracting with the Owner is a public process and any information provided through this process and any records the Bidder supplies to the Owner, including the terms and conditions of any Agreement entered into, may be subject to requests under the *ATIPPA, 2015*. In the event of a request to Memorial for third party business information in its custody and control, information can be withheld only if it meets all parts of the 3-part harms test for non-disclosure as stated in section 39 of the *ATIPPA, 2015*.

Information, including the financial value of a contract resulting from this procurement process, will be publicly released as part of the award notification process, in accordance with section 30 of the *Public Procurement Regulations*.

If a bidder has any questions about the collection and use of personal information pursuant to this Open Call, questions are to be submitted to the Open Call Contact. Further information relating to subsection 39(1) of the *ATIPPA, 2015* is provided in guidance documents available through the Office of the Information and Privacy Commissioner at <https://oipc.nl.ca/guidance/documents>.

3.26 Reserved Rights of the Owner

The Owner reserves the right to:

- (a) make public the names of any or all bidders as well as bid price and value of contract;
- (b) make changes, including substantial changes, to this Open Call provided that those changes are issued by way of addendum in the manner set out in this Open Call; request written clarification or the submission of supplementary written information in relation to the clarification request from any bidder and incorporate a bidder's response to that request for clarification into the bidder's bid. This shall not be an opportunity for bid repair;
- (c) assess a bidder's bid on the basis of: (i) a financial analysis determining the actual cost of the bid when considering factors including quality, service, price and transition costs arising from the replacement of existing goods, services, practices, methodologies and infrastructure (howsoever originally established); and (ii) in addition to any other evaluation criteria or considerations set out in this Open Call consider any other relevant information that arises during this Open call process; and (iii) Unbalanced bids, as determined by the Owner, will be rejected (i.e. prices must fairly represent proper compensation for various items of work to be done).
- (d) waive minor irregularities and formalities and accept bids that substantially comply with the requirements of this Open Call ;
- (e) verify with any bidder or with a third party any information set out in a bid;
- (f) check references other than those provided by any bidder;
- (g) disqualify a bidder, rescind a notice of selection or terminate a contract subsequently entered into if the bidder has engaged in any conduct that breaches the process rules or otherwise compromises or may be seen to compromise the competitive process;
- (h) cancel this Open Call process at any stage;
- (i) cancel this Open Call process at any stage and issue a new Open Call for the same or similar deliverables;
- (j) accept any bid in whole or in part; or
- (k) reject any or all bids;
- (l) not necessarily select the lowest or any bidder;

And these reserved rights are in addition to any other express rights or any other rights that may be implied in the circumstances.

3.27 Limitation of Liability

By submitting a bid, each bidder agrees that:

- (a) neither the Owner nor any of its employees, officers, agents, elected or appointed officials,

advisors or representatives will be liable, under any circumstances, for any claim arising out of this Open Call process including but not limited to costs of preparation of the bid, loss of profits, loss of opportunity or for any other claim; and

- (b) the bidder waives any right to or claim for any compensation of any kind whatsoever, including claims for costs of preparation of the bid, loss of profit or loss of opportunity by reason of the Owner's decision not to accept the bid submitted by the bidder for any reason, the Owner's decision to enter into an agreement with any other bidder or to cancel this bidding process, and the bidder shall be deemed to have agreed to waive such right or claim.

3.31 Governing Law and Interpretation

These Terms and Conditions of the Open Call Process:

- (a) are intended to be interpreted broadly and independently (with no particular provision intended to limit the scope of any other provision);
- (b) are non-exhaustive and shall not be construed as intending to limit the pre-existing rights of the Owner; and
- (c) are to be governed by and construed in accordance with the laws of the Province of Newfoundland & Labrador and the federal laws of Canada applicable therein.

3.32 Facility Compliance Requirement

- (a) Equipment, power tools, instruments and appliances intended for use within Memorial University's facilities must comply with all regulatory requirements related to use and/or installation in University facilities. This includes but is not limited to certification/listing by recognized agencies, Pressure Vessel Act of Newfoundland and Labrador and similar.
- (b) Items provided related to this open call that receive power from the University's electrical system must be certified or listed for use within Canada by a recognized agency such as Canadian Standards Association (CSA) or Underwriter Laboratories Canada (ULC). A full list of agencies recognized by Memorial University is available upon request.
- (c) Equipment, tools, instruments and appliances that generate pressure may require registration as a pressure system with the Province of Newfoundland and Labrador. Compliance with the Boiler, Pressure Vessel and Compressed Gas Regulations under the Public Safety Act of Newfoundland and Labrador and the Boiler, Pressure Vessel, and Pressure Piping Code CSA B51:19 shall be demonstrated.
- (d) The vendor is responsible for all costs associated with ensuring the system is compliant with legislative requirements and for the application and registration processes. Field certifications may be considered but all costs and efforts for such scenarios are the responsibility of the vendor.

[End of Part 3]

PART 4 – ENVIRONMENTAL HEALTH AND SAFETY REQUIREMENTS

- 4.1** Maintaining a healthy and safe environment for all members of the campus community, as well as visitors, is a priority with the University. This involves a commitment from all sectors of the campus community and extends to outside agencies having occasion to come on campus to conduct business.

The following requirements will apply to all work undertaken by contractors and service personnel on any University property or for any work undertaken on behalf of the Owner.

4.1.0 Regulations, Codes and Standards

Contractors shall be familiar with and abide by provisions of various safety codes and standards applicable to the work performed and should refer to:

The Contractor shall be completely responsible for the safety of the Work as it applies to protection of the public and property and construction of the Work.

The codes that must be followed and enforced for safety are:

- (a) The National Building Code, Part 8, Safety Measures at Construction and Demolition Sites (Latest Edition);
- (b) Canadian Code for Construction Safety (Latest Edition) as issued by the Associate Committee of the National Building Code;
- (c) The Occupational Health and Safety Act of Newfoundland and Labrador (most current version) and Regulations.

In particular, strict adherence to the Provincial Occupational Health and Safety Act and Regulations and with the National Building Code of Canada, Part 8 is required.

4.2.0 General Health and Safety Regulations

- (a) Contractors/service agencies shall ensure that members of the campus community are not endangered by any work or process in which they may be engaged. Work areas shall be adequately barricaded, and if dust or fumes are generated, suitable enclosures shall be installed to contain such emissions.
- (b) No material shall be stored in such a way as to obstruct walkways or represent a danger to pedestrian or vehicular traffic.
- (c) Adequate protection shall be provided to prevent the possibility of goods falling from scaffolding or elevated areas. Areas where goods are being loaded or off loaded shall be barricaded or otherwise protected to prevent unauthorized entry. Appropriate warning signs must be posted.
- (d) The work areas must be kept reasonably clean and free from debris which could constitute a fire hazard. Care must be taken to ensure that the work process does not activate fire

alarm detection devices. (Generation of dust and fumes can activate smoke detectors causing a false alarm).

- (e) Due consideration shall be given to fire safety in buildings. Flammable goods must be kept away from sources of ignition. No work involving the use of open flame devices must be undertaken around flammable solvents or gases.
- (f) Some University buildings contain asbestos and other hazardous materials. Do not alter or disturb any goods believed to contain asbestos (unless this is a duly authorized part of the project). Consult with University officials before proceeding with any work.
- (g) Safety Data Sheets shall be procured for any hazardous product used on campus. Such sheets shall be made readily available for consultation as required under the Workplace Hazardous Materials Information System (WHMIS).
- (h) **Contractors are required to complete the online training module for Memorials Zero Energy Isolation Program (ZEIP) before mobilizing on site. Training can be accessed via the link: <https://ooc.citl.mun.ca/enrol/index.php?id=21>.**
 - **First time users must create an account. Click 'Create new account'. Enter required information and click 'Create my new account'.**
 - **A confirmation email will be sent to the email you entered when creating your account. Open that email and click the link it contains.**
 - **Click 'Zero energy isolation Program for Contractors'.**
 - **To enroll in the training, enter the enrollment key: 7653. Click 'Enroll me'.**
 - **Complete the training according to the instructions provided in the course.**
 - **Successful completion certificates shall be available during auditing by Environmental Health & Safety.**

NOTE: The above requirements are not to be considered all-inclusive and are considered to be complementary to the safety requirements outlined in the agreement between the University and Supplier. Certain conditions and circumstances may require adherence to additional safety requirements.

As a general requirement, contract/service personnel are expected to conduct all work on campus in a professional and safe manner and to give priority to the safety and welfare of members of the campus community.

4.3.0 Contractor Safety Management

4.3.1 All Contractors and Subcontractors to be used by the Contractor in the execution of the Contract shall be required to submit confirmation of a current third party occupational health and safety program certification (Letter of Assurance). These may include, but not be limited to, Certificate of Recognition (COR), OHSAS 18001, and CSA Z.1000.

4.3.2 All Contractors and Subcontractors shall be required to review and follow all requirements of sections 4.4.5.2. below.

4.3.3 Prior to Contract award, the Contractor will be required to provide the Information requested in 4.4.5.2. below.

4.3.4 The University reserves the right to stop any work or portion of work where no documentation can be produced on site which identifies the hazards presented by a piece of work, safe work procedures for work or certification of employees performing work. The Contractor is liable for any costs incurred by affected parties associated with such a stoppage.

4.4.0 Contractor Safety Management Element

4.4.1 Purpose

This element establishes the requirements for the administration and monitoring of contractor health and safety programs and activities at Memorial University. These measures shall ensure that contractors understand their collective responsibility with respect to the Occupational Health & Safety Act and Regulations, Memorial University policy and this element.

4.4.2 Scope

This procedure shall apply to all work done for Memorial University of Newfoundland with respect to the provision of services as outlined below. Memorial University reserves the right to exempt a Contractor from this element, in whole or in part, based upon an evaluation of the risk of the work being conducted. This evaluation must comply with the hazard identification and risk management element.

4.4.3 Definitions

Act: Newfoundland & Labrador Occupational Health & Safety Act, latest edition.

Contract: A documented agreement between Memorial University and a contractor.

Contractor: The principal contractor, person, partnership, or corporation bound to execute the work under the contract and defined as such in the agreement is responsible for the supervision of the work so as to ensure the work is carried out in accordance with the contract.

Project Management Team: The group assigned by the University to act on behalf of the owner with respect to the execution of Contractor work.

Principal Contractor: The person primarily responsible for the carrying out of a contract.

Regulations: Newfoundland & Labrador Occupational Health & Safety Regulations, latest edition.

Subcontractor: A person, firm or corporation having a direct contract with the Contractor or subcontractor(s) to perform a part or parts of the work included in the contract, or to supply products worked to a special design according to the contract documents, but does not include one who merely supplies products not so worked.

Owner: The Owner, Engineer/Architect are the persons, firms or corporation identified as such in the Contract. The term Owner, Engineer/Architect means, respectively, each of the Owner, Engineer/Architect and their authorized representatives as designated by each such party in writing.

Work: The services and job procedure completion that is described in the contract.

4.4.4 Roles and Responsibilities

4.4.4.1 Project Management Team, including Environmental Health & Safety

Will monitor the Contractor's performance for health and safety compliance. Monitoring activities may include but are not limited to:

- planned and unplanned workplace inspections;
- attendance of meetings;
- communications of safety related issues and topics, as deemed necessary;
- review of contractor records, inspections, work practices and documentation; and
- complete audits to verify that contractors and subcontractors are meeting their legislative, procedural and contractual responsibilities.

4.4.4.2 Contractors

Will comply with applicable Federal and Provincial legislation and applicable MUN safety procedures. Contractor responsibilities include but not limited to:

- report all incidents immediately to the required University project team followed by a written incident report within 24 hours;
- be responsible for the safety of subcontractors including those not under their employ;
- stop work if the conditions are such that work cannot be performed safely;
- perform evaluation, monitoring of the workplace to identify potential hazards and associated risks and ensure corrective actions are implemented;
- ensure daily task specific hazard assessments are completed; and
- maintain the accountability of persons responsible for the reporting and correction of hazards.

4.4.5 Procedure

4.4.5.1 Considerations prior to signing of contract

Prior to signing of contract, the preferred General Contractor shall provide proof of compliance with 4.4.4.2. within seven (7) calendar days. After a pre-signing start up meeting, the General Contractor shall provide proof of compliance of themselves and their subcontractors with 4.4.4.2. as well as the information requested in Section 4.4.4.2.(a)(b).

4.4.5.2 Requirements

All Contractors, and their Subcontractors, shall be required to submit confirmation of a current third party occupational health and safety program certification (Letter of Assurance). These may include, but not be limited to, Certificate of Recognition (COR), OHSAS 18001, and CSA Z.1000.

Contractors shall also provide the following:

- (a) health and safety policy statement;
- (b) safety program table of contents; and
- (c) site hazard assessment;

The hazard assessment shall be updated by the General Contractor and re-submitted whenever the conditions, work practices or work forces change to the extent that new hazards can be identified.

In lieu of a Subcontractors 3rd party program, Contractors shall be required to integrate the Subcontractor(s) into the Contractors program and provide proof of same.

Memorial reserves the right to request and audit the full safety program of Contractors and Subcontractors and their associated documentation. This documentation may include, but not be limited to the following:

- (a) safety program and/or manual
- (b) applicable documented safe work practices;
- (c) inspection reports and schedules;
- (d) required employee safety training certifications and qualifications; and
- (e) updated list of OHS Committee and/or a worker health and safety representative, or workplace health and safety designate.

Request for submission shall be complied with within 7 calendar days of a written request from Memorial's Environmental Health and Safety unit.

Memorial reserves the right to:

- (a) Reject any Contractor that fails to meet the requirements or schedules outlined herein;
- (b) The University reserves the right to stop any work or portion of work where the risk presents an immediate danger.

4.4.5.3 Schedule of Submissions

General Contractors and their sub-contractors who have complied with 5.1.1 will be permitted to commence physical work on the site however no work shall be performed by the General Contractor, their sub-contractors until such a time as they comply with 5.1.1.

4.4.6 Post-Contract Evaluation

Environmental Health & Safety will determine the extent of the evaluation of the Contractor's safety performance at the completion of the contract. This evaluation will be conducted by way of a standard contractor safety evaluation form and will be supported by objective evidence documented during the term of the Contract. The records of the evaluation must be retained with the project owner.

4.5 Access To Site

4.5.1 All Contractors and Subcontractors to be used in the execution of the Contract shall give advance notification of when they will be on site. Any work to be performed outside of Regular Time must have advance approval of the Owner.

Any discontinuation of the Work which causes a Contractor or their Subcontractors to suspend operations onsite will require the following:

- Contractor/Subcontractors shall notify the Owner of the stop work date.
- Contractor/Subcontractors shall ensure the site is left in a safe and secure condition.
- Contractor/Subcontractors shall ensure that locks and tags on mechanical and/or electrical systems are removed and, where necessary, replaced by the University.
- Contractor/Subcontractors shall not return to site without expressed prior permission from the Owner.

[End of Part 4]

PART 5– GENERAL CONDITIONS

- 5.1** I/We hereby authorize the Owner to release names of Subcontractors, Suppliers and Manufacturers used in my/our Bid including those as listed in Appendix "D", where such information is requested from the Owner.
- 5.2** I/We understand that Bids that do not list major Subcontractors and Suppliers and Manufacturers where required in Appendix "D" may be rejected.
- 5.3** I/We reserve the right to substitute other Subcontractors and/or Suppliers and/or Manufacturers for any Subcontractor or Suppliers or Manufacturer withdrawing their Bid or becoming bankrupt after the date hereof. Any such substitutes shall be subject to the approval of the Owner and contingent upon evidence of withdrawal or bankruptcy satisfactory to the Owner.
- 5.4** I/We agree that upon approval by the Engineer/Architect, the Owner shall have the right to take possession of any part of the work upon its completion, except for minor deficiency items, and that such possession shall not necessarily constitute acceptance of that part of the work.
- 5.5** I/We understand and agree that the Owner may order changes to the work in the form of additions or deletions in accordance with the General Conditions, Supplementary General Conditions and the intent of the Contract Documents.
- 5.6** I/We understand and agree that the Unit Price Table in Appendix "C2" must be completed where indicated and the total amount included in my/our stipulated price for the total performance of the work under Part 4 of the Bid and Acceptance form. I/We understand that the Unit Prices include all costs and charges of every kind, including overhead and profit, to perform the items of work listed in Appendix "A". I/We also understand that these same Unit Prices will be used for additions or deletions to the actual measured quantities.
- 5.7** When Appendix "E" is included in the Open Call, I/we understand that bids which do not list project references, where required in Appendix "E", will be rejected.

5.8 Corporations Act

The Corporations Act of Newfoundland and Labrador requires that an extra-provincial company be registered before it begins or carries on business in the Province. If your company is not registered, please apply for the appropriate forms and procedures to:

Commercial Registrations Division
Dept. of Government Services, PO Box 8700
St John's, NL Canada A1B 4J6
Phone: 709-729-3317, Fax: 709-729-0232
Website: http://www.gs.gov.nl.ca/registries/companies/corp_art_inc.html

[End of Part 5]

Part 6 – Supplementary Terms and Conditions

6.1 The open call document consist of the Open Call and Acceptance Form, General Conditions of Contract, Supplementary General Conditions of Contract, Special Conditions, Campus Safety and Health Regulations, Contractors Performance Evaluation, Drawings, Specifications and any Addenda to the Contract Documents issued before the open call closing period.

6.2 Bid Surety

Bids shall be accompanied by a copy of a bid security by way of a Bid Bond from a surety company acceptable to the Owner and which is licensed to do business in the Province of Newfoundland and Labrador or a copy of a cheque in the amount of 10 percent of the bid price. Originals to be delivered to Memorial University post tender closing. Bid security will not be required for a total contract value of \$100,000 or less (HST **Excluded**), unless specifically called for in the contract documents. The bid security will be returned to the bidder upon receipt of the required Performance Bond and Labour and Materials Payment Bond as described in the General Conditions for the Stipulated Price Contract

6.3 Site Visit

A site visit may occur at the time and location identified on the Request for Open Calls for Bids Information Sheet.

Questions will not be answered at the site visit.

Before submitting a bid, Bidders may carefully examine the site of the Proposed Work and fully inform themselves of the existing condition and limitations. It is the responsibility of the Bidder to report any unsatisfactory conditions in writing which may adversely affect the proper completion of the work, to opencalls@mun.ca, at least **eight (8)** days before the open call closing date. Submission of a bid shall imply acceptance of previously completed Work and the conditions of the site, and the Contractor shall, therefore, be fully responsible for executing the Work in accordance with the Contract Documents.

6.4 Substitution of Materials

6.4.1 The open call shall be based upon using the materials or products as specified without substitution, unless there is an "or approved alternate" clause. Where two or more brand names are specified, the choice shall be left to the bidder. Where only one brand name is stated, there shall be no substitution.

6.4.2 Where the Specifications include the "or approved alternate" clause, substitutions may be proposed provided that the request for a substitution is received in writing at least eight (8) days (3:00pm NST) prior to the open call closing date and shall clearly define and describe the product for which the substitution is requested. Submissions shall compare in tabular form, to the characteristics and performance criteria of the specified material.

6.4.3 It is the Bidder's responsibility to ensure that the substituted article is equivalent to the specified article with regard to design, function, appearance, durability, operation and quality.

6.4.4 Request for substitutions made after the award of the contract will be subject to the requirements of Clause 2.37.0 MATERIALS AND SUBSTITUTIONS in the General Conditions of the Contract and will only be considered under special circumstances or where it is clear, at the Engineer's/Architect's discretion, that proposed substitution will provide a substantial benefit to the Owner.

6.4.5 Approval of the substitution shall be in the form of an addendum to the Specifications.

The decision on substitutions will be final.

6.5 Completion date

6.5.1 Bidders shall state the time required to complete the Contract from time of open call award. The bidder shall, within seven (7) days after the Contract is award submit a preliminary construction schedule indicating as closely as possible the starting and completion dates for the major sections of the Work.

[End of Part 6]

APPENDIX A – SPECIFICATIONS AND DRAWINGS

**SPECIFICATIONS AND DRAWINGS
LOCATED AT THE END OF THIS DOCUMENT**

APPENDIX B – SUBMISSION FORM

1. Bidder Information

Please fill out the following form, naming one person to be the bidder's contact for the Open Call process and for any clarifications or communication that might be necessary.	
Full Legal Name of Bidder:	
Any Other Relevant Name under which Bidder Carries on Business:	
Street Address:	
City, Province/State:	
Postal Code:	
Phone Number:	
Fax Number:	
Company Website (if any):	
Bidder Contact Name and Title:	
Bidder Contact Phone:	
Bidder Contact Fax:	
Bidder Contact Email:	

2. Offer

The bidder has carefully examined the Open Call documents and has a clear and comprehensive knowledge of the Deliverables required under the Open Call. By submitting a bid, the bidder agrees and consents to the terms, conditions and provisions of the Open Call, including the Form of Agreement, and offers to provide the Deliverables in accordance therewith at the rates set out in the completed Pricing Form (Appendix C1 and/or C2 and/or C3).

3. Rates

The bidder has submitted its rates in accordance with the instructions in the Open Call and in the Pricing Form (Appendix C1 and/or C2 and/or C3). The bidder confirms that it has factored all of the provisions of Appendix A, including insurance and indemnity requirements, into its pricing assumptions and calculations.

4. Addenda

- 4.1** The bidder is deemed to have read and accepted all addenda issued by the Owner. The onus is on bidders to make any necessary amendments to their bids based on the addenda. The bidder is required to confirm that it has received all addenda by listing the addenda numbers in table below: **(Listing of individually the numbers of each Addendum received in the blank space)**

NOTE: FAILURE TO COMPLETE “TABLE: ADDENDA RECEIVED” LOCATED BELOW SHALL RESULT IN BID DISQUALIFICATION:

TABLE 1.10: ADDENDA RECEIVED

Bidders who fail to complete the above table will be deemed to have not received all posted addenda and shall be deemed **non-compliant**.

5. No Prohibited Conduct

The bidder declares that it has not engaged in any conduct prohibited by this Open Call.

6. Disclosure of Information

The bidder hereby agrees that any information provided in this bid, even if it is identified as being supplied in confidence, may be disclosed where required by law or by order of a court or tribunal. The bidder hereby consents to the disclosure, on a confidential basis, of this bid by the Owner to the advisers retained by the Owner to advise or assist with the Open Call process, including with respect to the evaluation of this bid.

7. Bid Irrevocable

The bidder agrees that its tender shall be irrevocable for a period of **45** days running from the moment that the Submission Deadline passes.

8. Execution of Agreement

The bidder agrees that in the event its bid is selected by the Owner, in whole or in part, it will finalize and execute the Agreement in the form set out in Appendix A (or in a form mutually acceptable to the parties) to this Open Call in accordance with the terms of this Open Call . Failure to submit this signature section will render the proposal **NON-COMPLIANT** and the proposal will be disqualified.

APPENDIX C1 – PRICING FORM

1. INSTRUCTIONS ON HOW TO COMPLETE THE PRICING FORM

- Rates must be provided in Canadian Dollars
- Rates quoted by the bidder must be all-inclusive and must include all labor and material costs, all travel and carriage costs, all insurance costs, all costs of delivery to the Owner, all costs of installation and set-up, including any pre-delivery inspection charges, and all other overhead, including any fees or other charges required by law
- Owner: Having carefully examined the site and all conditions affecting the proposed work as well as the Bid Documents including the Drawings and Specifications, all Addenda and the Instructions to bidders, I/We, the undersigned, hereby offer to furnish all necessary labour, materials, superintendence, plant, tools, equipment, etc., required to complete all work requisite and necessary for the proper execution of this Contract, expeditiously and in the satisfactory manner and accept in full payment therefore a stipulated sum of:

	Contract Bid HST EXCLUDED	
A: Module A: All work associated with 1M101		HST Excluded
B: Allowance for Module A (Section 01 21 00)	\$7500	HST Excluded
Complete Module A Work in:	_____	Weeks
C: Module B: All work associated with 1M102		HST Excluded
D: Allowance for Module B (Section 01 21 00)	\$7500	HST Excluded
Complete Module B Work in:	_____	Weeks
E: Total: \$(A+B+C+D)		HST Excluded
Complete Total Work in:	_____	Weeks

NOTE: Bids will be evaluated based on A+B, C+D, or Price E only

I/We agree to commence work within two (2) weeks after the acceptance of my/our Bid and complete the work in **See Table Above** weeks from the acceptance of the Bid and to coordinate the scheduling of our work with that of all Subcontractors working on the Project. The time of completion indicated herein is required and will be a significant factor in assessing bids.

2. THE DELIVERABLES:

FACULTY OF MEDICINE AV UPGRADES TO 1M101 & 1M102 as per specifications listed in
Appendix A

3. MANDATORY SUBMISSION REQUIREMENTS

(a) Submission Form (Appendix B)

Each bid must include a Submission Form (Appendix B) completed and signed by an authorized representative of the bidder.

(b) Each bid must include Pricing Form (Appendix C1) as per instructions on form.

(c) Where Appendix C2 and C3 are required, they must be included in bid submission.

**APPENDIX C2 – UNIT RATES
USE TO OBTAIN UNIT RATE BIDS**

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APPENDIX C3- OPTIONAL SCOPE BIDDING TABLE

1. Substitution acceptance (Approved Alternate) must be in accordance with section no. **6.4 of Part 3 of the Open Call and Acceptance Form**
2. If the sum of all items bid on this bid is in excess of \$100,000.00 (HST **Excluded**) refer to section no. **6.2 Bid Surety of Part 3 of the Open Call and Acceptance Form** to include correct bid surety.
3. Bid shall be inclusive of supply, delivery and installation of all items.
4. Memorial University Reserves the Right to award each item in part, or in whole.
5. Failure to complete Appendix C3 will result in a non-compliant bid.
6. The prices in Appendix C3 will not be used to select a preferred bidder.

Item No.	Bid Item (Item No. Referenced from consultant Appendix A- Specification & Scope)	Amount (HST Excluded)
1	2.7 ADD OPTION- Tiered Lecture Hall- Projection Screens	
2	2.8 ADD OPTION- Tiered Lecture Hall- UPS	
3	2.9 ADD OPTION- Tiered Lecture Hall- Equipment Racks	
4	2.10 ADD OPTION- Tiered Lecture Hall- Wireless Microphone System	
5	2.11 ADD OPTION- Tiered Lecture Hall- Assistive Listening System	
6	2.12 ADD OPTION- Tiered Lecture Hall- Power Amplifiers	
7	2.14 ADD OPTION- Flat Floor Interactive Learning Room- Projection Screens	
8	2.15 ADD OPTION- Flat Floor Interactive Learning Room- UPS	
9	2.16 ADD OPTION- Flat Floor Interactive Learning Room- Equipment Racks	
10	2.17 ADD OPTION- Flat Floor Interactive Learning Room- Wireless Microphone System	
11	2.18 ADD OPTION- Flat Floor Interactive Learning Room- Assistive Listening System	
12	2.19 ADD OPTION- Flat Floor Interactive Learning Room- HDMI Auto-Switchers	
13	2.20 ADD OPTION- Flat Floor Interactive Learning Room- Power Amplifiers	
14	2.21 Unit Price- Network Switch	

BIDDER SIGNATURE FORM:

BIDDERS MUST COMPLETE THE BIDDER SIGNATURE FORM. ANY BIDS RECEIVED WITHOUT THE BIDDER CONTACT FORM COMPLETED WILL BE DEEMED NON-COMPLIANT

(See Part 1 section 1.8 for Electronic Signature acceptance)

Signature of Witness

Signature of Bidder Representative

Name of Witness

Name of Bidder Representative

Title of Bidder Representative

Date

I have the authority to bind the bidder.

**IN SIGNING THIS PAGE AND
SUBMITTING YOUR PROPOSAL, THE
PROONENT ACKNOWLEDGES
HAVING READ, UNDERSTOOD AND
AGREED TO THE TERMS AND
CONDITIONS OF THIS DOCUMENT**

APPENDIX D- LIST OF SUBCONTRACTORS

Herewith is the list of Subcontractors, Suppliers and/or Manufacturers referred to in Section no. **5.1 of Part 5 of the Open Call and Acceptance Form**. The Subcontractors and Suppliers whose bids have been used in the preparation of this Bid must be listed in full including work to be done by own forces (B.O.F.). By Own Forces will be considered valid and satisfactory only if, prior to award, the supplier provides three (3) current (< 3 years) references of satisfactory completion of trade work of similar **scale, scope and complexity** as that described within the Bid documents. Trade certifications may be requested in addition to the references above. The determination of suitability is entirely at the discretion of the owner and shall be based on submitted documentation. The owner may use their knowledge and understanding of experience and performance of the Contractor on past work in lieu of this submission. The list will be subject to the approval of the Owner.

NOTE: FAILURE TO COMPLETE THIS PORTION OF THE BID SUBMISSION SHALL RESULT IN DISQUALIFICATION.

The trades below, if listed, have been identified by the owner, however it is the Bidder’s responsibility to identify all applicable subtrades.

Sample List Only <TO BE EDITED BY PROJECT COORDINATOR/MANAGER>

TRADE/DIVISION	SUBCONTRACTOR - SUPPLIER - MANUFACTURER
Communications	
Specialties	
Controls	
Electrical	
ADD TRADES AS REQUIRED	

APPENDIX E – PROJECT REFERENCE (ROOFING PROJECTS ONLY)

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Appendix F- Mandatory Proponent Information

Mandatory Documents Submitted:

Item	Mandatory Submission Requirement.	Check	Signature
1	AV project schedule GANTT chart with milestones and completion dates meeting the required timelines as indicated in Appendix A. Control and DSP systems programming by Owner requires 30 days from time of substantial completion to complete.		
2	Industry Staff Credentials- must be submitted with bid.		
3	<p>Appendix G Detailed Bill of Materials/ labour/ Project Management/ Warranty support: Responses are to include a complete and accurate list of all electronic and electroacoustic items to be supplied, including wire, showing name of manufacturer, the manufacturer's model number and the unit quantity. This accurate list is a duplicate of Item 16 (Itemization of Supply) with itemized prices added.</p> <p>All labour including but not limited to: installation labour, configuration labour, engineering, project management, commissioning, approvals, and training must also be listed as costed line item entries in this section.</p> <p>Sample template provided.</p>		



DEPARTMENT OF FACILITIES MANAGEMENT

GENERAL CONDITIONS

AND

AGREEMENT BETWEEN OWNER AND CONTRACTOR

FOR

THE STIPULATED PRICE CONTRACT

May 2023

**GENERAL CONDITIONS AND AGREEMENT
BETWEEN OWNER AND CONTRACTOR FOR THE STIPULATED PRICE CONTRACT**

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1.0 GENERAL CONDITIONS

1.1.0 DEFINITIONS

1.1.1 Contract Documents

The Contract Documents consist of the Instructions to bidders, Executed Agreement between the Owner and the Contractor, General Conditions of Contract, Supplementary General Conditions of Contract, Special Conditions, Campus Safety and Health Regulation, Contractor Performance Evaluations, Specifications, Drawings and such other documents forming part of the open call, including all amendments thereto incorporated before their execution and subsequent amendments thereto made pursuant to the provisions of the Contract or agreed upon between the parties. The successful bid and any Addenda to the Specifications issued during the bidding period shall also form part of the Contract Documents.

1.1.2 Owner, Engineer/Architect, Contractor

The Owner, Engineer/Architect and Contractor are the persons, firms or corporation identified as such in the Agreement. The term Owner, Engineer/Architect and Contractor means the Owner, Engineer/Architect and Contractor or their authorized representatives as designated by each party in writing.

1.1.3 Subcontractors

A Subcontractor is a person, firm or corporation having a direct contract with the Contractor to perform a part or parts of the Work included in the Contract, or to supply products worked to a special design according to the Contract Documents, but does not include one who merely supplies products not so worked.

1.1.4 The Project

The Project is the total construction contemplated of which the Work performed under the Contract Documents may be the whole or a part.

1.1.5 The Work

The Work means the total construction and related services required by the Contract Documents.

1.1.6 Place of Work

The Place of Work is the designated site or location of the project of which the Work may be the whole or a part.

1.1.7 Products/Materials/Equipment

The term Products/Materials/Equipment means all materials, machinery, equipment and fixtures forming the Work as required by the Contract Documents but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work and normally referred to as construction machinery and equipment.

1.1.8 Other Contractor

The term Other Contractor means any persons, firm or corporation employed by or having a separate contract directly or indirectly with the Owner for Work other than that required by the Contract Documents.

1.1.9 Time

- a) The Contract Time is the time stated in the Open Call for Bid and Acceptance Form for substantial performance of the Work.
- b) The date of substantial performance of the Work is the date certified by the Engineer/Architect.
- c) The term day, as used in the Contract Documents, shall mean the calendar day.
- d) The term working day means any day observed by the construction industry in the area of the place of the Work.

1.1.10 Substantial Performance of the Work

A Contract shall be deemed to be substantially performed:

- a) When the Work or a substantial part thereof is ready for use or is being used for the purpose intended; and
- b) When the Work to be done under the Contract is capable of completion or correction at a cost of not more than:
 - (i) 3% (Three per centum) of the first two hundred and fifty thousand dollars (\$250,000) of the Contract Price;
 - (ii) 2% (Two per centum) of the next two hundred and fifty thousand dollars (\$250,000) of the Contract Price; and
 - (iii) 1% (One per centum) of the balance of the Contract Price.
- c) When the Work or a substantial part thereof is ready for use or is being used for the purpose intended and where the Work cannot be completed expeditiously for

reasons beyond the control of the Contractor, the value of the remaining Work to be completed shall be deducted from the Contract Price in determining substantial performance.

1.1.11 Total Performance of the Work

Total Performance of the Work shall mean when the entire Work except those items arising from the provision **2.26.0 WARRANTY** has been performed to the requirements of the Contract Documents and is so certified by the Engineer/Architect.

1.1.12 Changes in the Work

Changes in the Work means additions, deletions or other revisions to the Work within the general scope of Work as contemplated by the Contract Documents.

1.1.13 Extra Work

Extra Work means any additional work or service, the performance of which is beyond the scope of Work as contemplated by the Contract Documents.

2.2.0 DOCUMENTS

2.2.1 The Contract Documents shall be signed in triplicate by the Owner and the Contractor.

2.2.2 Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.

2.2.3 In the event of conflicts between Contract Documents, the following shall apply:

- a) Documents of later date shall govern;
- b) Figured dimensions shown on the drawings shall govern even though they may differ from scaled dimensions on the same drawing;
- c) Drawings of larger scale shall govern over those of smaller scale of the same date;
- d) Specifications shall govern over drawings;
- e) Special Conditions shall govern over Specifications;
- f) The General Conditions of Contract shall govern over Specifications;
- g) Supplementary General Conditions shall govern over the General Conditions of the Contract;

h) The Executed Agreement between the Owner and the Contractor shall govern over all documents.

2.2.4 The Contractor will be provided, without charge, up to twelve (12) sets of Contract Documents or parts thereof as are reasonably necessary for the performance of the Work.

2.2.5 The Contractor shall keep a copy of all current Contract Documents and shop drawings on the site, in good order and available to the Engineer/Architect and or their representatives. This requirement shall not be deemed to include the executed Contract Documents.

2.2.6 Drawings, specifications, models and copies thereof furnished to the Contractor are to be used only with respect to the Work. Such documents and models are not to be otherwise used or revised in any manner without the written authorization of the Owner.

2.2.7 Models furnished by the Contractor at the Owner's expense are the property of the Owner.

2.3.0 ADDITIONAL INSTRUCTIONS AND SCHEDULE OF WORK

2.3.1 During the progress of the Work, the Engineer/Architect shall furnish to the Contractor such additional instructions as may be necessary to supplement the Contract Documents. All such instructions shall be consistent with the intent of the Contract Documents.

2.3.2 Additional instructions may include minor changes to the Work which affect neither the Contract Price nor the Contract Time.

2.3.3 Additional instructions may be in the form of drawings, samples, models or written instructions.

2.3.4 Additional instructions will be issued by the Engineer/Architect with reasonable promptness and in accordance with any schedule agreed upon for such instructions.

2.3.5 The Contractor shall prepare and update, as required, a construction schedule indicating the timing of major activities of the Work. The schedule shall be designed to conform with the Contract Time. The schedule shall be submitted to the Engineer/Architect within seven (7) days of the date of the Owner's letter of award. The contractor shall monitor the progress of the Work relative to the schedule and advise the Engineer/Architect of any revisions required as a result of delays, as provided for in **2.5.0 DELAYS**, and indicating what action will be taken to complete the Work within the Contract Time.

2.4.0 ENGINEER/ARCHITECT'S DECISIONS

- 2.4.1** The Engineer/Architect, in the first instance, shall decide on questions arising under the contract Documents and interpret the requirements therein. Such decisions shall be given in writing.
- 2.4.2** The Contractor shall notify the Engineer/Architect in writing within fourteen (14) days of receipt of a decision of the Engineer/Architect referred to in 2.4.1, should they hold that a decision by the Engineer/Architect is in error and/or at variance with the Contract Documents. Unless the Contractor fulfils this requirement, subsequent claims by them for extra compensation arising out of the decision will not be accepted.
- 2.4.3** If the question of error and/or variance is not resolved immediately, and the Engineer/Architect decides that the disputed work shall be carried out, the Contractor shall act according to the Engineer/Architect's written decision.

Any questions of change in Contract Price and/or extension of Contract Time due to such error and/or variance shall be decided as provided in **2.11.0 DISPUTES**.

2.5.0 DELAYS

- 2.5.1** If it can be clearly shown that the Contractor is delayed in the performance of the Work by any act or fault of the Owner, Engineer/Architect, then the Contract Time shall be extended for such reasonable time as the Engineer/Architect may decide in consultation with the Owner and the Contractor. The Contractor shall be entitled to be reimbursed for any costs incurred by them as a result of such a delay occasioned by the act or fault, provided that it can be clearly shown that the Contractor's forces cannot work efficiently elsewhere on the project and that the incurred cost is limited to that which could not reasonably have been avoided.
- 2.5.2** If the Contractor is delayed in the performance of the Work by a Stop Work Order issued by any court or other public authority and providing that such order was not issued as the result of any act or fault of the Contractor or of anyone employed by them directly or indirectly then the Contract Time shall be extended for such reasonable time as the Engineer/Architect may decide in consultation with the Contractor.
- 2.5.3** If the Contractor is delayed in the performance of the Work by civil disorders, labour disputes, strikes, lockouts, (including lockouts decreed or recommended for its members by a recognized Contractor's Association, of which the Contractor is a member) fire, unusual delay by common carriers or unavoidable casualties, or without limit to any of the foregoing, by any cause of any kind whatsoever beyond the Contractor's control, then the Contract Time shall be extended for such reasonable time as may be decided by the Engineer/Architect in consultation with the Owner and the Contractor, but in no case shall the extension of time be less than the time lost as the result of the event causing the delay, unless such shorter extension of time be agreed to by the Contractor.

2.5.4 No extension shall be made for delays unless written notice of claims is given to the Engineer/Architect within fourteen (14) days of its commencement, providing that in the case of the continuing cause of delay one notice shall be necessary.

2.5.5 If no schedule is provided under **2.3.0 ADDITIONAL INSTRUCTIONS AND SCHEDULE OF WORK**, no claim for delay will be considered because of failure to furnish instructions until fourteen (14) days after a demand for such instructions had been made and not then unless such claim is reasonable.

2.6.0 OWNER'S RIGHT TO PERFORM WORK, STOP WORK AND/OR TERMINATE CONTRACT

2.6.1 If the Contractor should be adjudged bankrupt or makes a general assignment for the benefit of creditors because of their insolvency or if a Receiver is appointed on account of their insolvency, the Owner may, without prejudice to any other right or remedy they may have, by giving the Contractor or Receiver or Trustee in Bankruptcy written notice, terminate the Contract. If a Performance Bond has been provided by the Contractor guaranteeing faithful performance of the Work, the Owner shall give written notice to the Surety invoking the terms of the bond.

2.6.2 The Owner may notify the Contractor in writing that they are in default of their contractual obligations, if the Contractor:

- a) Fails to proceed regularly and diligently with the Work; or
- b) Without reasonable cause wholly suspends the carrying out of the Work before the completion thereof; or
- c) Refuses or fails to supply sufficient, properly skilled workmen for proper workmanship, products or construction machinery and equipment for the scheduled performance of the Work within five (5) working days of receiving written notice from the Engineer/Architect except in those cases provided in **2.5.0 DELAYS**; or
- d) Fails to make payments due to their Subcontractors, their Suppliers for their workmen; or
- e) Persistently disregards laws or ordinances, or the Engineer/Architect's instructions; or
- f) Otherwise violates the provisions of their Contract to a substantial degree.

Such written notice by the Owner shall instruct the Contractor to correct the default within five (5) working days from the receipt of the written notice. If a Performance Bond has been provided by the Contractor, a copy of such written notice will be provided to the Surety.

- 2.6.3** If the correction of the default cannot be completed within the five (5) working days specified, the Contractor shall be considered to be in compliance with the Owner's instruction if they:
- a) Commence the correction of the default within the specified time; and
 - b) Provide the Owner with an acceptable schedule for such correction; and
 - c) Complete the correction in accordance with such schedule.
- 2.6.4** If the Contractor fails to correct the default within the time specified or subsequently agreed upon, the Owner may, without prejudice to any other right or remedy they may have:
- a) Correct such default and deduct the cost thereof as certified by the Engineer/Architect from any payment due under the Contract; or
 - b) Terminate the Contract by written notice to the Contractor. If a Performance Bond has been provided by the Contractor, the Owner will provide the Surety with a copy of such notice.
- 2.6.5** If the Owner terminates the Contract under the conditions set out above, they are entitled to:
- a) Take possession of the premises and products and utilize the temporary buildings, plants, tools, construction machinery and equipment, goods and materials, intended for, delivered to and placed on or adjacent to the Work and may complete the Work by whatever method they may deem expedient but without undue delay or expense;
 - b) Withhold any further payments to the Contractor until the Work is finished;
 - c) Upon total performance of the Work, charge the Contractor the amount by which the full cost of finishing the Work as certified by the Engineer/Architect including compensation to the Engineer/Architect for their additional services and a reasonable allowance to cover the cost of any corrections required by **2.26.0 WARRANTY** exceeds the unpaid balance of the Contract Price; or if such cost of finishing the Work is less than the unpaid balance of the Contract Price, pay the Contractor the difference;
 - d) On expiry of the warranty period, charge the Contractor the amount by which the cost of corrections under **2.26.0 WARRANTY** exceeds the allowance provided for such corrections, or if the cost of such corrections is less than the allowance, pay the Contractor the difference;

e) Invoke the terms of the Performance Bond if such Bond has been provided under the Contract.

2.6.6 The Contractor's obligation under the Contract as to the performance of the Work up to the time of termination will remain in force after such termination.

2.7.0 CONTRACTOR'S RIGHT TO STOP WORK AND/OR TERMINATE CONTRACT

2.7.1 If the Owner should be adjudged bankrupt or makes a general assignment for the benefit of creditors or if a Receiver is appointed on account of their insolvency, the Contractor may, without prejudice to any other right or remedy they may have, by giving the Owner written notice, terminate the Contract.

2.7.2 If the Work should be stopped or otherwise delayed for a period of thirty (30) days or more under an order of any court or other public authority and providing that such order was not issued as the result of any act or fault of the Contractor or of anyone directly or indirectly employed by him, the Contractor may, without prejudice to any other right or remedy they may have, by giving the Owner fifteen (15) days' written notice, terminate the Contract.

2.7.3 The Contractor may notify the Owner in writing that the Owner is in default of their contractual obligations if:

- a) The Engineer/Architect fails to issue a certificate in accordance with **2.16.0 CERTIFICATES AND PAYMENTS;**
- b) The Owner fails to pay the Contractor when due any amount certified by the Engineer/Architect and verified by the audit of the Owner;
- c) The Owner violates the provisions of the Contract to a substantial degree.

Such written notice shall advise the Owner that if such default is not corrected within fifteen (15) days from the receipt of the written notice, the Contractor may, without prejudice to any other right or remedy they may have, stop the Work and/or terminate the Contract.

2.7.4 If the Contractor terminates the Contract under the conditions set out above, they shall be entitled to be paid for all work performed including reasonable overhead and profit and for any loss sustained upon products, construction machinery and equipment and other damages as the Contractor may have sustained as a result of the termination of the Contract.

2.8.0 OTHER CONTRACTORS

- 2.8.1** The Owner reserves the right to let separate contracts in connection with the project of which the Work is part or do certain work by their own forces.
- 2.8.2** The Owner shall, in such cases, coordinate the Work and insurance coverage of other Contractors as it affects the Work of this Contract.
- 2.8.3** The Contractor shall coordinate their work with that of other Contractors and connect as specified or shown in the Contract Documents. Any change in the costs incurred by the Contractor in the planning and performance of such work which was not shown or included in the Contract Documents as of the date of signing the Contract, shall be evaluated as provided under **2.14.0 VALUATION AND CERTIFICATION OF CHANGES IN THE WORK** and authorized as provided in **2.13.0 CHANGES IN THE WORK AND EXTRA WORK**.
- 2.8.4** The Contractor shall report to the Engineer/Architect any apparent deficiencies in other Contractor's work which would affect this Contract immediately as they come to their attention and shall confirm such report in writing. Failure by the Contractor to so report shall invalidate any claims against the Owner by reason of the deficiencies of other Contractor's work except as to those of which they were not reasonably aware.

2.9.0 ASSIGNMENT

- 2.9.1** The Contractor shall not assign the Contract or any part thereof or any benefit or interest therein or thereunder without the written consent of the Owner.

2.10.0 SUBCONTRACTORS

- 2.10.1** The Contractor agrees to preserve and protect the rights of the Owner under the Contract with respect to any work to be performed under subcontract. The Contractor shall:
- a) Require their Subcontractors to perform their work in accordance with and subject to the terms and conditions of the Contract Documents; and
 - b) Be fully responsible to the Owner for acts and omissions of their Subcontractors and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by them.

The Contractor, therefore, agrees that they will incorporate all the terms and conditions of the Contract Documents into all Subcontractor Agreements they enter into with their Subcontractors.

- 2.10.2** The Contractor shall employ those Subcontractors proposed by them in writing and accepted by the Owner prior to the signing of the Contract for such portions of the Work as may be designated in the bidding requirements.
- 2.10.3** The Owner may, for reasonable cause, object to the use of a proposed Subcontractor and require the Contractor to employ one of the other Subcontractors.
- 2.10.4** In the event that the Owner requires a change from any proposed Subcontractor, the Contract price shall be adjusted by the difference in cost occasioned by such required change.
- 2.10.5** The Contractor shall not be required to employ as a Subcontractor any person or firm to whom they may reasonably object.
- 2.10.6** The Engineer/Architect may, upon reasonable request and at their discretion, provide to a Subcontractor information as to the percentage of the Subcontractor's work which has been certified for payment.
- 2.10.7** Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and the Owner.

2.11.0 DISPUTES

- 2.11.1** Differences between the parties to the Contract as to the interpretation, application or administration of this Contract or any failure to agree where agreement between the parties is called for, herein collectively called disputes, which are not resolved in the first instances by decision of the Engineer/Architect pursuant to the provisions of **2.4.0 ENGINEER/ARCHITECT'S DECISIONS** shall be settled in accordance with the requirement of the General Conditions.
- 2.11.2** The Claimant shall give written notice of such dispute to the other party no later than fourteen (14) days after the receipt of the Engineer/Architect's decisions given under **2.4.0 ENGINEER/ARCHITECT'S DECISIONS**. Such notice shall set forth particulars of the matters in dispute, the probable scope, extent and value of the dispute and relevant provisions of the Contract Documents. The other party shall reply to such notice no later than fourteen (14) days after they receive or are considered to have received it, setting out in such reply their grounds and other relevant provisions of the Contract Documents.
- 2.11.3** Pending settlement of the dispute, the Engineer/Architect will give such instructions as, in their opinion, are necessary for the proper performance of the Work or to prevent delays pending settlement of the dispute. The parties shall act immediately according to such instructions, it being understood that by so doing neither party will jeopardize any claim they may have. If it is subsequently determined that such instructions were in error or at variance with the Contract Documents, the Owner shall pay the Contractor cost incurred by the Contractor in carrying out such instructions which they were

required to do beyond what the Contract Documents correctly understood and interpreted would have required them to do, including costs resulting from interruption of the Work.

- 2.11.4** It is agreed that no act by either party shall be construed as a renunciation or waiver of any of their rights or recourse, provided they have given the notices in accordance with Paragraph 2.11.2 and have carried out the instructions as provided in Paragraph 2.11.3.
- 2.11.5** If the dispute or claim cannot be resolved to the satisfaction of both parties, either party may refer the matter to such judicial tribunal as the circumstances require.
- 2.11.6** In recognition of the obligation of the Contractor to perform the disputed work as provided in Paragraph 2.11.3, it is agreed that settlement of dispute proceedings may be commenced immediately following the dispute in accordance with the foregoing settlement of dispute procedures.

2.12.0 INDEMNIFICATION

- 2.12.1** Except as provided in Paragraph 2.10.2, the Contractor shall be liable for and shall indemnify and hold harmless the Owner and the Engineer/Architect, their agents and employees from and against all claims, demands, losses, costs, damages, actions, suits or proceedings whatsoever arising under any statute or Common law.
- a) In respect of personal injury to or the death of any person whomsoever arising out of or in the course of or caused by the carrying out of the Work; and
 - b) In respect of any injury or damage whatsoever to any property, real or personal or any chattel real, insofar as such injury or damage arises out of or in the course of or by reason of the carrying out of the Work.
- 2.12.2** The Contractor shall not be liable under Paragraph 2.12.1 if the injury, death, loss or damage is due to any act or neglect of the Owner or Engineer/Architect, their agents or employees.

2.13.0 CHANGES IN THE WORK AND EXTRA WORK

- 2.13.1** The Owner may, without invalidating the Contract, make changes by altering, adding to or deducting from the Work, with the Contract Price and the Contract Time being adjusted accordingly; and
- 2.13.2** No change in the Work shall be made without prior written order from the Owner, and no claim for an addition or deduction to the Contract Price or change in the Contract Time shall be valid unless so ordered and at the same time valued or agreed to be valued as provided in **2.14.0 VALUATION AND CERTIFICATION OF CHANGES IN THE WORK**. Signed faxed copies are acceptable at the discretion of the Owner.

2.14.0 VALUATION AND CERTIFICATION OF CHANGES IN THE WORK

2.14.1 The value of any change shall be determined in one or more of the following methods:

- a) By estimate and acceptance in a lump sum;
- b) By unit prices subsequently agreed upon;
- c) By cost and a fixed or percentage fee.

In the case of changes in the Work valued as outlined in Paragraph 2.14.1(a) (as will be the usual case), the Contractor will submit an itemized estimate of all materials and labour (including Subcontractor's work) to complete the change.

In the case of changes in the Work as valued in Paragraph 2.14.1 (c), the Contractor shall submit detailed invoices, vouchers and time sheets for all materials and labour to complete the change.

The submissions in both cases shall be in the manner acceptable to the Engineer/Architect and will show separately the following percentages for overhead and profit:

- (i) Subcontractors shall include, in the breakdown, their 15 percent mark-up (10 percent of the estimated cost for the overhead and 5 percent for profit).
- (ii) The Contractor shall include, in the breakdown, the percentages as outlined in (i) for the overhead and profit on their portion of the Work.
- (iii) The Contractor shall add 10 percent to the Subcontractor's pricing for their own profit and overhead combined.

2.14.2 Notwithstanding the provisions of Paragraph 2.14.1, in case of changes in the Work, the amount charged for equipment rentals shall be that provided in the rental Contract, and no additional amount shall be paid as markup for overhead or profit for the Contractor or Subcontractor.

2.14.3 When a change in the Work is proposed or required, the Contractor shall present to the Engineer/Architect for approval their claim for the change in the Contract Price and/or change in the Contract Time in a form acceptable to the Engineer/Architect and including the appropriate documentation. The Engineer/Architect shall satisfy themselves as to the correctness of such claim, and when approved by the Owner, a change order will be issued to the Contractor to proceed with the change. The value of Work performed in the change shall be included for payment with the regular certificates for payment.

- 2.14.4** In the case of changes in the Work to be paid for under methods (b) and (c) of Paragraph 2.14.1, the form of presentation of costs and methods of measurement shall be agreed to by the Engineer/Architect and Contractor before proceeding with the change. The Contractor shall keep accurate records, as agreed upon, of quantities or costs and present an account of the cost of the change in the Work, together with vouchers where applicable.
- 2.14.5** If the method of valuation, measurement and the change in Contract Price and/or change in Contract Time cannot be promptly agreed upon, and the change is required to be proceeded with, then the valuation, measurement and the change in Contract Price and/or Contract Time will be subject to final determination in the manner set out in **2.11.0 DISPUTES**. In this case, the Engineer/Architect shall, with the consent of the Owner, issue a written authorization for the change setting out the method of valuation and, if by lump sum, their valuation of the change in Contract Price and/or Contract Time.
- 2.14.6** In the case of a dispute in the valuation of a change authorized in the Work and pending final determination of such value, the Engineer/Architect shall certify the value of the Work performed in accordance with their own evaluation of the change and include the amount with the regular certificates for payment. The Contractor shall keep accurate records of quantities and cost of such work.
- 2.14.7** It is intended in all matters referred to above that both the Engineer/Architect and Contractor shall act promptly.
- 2.14.8** Should the Owner direct the Contractor not to correct work that has been damaged or that was not performed in accordance with the Contract Document, an equitable deduction from the Contract amount by the Architect/Engineer shall be made to compensate the Owner for the uncorrected or uncompleted work.
- 2.14.9** Credits will be based on the net cost of material and labour or the net difference in the unit price quantities.
- 2.15.0 APPLICATION FOR PAYMENT**
- 2.15.1** Applications for payment on account may be made monthly as the Work progresses.
- 2.15.2** Applications for payment shall be made monthly on a date to be agreed upon between the Owner and the Contractor, and the amount claimed shall be for the value proportionate to the amount of the Contract, of the Work performed and products delivered to the site at that date.
- 2.15.3** The Contractor shall submit to the Engineer/Architect, before the first application for payment, a schedule of values of the various parts of the Work aggregating the total amount of the Contract Price and divided so as to facilitate evaluation of applications for payment.

- 2.15.4** This schedule shall be made out in such form and supported by such evidence as to its correctness as the Engineer/Architect may reasonably direct and, when approved by the Engineer/Architect, shall be used as the basis for application for payment.
- 2.15.5** When making application for payment, the Contractor shall submit a statement based upon this schedule. Claims for products delivered to the site but not yet incorporated into the Work shall be supported by such evidence as the Engineer/Architect may reasonably require to establish the value and delivery of the products.
- 2.15.6** With each monthly claim for payment, except the first, the Contractor shall submit a Statutory Declaration attesting that they have made all payments to Subcontractors, Suppliers, and workmen on behalf of whom amounts were included in the previous claim for payment.
- 2.15.7** Applications for release of holdback monies following the substantial performance of the Work and the application for final payment shall be made at the time in the manner set forth in **2.16.0 CERTIFICATES AND PAYMENTS**.
- 2.15.8** For **all** projects, it should be clearly understood that the University's policy is as follows:
- a) Each Progress Claim must be accompanied by a breakdown indicating amounts included for each Subcontractor;
 - b) When the University makes a Progress Payment, it is made in prorated amounts on behalf of those Subcontractors for whom amounts have been included in the corresponding Progress Claim;
 - c) The Contractor submitting the Progress Claim **must** make payment of the amounts included for the various Subcontractors to the various Subcontractors within ten (10) working days of issuance of the Progress Payment by the University.
 - d) Monthly payment amounts are not final or conclusive as to their value or quality of work performed and are subject to reopening and readjustment
- 2.15.9** Contractors not following the above procedures will be considered to be in default of their Contract, and the University may proceed in accordance with **Article 2.6.0 OWNER'S RIGHT TO PERFORM WORK, STOP WORK AND/OR TERMINATE CONTRACT** Subsection **2.6.2 (d)** of the General Conditions.

2.16.0 CERTIFICATES AND PAYMENTS

2.16.1 The Engineer/Architect shall, within ten (10) days of receipt of an application for payment from the Contractor submitted in accordance with **2.15.0 APPLICATION FOR PAYMENT**, issue a certificate for payment in the amount applied for or such amount as they shall determine to be properly due. If the Engineer/Architect amends the application, they shall promptly notify the Contractor in writing, giving their reason(s) for the amendment.

2.16.2 The Owner shall, within thirty (30) days of receipt and approval by the Owner of a certificate for payment from the Engineer/Architect, make payment to the Contractor on account.

2.16.3 Notwithstanding any other provisions of the Contract:

- a) Where legislation permits and where, upon application by the Contractor, the Engineer/Architect has certified that a Subcontract has been totally performed to their satisfaction prior to the Substantial Performance of this Contract, the Owner may, at their discretion, pay the Contractor the holdback retained for such Subcontractor on the day following the expiration of the Statutory Limitations Period stipulated in the Mechanic's Lien Act applicable to the place of the Work and subject to the following conditions:
 - (i) A copy of the Contract between the Subcontractor and the General Contractor must be submitted.
 - (ii) The Subcontract is completed without deficiencies.
 - (iii) The warranty for the Subcontract will not start until Substantial Performance of the General Contract.
 - (iv) The General Contractor provides an approved Statutory Declaration that all monies have been paid to the said Subcontractor.
 - (v) The General Contractor provides an approved Waiver of Lien from this Subcontractor.
 - (vi) The Contractor and the Subcontractor provide an approved Waiver of Claim for all work associated with this Subcontractor.
 - (vii) A certificate is issued by the Engineer/Architect indicating that the Subcontract has been totally completed to their satisfaction.
 - (viii) The Owner will, at that time, release the total amount specified on the Subcontractor's Contract.

- 2.16.4** Notwithstanding the provisions of Paragraph 16.3 (a) and notwithstanding the wording of such certificate, the Contractor shall ensure that such work is protected pending the Total Performance of the Contract and be responsible for the correction of any defects in it regardless of whether or not they were apparent when such certificates were issued.
- 2.16.5** The Engineer/Architect shall within ten (10) days of receipt of an application from the Contractor for a Certificate of Substantial Performance make an inspection and assessment of the Work to verify the validity of the application. The Engineer/Architect shall within seven (7) days of their inspection notify the Contractor of their approval or the reasons for their disapproval of the application. When the Engineer/Architect finds the Work to be substantially performed, they shall issue such a certificate. The date of this certificate shall be the date of Substantial Performance of the Contract. Immediately following the issuance of the Certificate of Substantial Performance, the Engineer/Architect, in consultation with the Contractor, shall establish a reasonable date for the Total Performance of the Contract.
- 2.16.6** Following the issuance of the Certificate of Substantial Performance and upon receipt from the Contractor of all documentation called for in the Contract Documents, the Engineer/Architect shall issue a Certificate for Payment of holdback monies, providing that no lien or privilege claims against the Work exists, that the Contractor has submitted to the Owner a sworn statement that all accounts for labour, Subcontracts, products, construction machinery and equipment and any other indebtedness which may have been incurred by the Contractor in the Substantial Performance of the Work and for which the Owner might in any way be held responsible, have been paid in full and that the Contractor has submitted to the Owner a waiver of all claims associated with this project except holdback monies properly retained. The holdback monies will become due and payable on the day following the expiration of the Statutory Limitation Period stipulated in the Mechanic's Lien Act applicable to the place of buildings. The Owner may retain out of such holdback monies any sum required by law to satisfy any liens against the Work or other monetary claims against the Contractor which may be enforceable against the Owner.
- 2.16.7** The Engineer/Architect shall, within ten (10) days of receipt of an application from the Contractor for payment upon Total Performance of the Contract, make an inspection and assessment of the Work to verify the validity of the application. The Engineer/Architect shall, within seven (7) days of their inspection, notify the Contractor of their approval or the reasons for their disapproval of the application. When the Engineer/Architect finds the Work to be totally performed to their satisfaction, they shall issue a Certificate of Total Performance and certify for payment the remaining monies due to the Contractor under the Contract, less any holdback monies which are required to be retained. The date of this certificate shall be the date of Total Performance of the Contract. The Owner shall, within thirty (30) days of issuance of such certificate, make payment to the Contractor in accordance with the provisions of the Contract.
- 2.16.8** The release of any remaining holdback monies shall become due and payable on the day following the expiration of the Statutory Limitation period stipulated in the

Mechanics' Lien Act of the place of building provided that no claims against the Work exists and that the Contractor has submitted to the Owner a sworn statement that all accounts for labour, Subcontractors, products, construction machinery and equipment and any other indebtedness which may have been incurred by the Contractor in the Total Performance of the Work and for which the Owner might in any way be held responsible have been paid in full, except holdback monies properly retained.

2.16.9 No certificate for payment, any payment made thereunder or any partial or entire use of occupancy of the Work by the Owner shall constitute an acceptance of any work or products not in accordance with the Contract Documents.

2.16.10 As of the date of Total Performance of the Work as set out in the Certificate of Total Performance of the Work, the Owner expressly waives and releases the Contractor from all claims against the Contractor including, without limitation, those that might arise from the negligence or breach of Contract by the Contractor except one or more of the following:

- a) Those made in writing prior to the date of the Total Performance of the Work and still unsettled;
- b) Those arising from the provisions of **2.12.0 INDEMNIFICATION** or **2.26.0 WARRANTY**;
- c) Those made in writing within a period of six (6) years from the date of Substantial Performance of the Work, as set out in the Certificate of Substantial Performance of the Work or within such shorter period as may be prescribed by any Limitation Statute of the Province of Newfoundland and Labrador and arising from any liability of the Contractor for damages resulting from their performance of the Contract with respect to substantial defects or deficiencies in the Work for which the Contractor is proven responsible.

As used herein, "substantial defects or deficiencies" means those defects or deficiencies in the Work which affect the Work to such an extent or in such manner that a significant part or the whole of the Work is unfit for the purpose intended by the Contract Documents.

2.16.11 As of the date of Total Performance of the Work, as set out in the Certificate of Total Performance of Work, the Contractor expressly waives and releases the Owner from all claims against the Owner including, without limitation, those that might arise from the negligence or breach of Contract by the Owner except those made in writing prior to the Contractor's application for payment upon Total Performance of the Work and still unsettled.

2.16.12 In the event of conflict between the provisions of the General Conditions and **2.24.0 DAMAGES AND MUTUAL RESPONSIBILITY**, the provisions of this General Condition shall govern.

2.16.13 The holdback to be used by the Engineer/Architect when issuing certificates of payment will be ten (10) percent of the value of the Work completed at the date of Contractor's claim.

2.16.14 Notwithstanding any other provision of this Contract, the Owner may:

- a) In the event of a claim by the Owner against the Contractor for damages arising out of the performance or non-performance of the Contract, withhold payment of any amount equal to the alleged damages until the liability for damages is established, and no amount of interest will be paid on amounts held under this Clause;
- b) Set-off amounts owing by the Contractor to the Owner;
- c) Following the issuance of the Certificate of Substantial Performance, withhold payment of an amount equal to twice the cost as estimated by the Engineer/Architect of remedying deficiencies until the issuance of a Certificate of Total Performance, and no amount of interest will be paid on amounts held under this Clause.

2.17.0 TAXES AND DUTIES

2.17.1 Unless otherwise stated in the Supplementary General Conditions, the Contractor shall pay all applicable government sales taxes, goods and services taxes, customs duties and excise taxes with respect to the Contract.

2.17.2 Any increase or decrease in costs to the Contractor due to changes in such taxes and duties after the date of the Agreement and up to the agreed date of completion shall increase or decrease the Contract Price accordingly. If the Owner so desires, the Contractor is to cooperate with the Engineer/Architect and Owner and permit access to books and records in order to establish the amount of such taxes involved.

2.17.3 The Contractor shall maintain full records of their estimates and of actual costs to them of the Work, together with all proper open calls, quotations, contracts, correspondence, invoices, receipts, payments to Subcontractors and Suppliers and vouchers relating thereto and shall make them available to audit and inspection by the Owner, the Auditor General for Newfoundland and Labrador or by persons acting on their behalf and shall furnish them with any information which they may require from time to time in connection with such records.

2.18.0 LAWS, NOTICES, PERMITS AND FEES

2.18.1 The laws of the Province of Newfoundland and Labrador shall govern the Work.

2.18.2 The Contractor shall obtain all permits, licenses and certificates and pay all fees required for the performance of the Work which are in force at the date of open call closing with the following exceptions:

- a) The Contractor shall obtain building permits for the Work but are not required to pay for said permits.
- b) The Contractor shall not include the obtaining of permanent easements or rights of servitude.

2.18.3 The Contractor shall give all required notices and comply with all laws, ordinances, rules, regulations, codes and order of all authorities having jurisdiction relating to the Work, to the preservation of the public health and construction safety which are or become in force during the performance of the Work.

2.18.4 The Contractor shall not be responsible for verifying that the Contract Documents are in compliance with the applicable laws, ordinances, rules, regulations and codes relating to the Work. If the Contract Documents are a variance therewith or changes which necessitate modifications to the Contract Documents are required by the authorities having jurisdiction subsequent to the Open call closing date, the Contractor shall notify the Engineer/Architect in writing requesting direction immediately when any such variance or change is observed by them. The Engineer/Architect will make the changes required to the Contract Documents, and the Contract Price and/or Contract Time shall be adjusted in accordance with **2.13.0 CHANGES IN THE WORK AND EXTRA WORK** and evaluated in accordance with **2.14.0 VALUATION AND CERTIFICATION OF CHANGES IN THE WORK**.

2.18.5 If the Contractor fails to notify the Engineer/Architect in writing and obtain their direction as required in 2.18.4 and performs any work knowing it to be contrary to any laws, ordinances, rules, regulation, codes and orders of any authority having jurisdiction, they shall be responsible for and shall correct any violations thereof and shall bear all costs, expense and damages, attributable to their failure to comply with the provisions of such laws, ordinances, rules, regulations, codes and orders.

2.19.0 PATENT FEES

2.19.1 The Contractor shall pay all royalties and patent license fees required for the performance of the Contract and such royalties or fees shall be deemed to have been included in the Contract Price. They shall hold the Owner harmless from and against all claims, demands, losses, costs, damages, actions, suits or proceedings arising out of the Contractor's performance of the Contract which are attributable to an infringement or an alleged infringement of any patent or invention by the Contractor or anyone for whose acts they may be liable.

2.19.2 The Owner shall hold the Contractor harmless against all claims, demands, losses, costs, damages, actions, suits or proceedings arising out of the Contractor's performance of the Contract which are attributable to an infringement or an alleged

infringement of any patent or invention in executing anything for the purpose of the Contract, the model, plan or design of which was supplied to the Contractor by the Owner.

2.20.0 WORKERS' COMPENSATION

2.20.1 The Contractor shall be registered with and shall remain in good standing with the Workplace Health and Safety Compensation Commission during the term of their Contract.

2.20.2 At any time during the term of the Contract when requested by the Owner, the Contractor shall provide evidence of compliance by themselves and any or all of their Subcontractors.

2.21.0 LIABILITY INSURANCE

2.21.1 Comprehensive General Liability Insurance

- a) Without restricting the generality of **2.12.0 INDEMNIFICATION**, the Contractor shall provide and maintain, either by way of a separate policy or by an endorsement to their existing policy, Comprehensive General Liability Insurance acceptable to the Owner and subject to limits set out in detail below, inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof.
- b) The insurance shall be in the joint names of the Contractor and the Owner. It shall also cover as named Insureds all Subcontractors and anyone employed directly or indirectly by the Contractor or their Subcontractors to perform a part or parts of the Work but excluding Suppliers whose only function is to supply and/or transport products to the project site.
- c) The insurance shall also include as Named Insureds the architectural and engineering consultants of the Owner and Engineer/Architect.
- d) The insurance shall preclude subrogation claims by the Insurer against anyone insured thereunder.
- e) The Comprehensive General Liability Insurance will not be limited to, but shall include coverage for:
 - (i) Premises and Operations Liability
 - (ii) Products or Completed Operations Liability
 - (iii) Blanket Contractual Liability

- (iv) Cross Liability
- (v) Elevator and Hoist Liability
- (vi) Contingent Employer's Liability
- (vii) Personal Injury Liability arising out of false arrest, detention or imprisonment or malicious prosecution, libel, slander or defamation of character, invasion of privacy or wrongful entry
- (viii) Shoring, blasting, excavating, underpinning, demolition, pile driving and caisson work, work below ground surface, tunnelling and grading, as applicable
- (ix) Liability with respect to non-owned, licensed vehicles.

2.21.2 The Contractor shall provide and maintain liability insurance in respect of owned licensed vehicles subject to limits set out in detail in Article **2.21.0 LIABILITY INSURANCE** subsection **2.21.6**.

2.21.3 All liability insurance shall be maintained continuously until twelve (12) months after the date the Engineer/Architect issues a Certificate of Substantial Performance.

2.21.4 The Contractor shall provide the Owner with evidence of all liability insurance prior to the commencement of the Work and shall promptly provide the Owner with a certified true copy of each insurance policy.

2.21.5 All liability insurance policies shall contain an endorsement to provide all Named Insureds with prior notice of changes and cancellations. Such endorsements shall be in the following form:

"It is understood and agreed that the coverage provided by this policy will not be changed or amended in any way nor cancelled until thirty (30) days after written notice of such change or cancellation shall have been given to all Named Insureds."

2.21.6 The Contractor shall protect themselves and indemnify and save the Owner harmless from any and all claims which may arise from the Contractor's performance or failure of performance of the Contract and for this purpose shall, without restricting the generality of the foregoing, maintain insurance acceptable to the Owner to the following limits:

- a) Where the contract value exceed \$100,000 (**Excluded** of HST)
 - Comprehensive General Liability = \$3,000,000.00;
 - Standard Automobile Policy Liability = \$3,000,000.00.

b) Where the contract value is less than \$100,000 (**Exclusive** of HST)

- Comprehensive General Liability = \$2,000,000.00;
- Standard Automobile Policy Liability = \$2,000,000.00.

Prior to the commencement of any work hereunder, the Contractor shall file with the Owner a copy of each insurance policy and certificate required.

2.22.0 PROPERTY INSURANCE

2.22.1 The Contractor shall provide and maintain property insurance acceptable to the Owner insuring the full value of the Work in the amount of the replacement cost or the Contract value, whichever is greater, and the full value as stated of products for incorporation into the Work. The insurance shall be in the joint names of the Contractor, the Owner, the Subcontractors as Unnamed Insured or, if they specifically request, as Named Insured. The policies shall preclude subrogation claims by the Insurer against anyone insured thereunder.

2.22.2 Such coverage shall be provided by EITHER an ALL RISKS Builders' Risk Policy OR by a combination of a Coverage and Malicious Damage Endorsements and a Builder's Risk Difference in Conditions Policy providing equivalent coverage of Piers, Wharves and Docks, Government Structures Policy.

2.22.3 The policies shall insure against all risks of direct loss or damage. Such coverage shall apply to:

- a) All products, labour and supplies of any nature whatsoever, the property of the Insureds or of others for which the Insureds may have assumed responsibility, to be used in or pertaining to the site preparations, demolition of existing structures, erections and/or fabrication and/or reconstruction and/or repair of the insured project, while on the site or in transit, subject to the exclusion of the property specified.
- b) The installation, testing and any subsequent use of machinery and equipment including boilers, pressure vessels or vessels under vacuum.
- c) Damage to the Work caused by an accident to and/or the explosion of any boiler(s) or pressure vessel(s) forming part of the Work.

Such coverage shall exclude construction machinery, equipment, temporary structural and other temporary facilities, tools and supplies used in the construction of the Work and which are not expendable under the Contract.

2.22.4 The Contractor shall provide the Owner with evidence of all insurance prior to the commencement of the Work and shall promptly provide the Owner with a certified true copy of each insurance policy.

Policies provided shall contain an endorsement to provide all Named Insureds with prior notice of changes and cancellations. Such endorsements shall be in the following form:

"It is understood and agreed that the coverage provided by this policy will not be changed or amended in any way or cancelled until thirty (30) days after written notice of such change or cancellation shall have been given to all Named Insureds."

- 2.22.5** All such insurance shall be maintained continuously until ten (10) days after the date the Engineer/Architect issues a certificate of Total Performance. All such insurance shall provide for the Owner to take occupancy of the Work or any part thereof during the terms of this insurance. Any increase in the cost of this insurance arising out of such occupancy shall be at the Owner's expense.
- 2.22.6** The policies shall provide that, in the event of a loss, payment for damage to the Work shall be made to the Owner and the Contractor as their respective interests may appear. Damage shall not affect the rights and obligations of either party under the Contract except that the Contractor shall be entitled to such reasonable extension of time for Substantial and Total Performance of the Work as the Engineer/Architect may decide.
- 2.22.7** The Contractor and/or their Subcontractors, as may be applicable, shall be responsible for any deductible amounts under the policies and for providing such additional insurance as may be required to protect the Insureds against loss on items excluded from the policies.
- 2.22.8** When this Contract pertains to a new building or structure with a total bid amount greater than \$25,000.00, the Contractor shall maintain All Risk Builder's Risk Insurance acceptable to the Owner in the joint names of the Owner and Contractor in the amount of 100 percent of the total value of the Work done and material delivered to the site and payable to the Owner and Contractor as their respective interest may appear.

2.23.0 PROTECTION OF WORK AND PROPERTY

- 2.23.1** The Contractor shall protect the property adjacent to the project site from damage as the result of their operations under the Contract.
- 2.23.2** The Contractor shall protect the Work and the Owner's property from damage and shall be responsible for any damage which may arise as the result of their operations under the Contract except damage which occurs as the result of:
- a) Errors in the Contract documents; and/or
 - b) Acts or omissions by the Owner, their agents, employees or other Contractors.

2.23.3 Should the Contractor, in the performance of this Contract, damage the Work and/or Owner's property and/or property adjacent to the place of the Work, the Contractor shall be responsible for making good such damage at their own expense or pay all costs incurred by others in making good such damage.

2.23.4 Should any damage occur to the Work and/or Owner's property for which the Contractor is not responsible as provided in of **2.12.0 INDEMNIFICATION**, they shall make good such damage to the Work and, if the Owner so directs, to the Owner's property, and the contract Price and Contract Time shall be adjusted in accordance with in **2.13.0 CHANGES IN THE WORK AND EXTRA WORK** and evaluated in accordance with in **2.14.0 VALUATION AND CERTIFICATION OF CHANGES IN THE WORK**.

2.23.5 The Contractor shall be completely responsible for the safety of the Work as it applies to protection of the public and property and construction of the Work.

The codes that must be followed and enforced for safety are:

- a) The National Building Code, Part 8, Safety Measures at Construction and Demolition Sites (Latest Edition);
- b) Canadian Code for Construction Safety (Latest Edition) as issued by the Associate Committee of the National Building Code;
- c) The Occupational Health and Safety Act (1979) and Regulations.

2.23.6 Any person not following stipulated safety regulations shall be dismissed.

2.24.0 DAMAGES AND MUTUAL RESPONSIBILITY

2.24.1 If either party to this Contract should suffer damage in any manner because of any wrongful act or neglect of the other party or anyone employed by them then they shall be reimbursed by the other party for such damages. The party reimbursing the other party shall be subrogated to the rights of the other party in respect of such wrongful act or neglect if it be that of a third party.

2.24.2 Claims under this Contract shall be made in writing to the party liable within two (2) weeks after the first observance of such damage and may be adjusted by agreement or in the manner set out in **2.11.0 DISPUTES**.

2.24.3 If the Contractor has caused damage to any other Contractor on the Work, the Contractor agrees upon due notice to settle with such other Contractor by agreement or arbitration, if they will so settle. If such other Contractor sues the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor and may require the Contractor to defend the action at the Contractor's expense. If

any final order or judgment against the Owner arises therefrom, the Contractor shall pay or satisfy it and pay all costs incurred by the Owner.

2.24.4 If the Contractor becomes liable to pay or satisfy any final order, judgment or award against the Owner then the Contractor, upon undertaking to indemnify the Owner against any and all liability for costs, shall have the right to appeal in the name of the Owner such final order or judgment to any and all courts of competent jurisdiction.

2.24.5 Should the Contractor fail to meet the date to substantially perform the Work, as indicated in the Agreement between the Owner and the Contractor, and is unable to provide justification acceptable to the Owner for the delay then the Contractor will be held liable for any liquidated damage amount indicated in **3.0 SUPPLEMENTARY GENERAL CONDITIONS** and may be held liable for payment to the Owner for other damages and losses suffered by the Owner as a result of the Contractor's delay including additional costs for Engineering/Architectural supervision.

2.25.0 BONDS

2.25.1 The Contractor shall promptly provide the Owner the surety bonds called for in the Open call Documents.

2.25.2 All such bonds shall be issued by a duly incorporated surety company approved by the Owner and authorized to transact a business or surety-ship in the Province of Newfoundland and Labrador.

2.25.3 If bonds are called for in the and Acceptance form, Instructions to Bidders or Supplementary General Conditions, the costs attributable to providing such bonds shall be included in the bid price.

2.25.4 Should the Owner require the provision of a bond or bonds by the Contractor other than those provided for under 2.25.3, the Contract Price shall be increased by all costs attributable to providing such bonds.

2.26.0 WARRANTY

2.26.1 The Contractor shall be responsible for the proper performance of the Work to the extent that the design and specifications permit such performance.

2.26.2 Subject to Paragraph 2.26.1, the Contractor agrees to correct promptly, at their own expense, defects or deficiencies in the Work which appear prior to and during the period of one (1) year from the date of Substantial Performance of the Work or such longer periods as may be specified for certain products or work.

2.26.3 The Contractor shall correct and/or pay for any damage to other work resulting from any corrections required under the conditions of Paragraph 2.26.2.

2.26.4 Neither the Engineer/Architect's final certificate nor payment thereunder shall relieve the Contractor from their responsibility hereunder.

2.26.5 The Owner and/or Engineer/Architect shall give the Contractor written notice of observed defects promptly.

2.27.0 CONTRACTOR'S RESPONSIBILITIES AND CONTROL OF THE WORK

2.27.1 The Contractor shall have complete control of the Work and shall effectively direct and supervise the Work so as to ensure conformance with the requirements of the Contract Documents. They shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all parts of the Work under the Contract.

2.27.2 The Contractor shall have the sole responsibility for the design, erection, operation, maintenance and removal of temporary structural and other temporary facilities and the design and execution of construction methods required in their use. The Contractor shall engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform these functions where required by law or by the Contract Documents and, in all cases, where such temporary facilities and their method of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.

2.27.3 Notwithstanding the provision of Paragraphs 2.27.1 and 2.27.2 above or any provisions to the contrary elsewhere in the Contract Documents where such Contract Documents include designs for temporary structural and other temporary facilities or specify a method of construction in whole or in part, such facilities and methods shall be deemed to comprise part of the overall design of the Work, and the Contractor shall not be held responsible for that part of the design or the specified method of construction. The Contractor shall, however, be responsible for the execution of such design or specified method of construction in the same manner that they are responsible for the execution of the Work.

2.27.4 The Contractor shall carefully examine the Contract Documents and shall promptly report to the Engineer/Architect any error, inconsistency or omission they may discover. The Contractor shall not be held liable for any damage resulting from any such errors, inconsistencies or omissions in the Contract Documents which they may discover, and they shall not proceed with the Work affected until they have received corrected or missing information from the Engineer/Architect.

2.28.0 PROJECT MANAGER AND SUPERINTENDENCE

2.28.1 The Contractor shall employ a competent Project Manager and necessary assistants who shall be in attendance at the Work site at all times while the Work is being performed.

2.28.2 The Project Manager shall be satisfactory to the Engineer/Architect and shall not be changed except for good reason and only then after consultation with an agreement by the Engineer/Architect.

The Project Manager shall have a minimum of ten (10) years' experience on construction projects of similar scale, complexity, type and value.

The project manager shall submit a resume and cover letter.

2.28.3 The Superintendent shall represent the Contractor at the place of work and instructions given to them by the Engineer/Architect shall be held to have been given to the Contractor. Important instructions shall be confirmed to the Contractor in writing, other instructions will be so confirmed if requested.

The superintendent shall have a minimum of ten (10) years' experience on construction projects of similar scale, complexity, type and value.

2.29.0 LABOUR AND PRODUCTS

2.29.1 Unless otherwise stipulated elsewhere in the Contract Documents, the Contractor shall provide and pay for all labour, products, tools, construction equipment and machinery, water, heat, light, power, transportation and other facilities and services necessary for the requirements of the Contract Documents.

2.29.2 All products provided shall be new unless otherwise specified in the Contract Documents. Any products which are not specified shall be of a quality best suited to the purpose required, and their use shall be subject to the approval of the Engineer/Architect.

2.29.3 In carrying out their duties under this Contract, the Contractor shall comply with all Provincial and Federal legislation respecting labour and the employment of labour, where applicable, including the Labour Standards Code and shall not operate in conflict with the Human Rights legislation. In the employment of labour, preference should be given to persons normally residing in Newfoundland and Labrador.

2.29.4 The Contractor and Subcontractors shall maintain and keep available for inspection by the Owner, a record of the names and addresses of all persons employed on the project.

2.29.5 The Contractor shall maintain good order and discipline among their employees engaged on the Work and shall employ on the Work only employees skilled in their various trades.

2.29.6 There shall be no discrimination in the selection of workers for employment on the project in respect to race, religion, views or political affiliation, and the office of the Canada Manpower will be used in the recruitment of workers wherever possible.

- 2.29.7** The Contractor shall pay fair wages and shall pay rates of wages and allowances to the various classes of labour not less favourable than those prevailing in the area where the Work is being performed.
- 2.29.8** The Contractor shall be aware that the majority of hourly-paid and maintenance workers employed within the University are unionized. It is of utmost importance that

any labour force used by the Contractor neither disrupts or be disrupted by any labour conditions existing on the University campus. Failure by the Contractor to familiarize themselves with labour conditions on Campus or disruptions to the Contractor's own labour force because of labour conditions on Campus will not relieve them of their obligations to furnish all labour and materials necessary to carry out the requirements of the Contract.

2.30.0 SUBSURFACE CONDITIONS

2.30.1 The Contractor shall promptly notify the Engineer/Architect in writing if, in their opinion, the subsurface conditions at the project site differ materially from that indicated or reasonably inferred from the Contract Documents.

2.30.2 After prompt investigation, should the Engineer/Architect determine that conditions do differ materially, they shall issue appropriate instructions for changes in the Work as provided for in **2.13.0 CHANGES IN THE WORK AND EXTRA WORK**.

2.31.0 USE OF THE WORK

2.31.1 The Contractor shall confine their apparatus, the storage of products and the operations of their employees to limits indicated by laws, ordinances, permits or by instructions of the Engineer/Architect and shall not unreasonably encumber the premises with their products.

2.31.2 The Contractor shall not load or permit to be loaded any part of the Work with a weight or force that will endanger its safety.

2.31.3 Unless otherwise provided, the Contractor shall, at their own expense and without expense to the Owner, make suitable provision to accommodate all traffic, either pedestrian or vehicular, over or around the project upon which work is being performed in a manner satisfactory to the Engineer/Architect.

2.31.4 The Contractor shall provide and maintain at their own expense such fences, barriers, signs, lights and watchmen as may be necessary to prevent avoidable accidents to University Users or to the public generally.

2.31.5 All work shall be executed with the least possible interference with or disturbance to personnel and the Public. The Contractor shall cooperate with the person in charge of the premises. The Contractor shall ascertain from the Owner's representative the hours during which the work shall be performed, conform to the directions of the representative and to the directions of the said representative in determining the order in which the work shall be done.

2.31.6 The Contractor shall carry out all work required to maintain the building services and to provide necessary access for personnel and vehicles whenever new work affects occupied portions of the building.

2.31.7 Before final completion of the work, the Owner shall be entitled to make use of any portion of the work which is completed and fit for use for the installation of equipment, storage and furniture, supplies, etc., and for occupancy, if such can be arranged without interfering with the progress of the work.

2.32.0 CUTTING AND REMEDIAL WORK

2.32.1 The Contractor shall do all cutting and remedial work that may be required to make the several parts of the Work come together properly and shall coordinate the Work to ensure that this requirement is kept to a minimum.

2.32.2 Should the Owner, the Engineer/Architect, other contractors or anyone employed by them, be responsible for ill-timed work necessitating additional cutting and/or remedial work to be performed, it shall be valued as provided in **2.14.0 VALUATION AND CERTIFICATION OF CHANGES IN THE WORK** and added to the Contract Price.

2.32.3 Cutting and remedial work shall be performed by specialists familiar with the materials affected and shall be performed in a manner to neither damage nor endanger any work.

2.33.0 INSPECTION OF WORK

2.33.1 The Owner, the Engineer/Architect and their authorized representatives shall have access to the Work for inspection wherever it is in preparation or progress. The Contractor shall cooperate to provide reasonable facilities for such access.

2.33.2 If parts of the Work are designated for special tests, inspections or approvals in the Contract Documents or by the Engineer/Architect's instructions or the laws or ordinances of the place of the Work, the Contractor shall give the Engineer/Architect timely notice requesting inspection. Inspection by the Engineer/Architect shall be made promptly. The Contractor shall arrange for inspections by other authorities and shall notify the Engineer/Architect with timely notice of the date and time.

2.33.3 If the Contractor covers or permits to be covered any of the Work that is designated for special tests, inspections or approvals, before such special tests, the Contractor shall, if so instructed by the Engineer/Architect, uncover the Work, have the inspection satisfactorily completed and make good the Work at their own expense.

2.33.4 The Engineer/Architect may order any part of the Work to be specifically examined, should they believe such work not to be in accordance with the requirements of the Contract Documents. If upon examination such work is found not to be in accordance with the requirements of the Contract Documents, the Contractor shall correct such work and pay the cost of examination and correction. If such work is found to be in accordance with the requirements of the Contract Documents, the Owner will pay the cost of examination and replacement.

2.33.5 The Contractors shall furnish promptly to the Engineer/Architect two (2) copies of all certificates and inspection reports relating to the Work.

2.34.0 ***REJECTED WORK***

2.34.1 Defective work, whether the result of poor workmanship, use of defective products or damage through carelessness or other act or omission of the Contractor and whether incorporated in the Work or not which has been rejected by the Engineer/Architect as failing to conform to the Contract Documents, shall be removed promptly from the premises by the Contractor and replaced and/or re-executed promptly in accordance with the Contract Documents at the Contractor's expense.

2.34.2 Other contractors' work destroyed or damaged by such removals or replacements shall be made good promptly at the Contractor's expense.

2.34.3 If, in the opinion of the Engineer/Architect, it is not expedient to correct defective work not done in accordance with the Contract Documents, the Owner may deduct from the Contract Price the difference in value between the Work as done and that called for by the Contract, the amount of which shall be determined in the first instance by the Engineer/Architect.

2.35.0 ***SHOP DRAWINGS AND SAMPLES***

2.35.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by the Contractor to illustrate details of a portion of the Work.

2.35.2 The Contractor shall arrange for the preparation of clearly identified shop drawings as called for by the Contract Documents or as the Engineer/Architect may reasonably request.

2.35.3 Prior to submission to the Engineer/Architect, the Contractor shall review all shop drawings. By this review, the Contractor represents that they have determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data, or will do so, and that they have checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents. The Contractor's review of each shop drawing shall be indicated by stamp, date and signature of a responsible person.

2.35.4 The Contractor shall submit shop drawings to the Engineer/Architect for their review with reasonable promptness and in orderly sequence so as to cause no delay in the Work or in the Work of other contractors. If either the Contractor or the Engineer/Architect so requests, they shall jointly prepare a schedule fixing the dates for submission and return of shop drawings. Shop drawings shall be submitted in the form

of reproducible transparencies or prints as the Engineer/Architect may direct. At the time of the submission, the Contractor shall notify the Engineer/Architect in writing of any deviations in the shop drawings from the requirements of the Contract Documents.

2.35.5 The Engineer/Architect will review and return shop drawings in accordance with any schedule agreed upon or otherwise with reasonable promptness so as to cause no delay. The Engineer/Architect's review will be for conformity to the design concept and for general arrangements only, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract Documents unless a deviation on the shop drawings has been approved in writing by the Engineers/Architects.

2.35.6 The Contractor shall make any changes in shop drawings which the Engineer/Architect may require consistent with the Contract Documents and resubmit, unless otherwise directed by the Engineer/Architect. When resubmitting, the Contractor shall notify the Engineer/Architect in writing of any deviations other than those requested by the Engineer/Architect.

2.35.7 The Contractor shall submit for the Engineer/Architect's approval such standard manufacturer's samples as the Engineer/Architect may reasonably require. Samples shall be labeled as to origin and intended use in the Work and shall conform to the requirements of the Contract Documents.

2.35.8 The Contractor shall provide samples of special products, assemblies or components when so specified. The cost of such samples not specified shall be authorized as an addition to the Contract Price as provided in **2.13.0 CHANGES IN THE WORK AND EXTRA WORK**.

2.36.0 TESTS AND MIX DESIGNS

2.36.1 The Contractor shall furnish to the Engineer/Architect test results and mix designs as may be requested. The testing company must first be approved by the Engineer/Architect.

2.36.2 The cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by law, ordinances, rules and regulations relating to the Work and the preservation of public health, shall be authorized as an addition to the Contract Price as provided in **2.13.0 CHANGES IN THE WORK AND EXTRA WORK**.

2.37.0 MATERIALS AND SUBSTITUTIONS

2.37.1 Materials described and named in the specifications with "or approved equal" clause after the Manufacturer's name are so described as to the establish quality only, and substitutions of a similar materials may be made before the award of the Contract provided the Engineer/Architect's approval is obtained. Substitutions after the award

may be considered under special circumstances as indicated in Subsection 1.7.4 in the **INSTRUCTIONS TO Bidders**

2.37.2 Requests for substitutions must be accompanied by sufficient information in the form of shop drawings, manufacturer's literature, samples and other data to permit proper investigation of the substitutes proposed, together with any increase or decrease in price.

2.37.3 Whenever a substitute is proposed for approval, the Contractor shall guarantee that such proposed substitute will not adversely affect the space requirements allocated on the drawings for the material specified, and they shall agree to bear any additional expense incurred due to their use of the proposed substitute.

2.37.4 The Engineer/Architect may accept or reject any or all of the proposed substitutions as they see fit, and their decision on a question of equality shall be final.

2.38.0 TIME OF ESSENCE AND SCHEDULE

2.38.1 Time is of the essence of the Contract.

2.39.0 CASH ALLOWANCE

2.39.1 The Contract Price includes cash allowances, if any, stated in the Contract Documents.

2.39.2 Cash allowances, unless otherwise specified, cover the entire cost to the Contractor of services, products, construction machinery and equipment, freight, unloading, handling, storage, installation and other authorized expenses incurred in performing the Work stipulated under the cash allowances. This also includes the Contractors overhead and profit in connection with such cash allowance.

2.39.3 The cash allowance shall not include HST.

2.39.4 Where costs under a cash allowance exceed the amount of the allowance, the Contractor shall be compensated for any excess incurred and substantiated plus an allowance for overhead and profit as set out in **2.14.0 VALUATION AND CERTIFICATION OF CHANGES IN THE WORK**.

2.39.5 The Contract Price shall be adjusted by written order to provide for any excess or deficit to each cash allowance.

2.39.6 Progress payments on account of Work authorized under cash allowance shall be included in the Engineer/Architect's monthly certificates for payment.

2.39.7 A schedule shall be prepared jointly by the Engineer/Architect and Contractor to show the items called for under Cash Allowances. They must be authorized by the Owner for ordering purposes so that the progress of the Work will not be delayed.

2.40.0 CLEANUP AND FINAL CLEANING OF THE WORK

2.40.1 The Contractor shall maintain the Work in a tidy condition and free from the accumulation of waste products and debris, other than that caused by the Owner, other contractors or their employees.

2.40.2 When the Work is substantially performed, the Contractor shall remove their surplus products, tools, construction machinery and equipment not required for the performance of the remaining Work. They shall also remove waste products and debris, other than that caused by the Owner, other contractors or their employees, and leave the Work clean and suitable for occupancy by the Owner, unless otherwise specified.

2.40.3 When the Work is totally performed, the Contractor shall remove their surplus products, tools, construction machinery and equipment. They shall also remove waste products and debris other than that caused by the Owner, other contractors or their employees.

3.0 SUPPLEMENTARY GENERAL CONDITIONS

SUPPLEMENTARY GENERAL CONDITIONS

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4.0 SPECIAL CONDITIONS

4.1.0 LAYOUT OF WORK

- 4.1.1** Other than the original lot lines and a bench mark, both shown on the drawings, establish and maintain all grades, lines, levels and well-built batter boards at all corners of the building. As work progresses, lay out on the forms or rough flooring the exact location of all partitions as a guide to all trades.
- 4.1.2** Verify all grades, lines, levels and dimensions as shown on the drawings and report any errors or inconsistencies in the above to the Engineer/Architect before commencing Work.

4.2.0 JOB SIGN

- 4.2.1** At the start of the job, erect two painted signs as detailed and where located by the Engineer/Architect. This will be the only sign or advertisement permitted on the site unless instructed otherwise by the Engineer/Architect.
- 4.2.2** The signs shall be 8'0" x 8'0" plywood, properly supported. It shall be painted and shall show the names of the building, Owner, Prime Consultant, Major Subconsultants, Contractor and Major Subcontractors. A drawing of the signs to be erected will be supplied by the Engineer/Architect.

4.3.0 TEMPORARY OFFICES AND SHEDS

- 4.3.1** Construct and maintain, until completion of the Contract temporary offices and storage sheds in approved locations on site for the use of staff.
- 4.3.2** Buildings shall be of weatherproof wood stud and plywood construction completely equipped with adequate lighting, heating and ventilation, and in addition, the Contractor's office shall be fully furnished with desks, plan tables, storage cabinets, file drawers, chairs, stools and plan racks.
- 4.3.3** Provide storage sheds for small tools, equipment, perishable materials, etc., as necessary. All buildings shall be equipped with windows for natural light and doors properly fitted and equipped with locks.
- 4.3.4** Maintain offices and storage sheds in good condition to the approval of the Engineer/Architect from start of Work until final completion of Work or, when directed by the Engineer/Architect, remove offices and sheds from the site and leave areas free of debris and waste materials and in a clean and tidy condition.
- 4.3.5** Offices and storage sheds required by Trade Contractors, such as mechanical and electrical, shall be provided by the trade requiring them.

4.3.6 Provide an office approximately 120 square feet for the absolute use of the Owner or their representative(s). It shall be properly fitted and furnished with light, heat, telephone, lock and key, shelving, table and chairs and plan rack. The building shall be removed from the site at the completion of the Work.

4.4.0 **TEMPORARY SERVICES**

4.4.1 Light and Power

Furnish all temporary light and power required to provide such intensity of light and sufficient power as necessary for the Work to be carried out under the best conditions. Obtain and pay for all permits and inspection tests required by Provincial and/or Municipal authorities. Pay all charges and maintain fixtures and equipment in good working order. **This shall include electric heat.**

4.4.2 Telephone

Install and pay for the operation of one job telephone and one telephone for the use of the Engineer/Architect for the duration of the Contract. Subcontractors requiring individual telephones shall have them installed at their expense. Long distance calls will be at the expense of the party making the calls.

4.4.3 Toilets

At the start of operations, provide and maintain in sanitary condition sufficient temporary toilets and washing facilities for the use of personnel on the job. Conform to requirements of the Department of Health and other authorities having jurisdiction. Supply adequate quantities of disinfectant and toilet paper. When building toilets and washing facilities are operable, they may be used under the same conditions as the temporary toilets with the latter being removed, leaving all surfaces and areas hygienically clean and in immaculate condition.

4.4.4 Heat

Provide and maintain in good condition a temporary heating system for use when the building is closed in until the project has been handed over to the Owner. Pay for fuel and maintenance of the system. Maintain temperatures at a minimum of 50° F, (higher if required for special trades). Heating equipment not adequately protected or operated in conditions other than those intended by the manufacturer shall be regarded as temporary. Remove all such equipment and replace with new permanent equipment.

When ready for operation, the permanent heating equipment may be used for temporary heating purposes, subject to the conditions of the Mechanical Division of the specifications. Protect all permanent heating equipment used for temporary heating purposes. Provide satisfactory site conditions for the proper operation of this equipment.

4.4.5 Water Supply

Provide in two convenient locations outside the building line a fresh water supply for the use of all trades.

Where connection cannot be made to an existing water supply, provide adequate size tanks and keep them filled for use of all trades.

4.5.0 PLANT AND MACHINERY

4.5.1 Provide all framework, scaffolding, ladders, cranes, derricks, planks, screens, gantries, tarpaulins, tools, equipment and machinery for the proper execution of the Work. Scaffolding shall be erected without damage of the structure or the finishes, be removed to suit the installation of work of other trades and be promptly removed at completion.

4.5.2 Where it is the normal practice for the trade to provide its own scaffolding, it shall be included in the Subcontract.

4.6.0 PROTECTION OF PUBLIC AND WORKMEN

4.6.1 Part 8 of the National Building Code of Canada, latest edition, shall apply to this project in its entirety. This covers fencing, barricades, Fire protection, excavation, use of streets or public property, control of vehicular traffic and mechanical methods of demolition.

4.6.2 The latest edition of Canadian Construction Safety Code shall also apply to all phases of this project.

4.6.3 The Workers' Compensation Board Regulations shall also apply to all phases of this project.

4.7.0 CONSTRUCTION SCHEDULE

4.7.1 The Contractor shall, within seven (7) days after the Contract is awarded, prepare for the use of the Engineer/Architect and Owner, a construction schedule. It shall indicate as closely as possible the starting and completion dates for the major sections of the Work, together with the Subcontractors' names.

4.7.2 With each monthly progress claim, submit one (1) copy of the original construction schedule marked in red to show the actual construction progress on the date of the submission of the claim.

Weekly schedule updates shall be provided.

Provide updated construction schedule demoting the original.

4.8.0 PROGRESS PHOTOGRAPHS

4.8.1 Submit with monthly progress claim digital progress photographs taken from points designated by the Engineer/Architect. In the lower right-hand corner of the prints show the date and name of the project.

4.9.0 OPERATIONS AND MAINTENANCE DATA

4.9.1 On completion of the project, submit to the Engineer/Architect two (2) copies of Operations and Maintenance Data and one (1) electronic copy as original editable format.

- a) Bind data in vinyl hard covered, 3-ring, loose-leaf binder for 215 x 280 mm size paper.
- b) Enclose title sheet, labelled "Operation and Maintenance Data", project number, project name, date and list of contents.
- c) Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
- d) Provide electronic document in CD or DVD as original editable file format or, at the direction of the Owner, pdf format.

4.9.2 Include the following information plus data specified in Division 15 and 16:

- a) Maintenance instruction for finished surface and materials.
- b) Copy of hardware schedules.
- c) Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list. Indicate nameplate information such as make, size capacity and serial number.
- d) Names, addresses, phone and fax numbers of Subcontractors and Suppliers.
- e) Guarantees, warranties and bonds showing:
 - (i) Name and address of project;
 - (ii) Guarantee commencement date (date of Final Certification of Completion).
 - (iii) Duration of guarantee.

(iv) Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.

(v) Signature and Seal of Contractor.

f) Additional materials used in project listed under various sections showing name of manufacturer and source of supply.

4.9.3 Neatly type lists and notes. Use clear drawings, diagrams or manufacturer's literature.

4.9.4 The final certificate will not be issued until the data books have been received and approved by the Engineer/Architect.

4.10.0 COORDINATION OF WORK

4.10.1 The Contractor will coordinate the Work of their Subcontractors and provide necessary instructions and scheduling so as to permit continuous progress in the Work by all trades. They will coordinate work between the Subcontractors on the site to ensure that anchor bolts, plates, attachments, etc., are provided and set in place in a timely manner. They will lay out partitions and assist Subcontractors in establishing the actual location of the fixtures, pipes, outlets, duct conduit, etc., so as to limit the interference of one trade with another. Locations shown on the drawings are approximate. If interference problems are encountered which cannot be resolved on the site, advise the Engineer/Architect before proceeding with the Work. Conceal all mechanical and electrical work unless otherwise indicated.

4.11.0 TRAFFIC MAINTENANCE

4.11.1 Do not close or obstruct streets, sidewalks, driveways, etc., without permission from authorities having jurisdiction. Do not place or store materials in street, sidewalks, parking areas, etc., unless so authorized.

4.12.0 FIRE PROTECTION

4.12.1 Fire protection measures shall include:

- a) An adequate fire alarm signal, the use of fire resistant tarpaulins, the daily inspection of temporary heating system by competent staff and regular fire patrol;
- b) All temporary wiring shall be done by electricians qualified under the applicable local regulations;
- c) Supply and maintenance of fifteen (15) pounds dry chemicals and/or five (5) gallons soda-acid fire extinguishers in such locations that no working crew has to

travel more than fifty (50) feet to an extinguisher station. In any case, there shall be not less than one (1) fully charged extinguisher(s) at the job at any time.

4.13.0 JOB MEETINGS

4.13.1 Where the value of the contract exceeds \$100,000 (HST **Excluded**) job meetings shall occur at definitely prescribed times (minimum once a month), which will be determined after commencement of work, the Contractor shall organize job meetings and send out notices stating time and place to the Owner's representative, the Engineer/Architect, Subconsultants, to all Subcontractors and to other persons whose presences are required at the meetings. They shall take note of all persons attending these meetings and shall, within one (1) week after each job meeting, submit to the Owner, the Engineer/Architect, the Subconsultants and others present, minutes of the meeting which must show any major decisions made and any instructions or information required.

4.13.2 Where the value of the contract is less than \$100,000 (HST **Excluded**) job meetings shall occur at the discretion of the University Project Coordinator but shall not occur fewer than once per month.

4.14.0 AS-BUILT DRAWINGS

4.14.1 The Engineer/Architect will issue to the Contractor three (3) sets of prints of architectural, mechanical and electrical drawings for the sole purpose of providing "as-built" drawings. The Contractor shall pass these to the relevant Subcontractor who shall keep two (2) sets in their office and one (1) set on the job. As changes occur, the Subcontractor shall make them on the field set. Upon completion of the project, the Subcontractor shall accurately transfer all changes to the two (2) office sets in red ink and pass them to the Engineer/Architect, through the Contractor, for approval. If they are not approved, the Subcontractor shall prepare new sets for resubmission (purchasing additional white prints for this purpose).

4.14.2 As-built drawings shall be white prints and shall indicate all changes in Architectural, Mechanical and Electrical work, including any changes in location of piping, ducts, panels, etc.

4.14.3 Provide electronic as-builts in CD or DVD as original editable file format or, at the direction of the Owner, pdf format.

4.14.4 The Certificate of Total Performance will not be issued until such drawings have been received and approved.

4.15.0 COMPLETION TIME

4.15.1 The project shall be ready for the use and occupancy by the Owner within the time stated in the **Open Call and Acceptance Form.**

4.15.2 Prior to the acceptance by the Owner of the Substantial Performance, the Contractor and the Owner shall sign a list of deficiencies as prepared by the Engineer/Architect for prompt correction and/or completion.

4.16.0 CLOSE DOWN OF WORK

4.16.1 Should the Work be closed down for any cause, the Contractor shall assume all responsibility for its proper protection during such period. They must protect all foundation work and other work liable to be damaged.

4.17.0 BROKEN GLASS

4.17.1 The Contractor shall be held responsible for any damaged, broken or scratched glass and at completion shall replace all such glass at no additional cost to the Owner.

4.18.0 HOARDING

4.18.1 Before starting excavating, construct and thereafter maintain all necessary hoarding required by Municipal or Provincial regulations or by other authorities having jurisdiction.

4.19.0 COMMISSIONING

4.19.1 The Contractor is responsible for commissioning the Work to ensure that the various parts are operating in a manner as intended by the Contract Documents. Even through individual components and/or parts of the Work may have been tested and approved prior to the substantial completion, the Contractor must coordinate a final commissioning of the complete Work, including at the place of the Work all their major Subcontractors and Suppliers. The final commissioning will be carried out by the appropriate trades working together in a complementary manner such that the successful operation of the whole Work is completed properly to the satisfaction of the Engineer/Architect. The Substantial Performance Certificate will not be issued until the final commissioning of the Work has been successfully completed.

4.20.0 FINAL CLEAN-UP

4.20.1 At the end of the job, thoroughly clean the building of all rubbish and surplus materials.

4.20.2 Make good all damaged areas in the building caused as a result of the Work of this Contract.

4.20.3 Do final cleaning, waxing and polishing of resilient flooring.

5.0 CAMPUS SAFETY AND HEALTH REGULATIONS

Maintaining a healthy and safe environment for all members of the campus community, as well as visitors, is a priority with the University. This involves a commitment from all sectors of the campus community and extends to outside agencies having occasion to come on campus to conduct business.

The following regulations will apply to all work undertaken by contractors and service personnel on any University property.

5.1.0 REGULATIONS, CODES AND STANDARDS

Contractors shall be familiar with and abide by provisions of various safety codes and standards applicable to the work performed and should refer to Article **23. PROTECTION OF WORK AND PROPERTY** in the **General Conditions**.

In particular, strict adherence shall be required to the Provincial Occupational Health and Safety Act and Regulations and the National Building Code of Canada, Part 8.

5.2.0 GENERAL SAFETY REGULATIONS

- a) Contractors/service agencies shall ensure that members of the campus community are not endangered by any work or process in which they may be engaged. Work areas shall be adequately barricaded, and if dust or fumes are generated, suitable enclosures shall be installed to contain such emissions.
- b) No material shall be stored in such a way as to obstruct walkways or represent a danger to pedestrian traffic.
- c) Adequate protection shall be provided to prevent the possibility of materials falling from scaffolding or elevated areas. Areas where materials are being loaded or offloaded shall be barricaded or otherwise protected to prevent unauthorized entry. Where necessary, appropriate warning signs shall be posted.
- d) The work areas must be kept reasonably clean and free from debris which could constitute a fire hazard. Care must be taken to ensure that the work process does not activate fire alarm detection devices. (Generation of dust and fumes can activate smoke detectors causing a false alarm).
- e) Due consideration shall be given to fire safety in buildings. Flammable materials must be kept away from sources of ignition. No work involving the use of open flame devices must be undertaken around flammable solvents or gases.
- f) Do not alter or disturb any materials believed to contain asbestos materials (unless this is a duly authorized part of the project). Should suspect materials be encountered, consult with University officials before proceeding.

- g) Material Safety Data Sheets shall be procured for any hazardous product used on campus. Such sheets shall be made readily available for consultation as required under the Workplace Hazardous Materials Information System.

NOTE: The above regulations are not to be considered all inclusive and are considered to be complementary to the safety requirements outlined in the agreement between the Owner and the Contractor/Service Agency. Certain conditions and circumstances may require adherence to additional safety regulations.

As a general requirement, contract/service personnel are expected to conduct all work on campus in a professional and safe manner and to give priority to the welfare of members of the campus community.

6.0 CONTRACTOR PERFORMANCE EVALUATION

- 6.1.0 The purpose of this process is to maintain an acceptable level of performance with external contractors carrying out work for the Department of Facilities Management.
- 6.2.0 A record of the performance of external contractors will be maintained to identify the following:
- a) Those contractors who by virtue of satisfactory performance will continue to be eligible to submit bids for work at the University;
 - b) Those contractors whose performance is considered unsatisfactory and will be advised of the need to improve performance to remain eligible to submit bids for work at the University;
 - c) Those contractors whose record of unsatisfactory performance will render them ineligible to submit bids for work at the University.
- 6.3.0 Contractors' performance will be evaluated on a points rating system relative to quality of work performed, timeliness in completing work and management/administration of contracts/work and safety parameters.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Types of items described in this Section:
- B. Types of items described in this Section:
 - 1. Work Covered By the Contract Documents.
 - 2. Type of Contract.
 - 3. Work Phases.
 - 4. Work Under Other Contracts.
 - 5. Products Ordered In Advance.
 - 6. Owner-Furnished Products.
 - 7. Use of Premises.
 - 8. Owner's Occupancy Requirements.
 - 9. Work Restrictions.
 - 10. Interpretation Of Documents
 - 11. Specification Formats and Conventions.
 - 12. Project Management and Coordination.
 - 13. Construction Progress Documentation.
 - 14. Photographic Documentation.
 - 15. Substitution Procedures.
 - 16. Submittal Procedures.
 - 17. Environmental Procedures.
 - 18. Wildlife Protection.
 - 19. Quality Requirements.
 - 20. Regulatory Requirements.
 - 21. Temporary Facilities and Control.
 - 22. Temporary Barriers and Enclosures.
 - 23. Product Requirements.
 - 24. Execution.
 - 25. Construction Waste Management And Disposal.
 - 26. Closeout Procedures.
 - 27. List of Incomplete Items (Punch List)
 - 28. Operation and Maintenance Data.
 - 29. Project Record Documents.
 - 30. Demonstration and Training.
- C. Types of items you will not find described in this Section:
 - 1. Health and Safety Requirements

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: M-166-22 Faculty of Medicine AV upgrades to 1M101 & 1M102
 - 1. Project Location: Main Campus, Memorial University, St. John's, NL.

- B. Owner: Memorial University
 - 1. Owner's Representative: Department of Facilities Management, Tel. 709-864-8555

- C. The Work consists of the following:
 - 1. The Work includes Supply and installation of AV Systems as noted in Appendix A.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.

1.5 WORK PHASES

- A. The Work shall be conducted in a single phase.

1.6 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Preceding Work: Owner has awarded / will award separate contract(s) for the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.
 - 1. No proceeding work planned.
- C. Concurrent Work: Owner has awarded / will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
 - 1. No concurrent work planned.
- D. Future Work: Owner has awarded / will award separate contract(s) for the following additional work to be performed at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
 - 1. No future work planned.

1.7 PRODUCTS ORDERED IN ADVANCE

- A. General: Owner has negotiated Purchase Orders with suppliers of material and equipment to be incorporated into the Work. Owner will assign these Purchase Orders to Contractor. Costs for receiving, handling, storage if required, and installation of material and equipment are included in the Contract Sum.
 - 1. Contractor's responsibilities are same as if Contractor had negotiated Purchase Orders, including responsibility to renegotiate purchase and to execute final Purchase-Order agreements.
- B. List of Products Ordered in Advance:
 - 1. None.

1.8 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes providing support systems to receive Owner's equipment and making plumbing, mechanical, and electrical connections.
 - 1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.

2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Owner's Representative noting discrepancies or anticipated problems in use of product.
8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

B. Owner-Furnished Products:

1. No Owner-furnished products.

1.9 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.
- C. Use of Site: Limit use of premises to areas under construction. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Driveways and Entrances: Keep driveways parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- D. Use of Existing Building: If the work involves construction in an existing building, maintain the existing building in a weather tight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.10 OWNER'S OCCUPANCY REQUIREMENTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate

Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits, unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
2. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.11 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours, Monday through Friday, except otherwise indicated.

1. Weekend Hours: **Contractor to notify Owner's representative 48hrs prior to scheduling.**
2. Early Morning Hours: **Contractor to notify Owner's representative 48hrs prior to scheduling.**
3. Hours for Utility Shutdowns: **Dependant on Scope of shutdown. Contractor to notify Owner's representative 2 weeks prior to scheduling.**
4. Hours for Core Drilling and other noise generating activities: **To be scheduled after regular work hours. Contractor to notify Owner's representative 48hrs prior to scheduling.**

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's Representative's written permission.

C. No smoking is permitted on MUN Campus.

1.12 INTERPRETATION OF DOCUMENTS

A. In the event of discrepancies or conflicts in interpreting the Plans (drawings) and Specifications,

1. Supplementary General Conditions take precedence over all other documents.
2. General Conditions take precedence over drawings and specifications.
3. Division 1 Sections take precedence over technical specification sections in other Divisions;
4. Legends and schedules take precedence over drawings and Specifications, whether they are bound with the specifications or integral with the drawings;
5. Specifications take precedence over all other drawings;

B. Plans (drawings) and Specifications are complementary. When work is shown or mentioned on the drawings but is not indicated in the Specifications, or when work is indicated in the Specifications but is not shown or mentioned on the Drawings, it shall nevertheless be included in the Contract.

1.13 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's *MasterFormat* numbering system.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 - 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
- C. The words *shall*, *shall be*, or *shall comply with*, depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.14 PROJECT MANAGEMENT AND COORDINATION

- A. Coordination
 - 1. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
- B. Administrative and supervisory personnel
 - 1. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
 - 2. Maintain same superintendent on Project for duration of Project. Immediately notify Owner's Representative if superintendent should become unavailable to work and immediately replace with an alternate person acceptable to the Owner's Representative.
- C. Project meetings
 - 1. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 2. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Owner's Representative, within three days of the meeting.
 - 3. Progress Meetings: Conduct progress meetings at monthly intervals. Coordinate dates of meetings with preparation of payment requests.

1.15 Requests For Interpretation (RFIs)

- 1. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 - a. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

2. Allow seven working days for Owner's Representative's response for each RFI.
3. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Owner's Representative in writing within 10 days of receipt of the RFI response.

1.16 CONSTRUCTION PROGRESS DOCUMENTATION

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.
 1. Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 2. At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
- B. Reports
 1. Daily Construction Reports: Prepare a daily construction report and submit to Owner's Representative each week recording the following information concerning events at Project site:
 - a. List of subcontractors at Project site.
 - b. List of separate contractors at Project site.
 - c. Approximate count of personnel at Project site.
 - d. Equipment at Project site.
 - e. Material deliveries.
 - f. High and low temperatures and general weather conditions.
 - g. Accidents.
 - h. Meetings and significant decisions.
 - i. Unusual events.
 - j. Stoppages, delays, shortages, and losses.
 - k. Meter readings and similar recordings.
 - l. Emergency procedures.
 - m. Orders and requests of authorities having jurisdiction.
 - n. Change Orders received and implemented.
 - o. Construction Change Directives received and implemented.
 - p. Services connected and disconnected.
 - q. Equipment or system tests and start-ups.
 - r. Partial Completions and occupancies.
 - s. Substantial Completions authorized.
 2. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

1.17 PHOTOGRAPHIC DOCUMENTATION

- A. Preconstruction Photographs: Before starting construction take, digital photographs of Project site and surrounding areas, including existing items to remain during construction, from different vantage points.
- B. Periodic Construction Photographs: Take digital photographs weekly, with timing each month adjusted to coincide with the cut-off date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- C. E-mail or otherwise submit photos to Owner's representative on monthly basis to coincide with the each Application for Payment.

1.18 SUBSTITUTION PROCEDURES

- A. Substitution Requests: Submit PDF copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of Owner's Representatives and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 2. Owner's Representative's Action: If necessary, Owner's Representative will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Owner's Representative will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Owner's Representative's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Owner's Representative does not issue a decision on use of a proposed substitution within time allocated.
- B. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Owner's Representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner's Representative will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

- b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- C. Substitutions for Convenience: Owner's Representative will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Owner's Representative.
1. Conditions: Owner's Representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner's Representative will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.

1.19 SUBMITTAL PROCEDURES

- A. Contractor's Review
1. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Owner's Representative.
- B. Preferred Size for Paper Submittals
1. Provide paper submittals on sheets no less than 8 ½ x 11" Whenever practical, provide paper submittals on sheet size not greater than 11 x 17". In all cases ease of readability of submittal content by Engineer shall take precedent over providing information on preferred sheet size.
- C. Submittal Procedures
1. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - a. Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 2. Submit three paper copies of each submittal, unless otherwise indicated. The Owner's Representative will return no copies on any submittals but instead will e-mail a web link to a web site which will host PDFs of the reviewed documents.
 3. Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owner's Representative's receipt of submittal. No extension of the Contract Time will be authorized

because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- a. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Owner's Representative will advise Contractor when a submittal being processed must be delayed for coordination.
 - b. Resubmittal Review: Allow 15 days for review of each resubmittal.
 - c. Sequential Review: Where sequential review of submittals by Owner's Representative's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
4. Owner's Representative will review each submittal, make marks to indicate corrections or modifications required, and return it. Owner's Representative will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
- a. REVIEWED – NO COMMENTS
 - b. REVIEWED WITH COMMENTS. REVISE & RESUBMIT PRIOR TO START OF WROK.
 - c. REVIEWED WITH COMMENTS. PROCEED WITH WORK SUBJECT TO IMPLEMENTATION OF NOTED COMMENTS, REVISE AND RESUBMIT.
 - d. NOT ACCEPTED.

1.20 ENVIRONMENTAL PROCEDURES

A. Definitions

1. Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.

B. Fires and burning of rubbish on site not permitted.

C. Store, handle, and dispose of hazardous materials in accordance with applicable federal and provincial laws, regulations, codes and guidelines. Store in location that will prevent spillage into the environment

D. Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

1. Do not pump water containing suspended materials into waterways, sewer or drainage systems.

E. Protect any trees and plants on site and adjacent properties that are in immediate area of construction.

1. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
2. Restrict tree removal to areas indicated or designated by Owner's Representative.

F. Minimize stripping of topsoil and vegetation.

1.21 WILDLIFE PROTECTION

A. Should nests of migratory birds (Seagulls) be encountered during work, immediately notify Owner's Representative for directives to be followed.

1. Do not disturb nest site and neighbouring vegetation until nesting is completed.
2. Minimize work immediately adjacent to such areas until nesting is completed.
3. Protect these areas by following recommendations of Canadian Wildlife Service.

1.22 QUALITY REQUIREMENTS

A. Conflicting Requirements

1. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Owner's Representative for a decision before proceeding.
2. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Owner's Representative for a decision before proceeding.

B. Quality Control

1. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - a. Payment for these services will be made by the Owner.
 - b. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
2. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - a. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - b. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - c. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

1.23 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with National Building Code of Canada (NBC) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- B. Meet or exceed requirements of:
 1. Contract documents.
 2. Specified standards, codes, and referenced documents.

1.24 TEMPORARY FACILITIES AND CONTROLS

A. Temporary Utility Installation

1. General: Install temporary service or connect to existing service.
 - a. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Sanitary Facilities: If the Owner has existing toilet facilities these may be used as long as these facilities are kept cleaned and maintained in a condition acceptable to the Owner. Otherwise provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
3. Water Service: If the Owner has existing water service it may be used as long as it does not impact on the Owner's need. Otherwise install water service and distribution piping in sizes and pressures adequate for construction.

4. Sewers and Drainage: Provide temporary utilities as required to remove effluent lawfully.
5. Heating: Provide temporary heating as required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
6. Ventilation and Humidity Control: Provide temporary ventilation as required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
7. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - a. Install electric power service overhead, unless otherwise indicated.
 - b. If the Owner has an existing power source, the contractor may access it for temporary power provided it does not impact the Owner's needs.
8. Lighting: Provide temporary lighting with local switching as required to provide adequate illumination for construction operations, observations, inspections, and traffic conditions.
9. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
10. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
11. Tree and Plant Protection: Install temporary fencing as required to protect trees and plants intended to remain. Install protection outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
12. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner as required to prevent people and animals from easily entering site except by entrance gates.

B. Operation, Termination, and Removal

1. Maintain facilities in good operating condition until removal.
2. Remove each temporary facility when need for its service has ended.

1.25 TEMPORARY BARRIERS AND ENCLOSURES

A. Hoarding

1. For work involving the excavation for new foundations or the erection of new structures outside of an enclosure, provide hoarding.

B. Weather Enclosures

1. Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

C. Dust Tight Screens

1. Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

D. Protection Of Building Finishes

1. Provide protection for finished and partially finished building finishes and equipment during performance of work.
2. Provide necessary screens, covers, and hoardings.
3. Be responsible for damage incurred due to lack of or improper protection.

1.26 PRODUCT REQUIREMENTS

A. Manufacturer's Instructions

1. Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
2. Notify Owner's Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Owner's Representative may establish course of action.

B. Quality

1. Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source, and quality of products provided.
2. Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
3. Should any dispute arise as to quality or fitness of products, decision rests strictly with Owner's Representative based upon requirements of Contract Documents.
4. Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

C. Product Warranties

1. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

D. Product Selection Procedures

1. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1.27 EXECUTION

A. Materials

1. Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
2. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Owner's Representative for the visual and functional performance of in-place materials.

B. Construction Layout

1. Where work involves construction outside of an existing footprint, engage a land surveyor to lay out the Work using accepted surveying practices.
2. On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified location certificate showing dimensions, locations, angles, and elevations of construction and site work.

C. Installation

1. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

- a. Make vertical work plumb and make horizontal work level.
 - b. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - c. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - d. Maintain minimum headroom clearance of 2440 mm in occupied spaces and in unoccupied spaces.
 2. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
 3. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - a. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner's Representative.
 - D. Cutting And Patching
 1. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - a. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
 2. Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - E. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - F. Progress Cleaning
 1. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 2. Site: Maintain Project site free of waste materials and debris.
 - G. Correction Of The Work
 1. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 2. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
 3. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - H. Protection Of Installed Construction
 1. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
 2. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
- 1.28 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
- A. Waste Reduction
 1. Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:
 - a. Use of a central cutting area to allow for easy access to off-cuts;
 - b. Use of off-cuts for blocking and bridging elsewhere.

- c. Use of effective and strategically placed facilities on site for storage and staging of left-over or partially cut materials (such as gypsum board, plywood, ceiling tiles, insulation etc...) to allow for easy incorporation into
 - B. Material Source Separation Process
 1. Perform demolition and removal of existing building components and equipment following a systematic deconstruction process.
 2. Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
 - a. Reinstallation into the work where indicated.
 - b. Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
 - c. Sending as many items as possible to locally available recycling facility.
 - d. Segregating remaining waste and debris into various individual waste categories for disposal in a *non-mixed state* as recommended by waste processing/landfill sites.
 - C. Disposal Requirements
 1. Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.
- 1.29 CLOSEOUT PROCEDURES
- A. Substantial Completion
 1. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - a. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - b. Advise Owner of pending insurance changeover requirements.
 - c. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - d. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - e. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - f. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - g. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - h. Complete start-up testing of systems.
 - i. Submit test/adjust/balance records.
 - j. Terminate and remove temporary facilities from Project site, along with mock-ups, construction tools, and similar elements.
 - k. Advise Owner of changeover in heat and other utilities.
 - l. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - m. Complete final cleaning requirements, including touch-up painting.
 - n. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
 2. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Owner's Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner's Representative will prepare the Certificate of Substantial Completion after inspection or will notify

- Contractor of items, either on Contractor's list or additional items identified by Owner's Representative, that must be completed or corrected before certificate will be issued.
3. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- B. Final Completion
1. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 - a. Submit a final Application for Payment according to the General Conditions.
 - b. Submit certified copy of Owner's Representative's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner's Representative. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - c. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - d. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 2. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Owner's Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner's Representative will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - a. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- C. Final Cleaning
1. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
 2. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
- 1.30 LIST OF INCOMPLETE ITEMS (PUNCH LIST)
- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Owner's Representative.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. Three paper copies of product schedule or list, unless otherwise indicated.
- 1.31 WARRANTIES
- A. Submittal Time: Submit written warranties on request of Owner's Representative for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 215-by-280-mm paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title *WARRANTIES*, Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.32 OPERATION AND MAINTENANCE DATA

- A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- C. Manual Contents: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- D. **Format: Submit operations and maintenance manuals in the following format:**
 - 1. **PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Owner's Representative.**
 - a. **Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.**
 - b. **Enable inserted reviewer comments on draft submittals.**

1.33 PROJECT RECORD DOCUMENTS

- A. Record Drawings
 - 1. Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 2. Mark Record Prints to show the actual installation where installation varies from that shown originally.
 - 3. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - a. Accurately record information in an understandable drawing technique.
 - b. Record data as soon as possible after obtaining it. Record and check the mark-up before enclosing concealed installations.
 - 4. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.

- f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Change Directive.
 - k. Changes made following Owner's Representative's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
5. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 6. Mark record sets with erasable, red-coloured pencil. Use other colours to distinguish between changes for different categories of the Work at same location.
 7. Mark important additional information that was either shown schematically or omitted from original Drawings.
 8. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
 9. Submit record drawings to Owner's Representative prior to requesting Substantial Completion inspection.

1.34 DEMONSTRATION AND TRAINING

- A. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of maintenance of each item of equipment.
- B. Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- C. Review contents of manual in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.
- E. The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- .1 Types of items described in this Section:
 - .1 Administrative and procedural requirements governing allowances.
 - .1 Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
 - .2 Types of allowances include the following:
 - .1 Revise list below to suit Project.
 - .2 Lump-sum allowances.
 - .3 Unit-cost allowances.
 - .4 Quantity allowances.
 - .5 Contingency allowances.
 - .6 Testing and inspecting allowances.
- .2 Types of items you will not find described in this Section:
 - .1 Procedures for using unit prices.
 - .2 Procedures governing the use of allowances for testing and inspecting.
 - .3 Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

- .1 At the earliest practical date after award of the Contract, advise Owner's Representative of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- .2 At Owner's Representative's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- .3 Purchase products and systems selected by Owner's Representative from the designated supplier.

1.4 SUBMITTALS

- .1 Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- .2 Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- .3 Submit time sheets and other documentation to show labour time and cost for installation of allowance items that include installation as part of the allowance.

-
- .4 Coordinate and process submittals for allowance items in same manner as for other portions of the Work.
 - 1.5 COORDINATION
 - .1 Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.
 - 1.6 QUANTITY ALLOWANCES
 - .1 Allowance shall include cost to Contractor of specific products and materials selected by Owner's Representative under allowance and shall include freight, and delivery to Project site.
 - .2 Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labour, installation, overhead and profit, and similar costs related to products and materials selected by Owner's Representative under allowance shall be included as part of the Contract Sum and not part of the allowance.
 - .3 Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - .1 If requested by Owner's Representative, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.
 - 1.7 CONTINGENCY ALLOWANCES
 - .1 Use the contingency allowance only as directed by Owner's Representative for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
 - .2 Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, insurance, equipment rental, and similar costs.
 - .3 Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
 - .4 At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.
 - .5 The cash allowance shall not include HST.
 - 1.8 TESTING AND INSPECTING ALLOWANCES
 - .1 Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
 - .2 The allowance does not include incidental labour required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labour to assist the testing agency shall be included in the Contract Sum.
 - .3 At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.
 - 1.9 ADJUSTMENT OF ALLOWANCES

- .1 Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - .1 Include installation costs in purchase amount only where indicated as part of the allowance.
 - .2 If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - .3 Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- .2 Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labour, installation, overhead, and profit.
 - .1 Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - .2 No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- .1 Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- .1 Contingency Allowance:
 - .1 Include Module A Contingency Allowance of \$7500 for use according to Owner's instructions (See Appendix C1).
 - .2 Include Module B Contingency Allowance of \$7500 for use according to Owner's instructions (See Appendix C1).

END OF SECTION



Memorial University of Newfoundland
Faculty of Medicine
AV Systems

Appendix A- Specifications and
Scope

January 25, 2024
Revision 1.4: Issue for Open Call
EH Project 22405

THIS DOCUMENT IS NOT FOR CONSTRUCTION

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<https://engineeringharmonics.sharepoint.com/projects/2022/22405/Shared Documents/docs-wip/Appendix A-Specifications and Scope.docx>

1. GENERAL

1.1 Summary

- .1 MUN is a public university based in St. John's, NL with multiple satellite campuses.
- .2 Memorial University's Faculty of Medicine is committed to providing the highest standard of medical education and supporting health research with the goal of advancing the health of the people and communities served.
- .3 The Faculty of Medicine is leader in rural medical education and have received national and international awards and recognition. As the only medical school in Newfoundland and Labrador, research that focuses on the need of local communities is a priority. Ground-breaking research has provided important medical discoveries, which have led to improved medical interventions and patient care.
- .4 The Faculty of Medicine is looking for updating audio-visual technologies in two Lecture Halls to enable distance learning and multi-site education.
- .5 This specification seeks bids for audio visual installation to implement the design of the Systems Designer within the Project.
- .6 This Project includes AV provisions in the Lecture Halls and control rooms as outlined below.

1.2 Overview

- .1 Systems topology which operates in a networked environment and utilizes standard Ethernet LAN based technology is desired. Where possible the systems described in this document shall implement structured cable architectures.
- .2 The Owner shall configure building infrastructure, Owners Network, associated systems and VLAN's as requested and coordinated by the AV Contractor.
- .3 The AV Contractor shall provide an audiovisual system that meets or exceeds the following goals and objectives:
 - 1) Implements a modular, scalable design; and
 - 2) Systems shall be intuitive for users and service personnel.

1.3 Summary of Work

- .1 The project includes engineering, manufacturing, supply, pre-build, legacy device removal, and installation and configuration/ optimization of specified AV systems.
- .2 Shop drawings/ documents and closeout documents and manuals.
- .3 On-going project management and coordination for AV systems among stakeholders, project partners, including bi-weekly site meetings through to project completion.

- .4 Provide mock-up projection screen fabric on site with fast-fold frame and light rejection fabric for proof of concept and Owner acceptance. See Mock-up section 1.6.5 below.
- .5 Coordinate AV system components with project team as required.
- .6 Coordinate installation details and requirements with the Owner as required.
- .7 Coordinate AV system related raceways to support AV related cabling.
- .8 Coordinate AV system Network requirements with the Owner’s ITS group.
- .9 Ensure AV system related millwork is correctly implemented to house AV systems.
- .10 Coordinate, decommission existing systems as needed, transport, test and integrate all OSE devices as required.
- .11 Pre-build all racking systems and test before delivery to project site if provisioned.
- .12 Coordinate AV infrastructure with other trades if needed, ensuring structural support, required to support for audiovisual equipment is in place and if required inspected before installation of AV devices.
- .13 Coordinate and execute Owner asset management tagging systems and logging.
- .14 Execute final device installation and system configurations after construction site “dust free” hand-over.
- .15 Test, commission, and report deficiencies to Systems Designer.
- .16 Final system testing, commissioning, and equipment training including Video Capture of all AV Contractor training sessions for Owner use.
- .17 Warranty support for one (1) year, with optional extensions.
- .18 Additional system automation elements shall be discussed and reviewed through user interface (UI) development meetings held between AV contractor, Systems Programmer, Systems Designer, and Owner. Organize, chair, and minute these meetings.

1.4 References

1.4.1 Abbreviations and Acronyms

Term	Definition
AES	Advanced Encryption Standard
AFF	Above Finished Floor
ALR	Ambient Light Rejection
AV	Audio Visual
AVoIP	Audio Video Over IP
BGM	Background Music
BOM	Bill Of Materials

Term	Definition
BYOD	Bring Your Own Device
BYOM	Bring Your Own Meeting
DS	Digital Signage
DSP	Digital Signal Processing
DvLED	Direct View LED
EDID	Extended Display Identification Data
GUI	Graphical User Interface

Term	Definition
HA	Hearing Assistance
HDCP	High-bandwidth Digital Content Protection
HDMI	High Definition Multimedia Interface
HLD	High Level Design
IP	Internet Protocol
IR	Infrared
KVM	Keyboard Video Mouse
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
MM	Multi Mode
OSE	Owner Supplied Equipment
PC	Personal Computer

Term	Definition
PTZ	Pan, tilt & zoom
RF	Radio Frequency
RU	Rack Unit (1.75 inches)
SI	Simultaneous Interpretation
SM	Single Mode
SLA	Service Level Agreement
TBD	To be determined
TV	Television
UC	Unified Communications
UHD	Ultra High Definition
UPS	Uninterruptible Power Supply
UTP	Unshielded Twisted Pair
VC	Videoconference

1.4.2 Definitions

- .1 **“Architect”** refers to MUN facilities representative.
- .2 **“Consultant”** or **“Systems Designer”** as it is used in this OPEN CALL FOR BID, refers to Engineering Harmonics Inc.
- .3 **“GC”** or **“General Contractor”** refers to MUN facilities representative.
- .4 **“MUN”** refers to The Memorial University of Newfoundland.
- .5 **“Owner”** refers to The Memorial University of Newfoundland.
- .6 **“Owners Network”** refers to the structured Network cable plant and infrastructure provisioned by the Owner to support the AV systems.
- .7 **“Preferred Proponent”** means a Proponent that is selected by MUN to attempt to negotiate an agreement at a particular point in time.
- .8 **“Project”** refers to MUN’s process of technology renovations described in this document.
- .9 **“System Programmer”** refers to the Control Systems and DSP Programmer assigned by Owner.

.10 **“Proponent”** means a party that submit documents in response to this OPEN CALL FOR BID. The term “Proponent” shall include the Proponent’s team members, advisors, agents, consultants, contractors, employees, and representatives. The term “Proponent” includes the terms “Preferred Proponent”, “AV Contractor”, “Systems Contractor” and “Contractor”.

.11 **“Open Call for Bid”** includes, but is not limited to, all information contained in a Open Call for Bid or which is disclosed by or through a Proponent to MUN during the evaluation of Bid; and any and all ideas, concepts, products, alternatives, processes, recommendations and suggestions developed by or through a Proponent and revealed to or discovered by MUN, including any and all those which may be connected in any way to the preparation, submission, review or negotiation of any Open Call for Bid.

.12 **“Open Call for Bid License”** means a non-exclusive, perpetual, irrevocable, world-wide, fully paid and royalty free license (fully assignable without the consent of the Proponent and with the right to sub-license without the consent of the Proponent) to use the Open Call for Bid Information, which includes the right to modify the Open Call for Bid Information, and, where applicable, to use it, or any modified form of it, anywhere in the world.

.13 **“OPEN CALL FOR BID”** means the Bid documents contained herein.

.14 **“OPEN CALL FOR BID Documents”** means: this Bid Specification and all schedules and appendices attached hereto; any documents or other information provided by MUN to a Proponent from time to time in relation to the OPEN CALL FOR BID, including any information in any data room set up by MUN; any information provided to a Proponent by a third party at MUN’s request; any responses provided by MUN to a Proponent to any inquiries from one or more Proponents; and any addenda issued by MUN in response to Proponent inquiries.

.15 **“Bid Process”** refers to the OPEN CALL FOR BID process described herein.

.16 **“Services”** refers to goods and services related to the Project.

.17 **“Substantial Performance of the Work”** refers to requirements in section 3.8

.18 **“Work”** refers to the work described in this OPEN CALL FOR BID.

1.4.3 Reference Standards

.1 The following references are to be used as guidelines for the Work.

- 1) EIA RS-310-C, Racks, Panels and Associated Equipment
- 2) CSA C22.1-94, Canadian Electrical Code Part I (current edition, Safety Standard for Electrical Installations)
- 3) CSA Standard T527-94, Grounding and Bonding for Telecommunications in Commercial Buildings
- 4) ANSI/EIA/TIA-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
- 5) ISBN 0-240-80286-1, Audio Systems Design and Installation, P. Giddings (Focal Press, 1990)
- 6) Building Industry Consulting Services International (BICSI) Telecom Distribution Methods (TDM) Manual

- 7) ANSI/BICSI 002-2014 DATA Center Design and Implementation Best Practices
- 8) TIA/EIA-568-B.1 and TIA/EIA-569-A, Category 6 Cabling Standards
- 9) “Controlling the Temperature Inside Equipment Racks” – Middle Atlantic
- 10) IEEE 802.3af – Wired Ethernet
- 11) AVIXA V202.01:2016 Display Image Size for 2D Content in Audiovisual Systems
- 12) AVIXA A102.01:2017 Audio Coverage Uniformity in Listener Areas
- 13) ANSI/INFOCOMM 2M-2010, Standard Guide for Audiovisual Systems Design and Coordination Processes
- 14) ANSI/INFOCOMM 3M-2011, Projected Image System Contrast Ratio

1.4.4 Drawing List

- .1 The AV system drawings, as listed on AV-000 List of Drawings, shall be read in conjunction with, and form part of, these specifications.
- .2 AV systems functional drawings illustrate conceptual system configuration only.
- .3 Refer to Architectural, Mechanical, Communication and Electrical drawings for coordination.

1.5 Administrative Requirements

1.5.1 Pre-installation Meetings

- .1 Attend pre-installation meetings as required.
- .2 Organize and chair Owner meetings as required.
 - 1) Provide minutes of Owner’s meetings to the Systems Designer.

1.5.2 Sequencing

- .1 Coordinate efforts in concert with the agreed schedule and Owner occupancy and use dates.
- .2 Coordinate with the Systems Programmer to include the onsite software deployment schedule and testing with the Audio Visual master schedule.
- .3 Author and submit proposed draft and final revised AV Systems schedules for Owner acceptance and coordination.
 - 1) Submit schedules to Systems Designer and Systems Programmer

1.5.3 Scheduling

- .1 Completed Summer of 2024.
- .2 Module A: Tiered Lecture Hall 1M101 with Control and Rack rooms 1M107 & 1M108 are priority for completion.
- .3 Room availability (site install start) dates as follows:
 - 1) 1M-101 and associated Control Room May 13, 2024
 - 2) 1M-102 and associated Control Room June 22, 2024

- .4 Software Deployment (site installation completed and tested) as follows:
 - 1) 1M-101 and associated Control Room July 8th, 2024
 - 2) 1M-102 and associated Control Room July 15th, 2024
- .5 Handover and End User Training
 - 1) 1M-101 & 1M-102 and Control Rooms August 12th, 2024
- .6 Classes start date (all rooms):
 - 1) August 19, 2024
- 1.5.4 Permits, Codes and Regulations
 - .1 Obtain permits, registrations, licenses, and insurance necessary to execute the Work in compliance with applicable regulations.
 - .2 Perform the Work in compliance with relevant codes and regulations.
- 1.5.5 Worker's Compensation
 - .1 Provide proof of good standing with WorkplaceNL.
 - .2 Pay WorkplaceNL costs in accordance with Newfoundland and Labrador law for workers including Sub-Contractors and Freelance Workers.
 - .3 Provide up to date WorkplaceNL Clearance Certificates during project and before payment is released, this includes those from sub-contractors.
- 1.5.6 Confidentiality
 - .1 Throughout the term of this agreement, and for a period of three years, protect the confidentiality of proprietary and confidential information that has been disclosed. Similarly, the recipients of proprietary information from the AV Contractor shall also protect the confidentiality of proprietary and confidential information so disclosed. In each case, this information is to be protected with the same standard of care as is used to protect the confidentiality of its own proprietary and confidential information. This protection shall be a reasonable standard and, shall protect such information as required by law, including the Freedom of Information and Protection of Privacy Act.
 - .2 Owner shall not reproduce or distribute bid submissions in whole or part to other competitive firms involved in this tender. Owner reserves the right to reproduce and distribute bid submission in whole or part to a third party for the purpose of bid evaluation.
 - .3 No part of the bid documents shall be distributed, copied in whole or partially, except for the purpose of preparing the bid for this contract with associated internal personnel. Copying or dissemination of part of the documents for purposes other than bid preparation is prohibited.
- 1.6 Submittals
- 1.6.1 Project Schedule
 - .1 Upon Notification of Award, immediately schedule a site meeting with the Owner and Systems Designer for initial coordination of the build.
 - .2 Within five days of contract award, submit a revised and detailed project schedule for review and comment by the Systems Designer and Owner. Revise and re-submit for acceptance.

.3 Provide regular schedule updates, once per week during active project periods, to the Systems Designer and Owner.

1.6.2 Shop Drawings

.1 Within ten days of contract award, submit a list of proposed shop drawings for the purpose of tracking the progress. Shop drawings are to be submitted to and for review by Systems Designer.

.2 Allow one week for review and one week for possible resubmission. Submissions are not to jeopardize the Project schedule.

.3 Shop drawings are for reviewing documents for conformance with the Project design concepts. As part of the approval process, only compliance with information given in the contract documents shall be reviewed. Corrections or comments made by Systems Designer during this process do not waive compliance with the requirements as specified. Further, the value of the work is not altered by this review where equipment has not been added, deleted or where it is needed to meet the requirements of the specification.

.4 The returned submittal shall have annotations, amendments and / or comments. Correct where noted, and if modifications are needed or if additional equipment is required for system to function as specified, there shall be no changes to contract value. Make corrections in a timely manner. Corrections or comments noted by Systems Designer during this process do not waive compliance with the requirements as demonstrated in the drawings and specification documents.

.5 For each submittal, provide electronic files. Submissions are to be complete unless approved by Systems Designer before submission. Partial submissions shall not be accepted and shall be returned for completion.

.6 Provide a Bill of Materials in active spreadsheet format.

.7 It is the responsibility of the Systems Contractor to review the Itemization of Supply four weeks prior to ordering product from the manufacturers / distributors. This updated Itemization of Supply will be reviewed and approved by Systems Designer for product equivalency.

.8 Drawings shall be neat and organized to show information including cable numbering scheme and a cable pull list for the electrical contractor. Submit drawings in PDF and AutoCAD. Drawings are to be a minimum size of Architectural E.

.9 As a minimum, the following drawing types are required:

- 1) Floor and site plans indicating equipment locations. Plans shall include equipment identification and either direct references to wiring details for each specific installation and wiring condition, or a schedule that references the same.
- 2) Functional block (flow) diagram showing the interconnection of equipment. Detail shield ground scheme. For each wire or wire group, show wire numbers and wire type. Identify device connection at each termination. For each device or device group, identify type, model and location. For each multi-pin connection, provide pin / conductor / function schedule. For each network-connected device, provide coordinated IP address label.

- 3) A network utilization schedule indicating device manufacturer, model, installed location, IP address, MAC address, field cable identifier, patch circuit number, patch cable identifier, Ethernet switch and switch port counts shall be provided.
- 4) Coordinate, Document and Maintain IP and network connectivity with Owner, Systems Programmer and Systems Designer. Record on shop drawing submittals and on as-built documentation.
- 5) Riser diagrams / cable diagram(s) showing system conduit, backboxes, connector, cable and cable numbering for systems.
- 6) Schematic diagrams showing detailed wiring interconnections of custom assemblies, terminal strips, terminal blocks and multi-pin connectors and harness details.
- 7) Location plan showing floor, wall and ceiling equipment locations.
- 8) Panel, bulkhead and rack elevations.
- 9) Display, general devices and loudspeaker mounting system designs.
- 10) EDID settings
- 11) HDCP settings for all devices. For simplification of reporting, common items may be grouped as required.
- 12) Table layout and elevation showing equipment and panel location and installation methods for fixed equipment and for portable equipment.
- 13) Equipment rack layouts, Operator Station Layouts and specifications including AC power distribution.
- 14) For data control interfaces, a document describing the complete command interface to system.
- 15) Testing checklists and documentation.
- 16) Power Requirements.

.10 Confirm with Owner cable labeling standards to be followed before submitting shop drawings.

1.6.3 Samples

.1 Submit proposed equipment and device samples to Systems Designer as they may be requested.

1.6.4 Test and Evaluation Reports

.1 Refer to 3.6 Testing and Adjustments and 3.7 Testing Procedures.

1.6.5 Preconstruction Screen Test Mock-Up:

1.6.5.1 General

.1 Provide on-site ALR projection screen fabric with snap frame and fast fold legs as mock-up for Owner's consideration.

.2 See add options, 2.7 and 2.14, below for ALR fabric specification.

.3 On-site screen test will utilize the existing Epson laser projectors.

1.6.5.2 Installation

.1 Install one mock up testing screen for a side-by-side evaluation with the Owner.

- .2 Use content indicated by the Owner during test.
- .3 Re-align projected image before, during, and after test as required.
- .4 If accepted by the Owner, remove existing screen fabrics, and install new fabrics on existing screen frames (Draper Clarion), re-align and calibrate projectors as required.

1.6.6 Preconstruction Mock-Up Submittals:

- .1 All mock-up submittals must be in accordance with the requirements of the Owner. In addition, the Systems Designer requires the following:
 - 1) Preconstruction Testing Program: Developed specifically for Project.
 - 2) Preconstruction Test Reports: Prepared by a qualified preconstruction testing agency for each mock-up test.
 - 3) Record Drawings: Submit record drawings of preconstruction mock-ups prepared by preconstruction testing agency.

1.6.7 Network & Connectivity Documentation

- .1 Documentation to include:
 - 1) IP address, Subnet & Gateway for all connected network ports
 - 2) MAC Address for all connected network ports
 - 3) Ports & Protocols in use by port

1.6.8 Closeout Submittals

1.6.8.1 Maintenance Contracts/ Service Level Agreement (SLA)

- .1 Provide detailed SLA, include as a minimum:
 - 1) Commencement date, duration.
 - 2) Service ticket management and reporting.
 - 3) Inclusions and exclusions.
 - 4) Response times related to severity of the outage.
 - 5) Procedures for escalation.
 - 6) Facility service history semi-annual report.
- .2 Minimum SLA Requirements
 - 1) There are 2 defined levels of service based on the severity of the outage. OWNER's FOM AV/IT representatives will first verify that the device is still online, connected and has access to the required network(s). Beyond this point the following two response times are required as related to the two outage level definitions. The two outages listed below would involve any of the key operational components in the rooms including but not limited to the scheduling panel, the UC Communications Devices, video routing, control and/or sound system. Accessories such as a replacement HDMI USB-C cables, OWNER would retain spares and expect next business day shipping on those components.
 - 2) A Minor Outage is defined as

- a) any general operational issue, not inhibiting multi-site sessions of the room(s).
- 3) A Major Outage is defined as
 - a) a failure of the multi site session capability that have made the room(s) not usable for their intended purpose.
- 4) A Minor Outage will have an initial response time of 4 hours and a repair time of next business day.
- 5) A Major Outage will have an initial response time of 2 hours and a repair time of 4 hours.
- 6) All of the times and hours above are calculated based on OWNER business hours of 8:30am – 4:30pm NT.

1.6.8.2 Operation and Maintenance Manual

- .1 Each manual set includes one electronic copy and one hard copy, including Record Drawings as described in this section, for review and approval by Systems Designer as a portion of Acceptance and Commissioning (see Section 3.8.1).
- .2 Update facility infrastructure drawings to “As Built” and submit to Owner in manual submission (include facility wiring and numbering schemes).
- .3 Operation and Maintenance Manual shall contain:
 - 1) Detailed Table of Contents
 - 2) Project Name and document Title on the title page and in the header
 - 3) Contacts and credit page, including a list of key company contacts for service with 24 / 7 service contact numbers.
 - 4) Warranty Certificate Statement with statement of completion/ expiry.
 - 5) Itemized list of manufacturers’ warranties, durations, and expiry dates.
 - 6) Inventory tracking spreadsheet (BoM) with serial numbers in PDF and in active spreadsheet format (include on USB memory drive file).
 - 7) User operating instructions, which detail operation of the various systems for the day-to-day user (includes control panel layouts, screen dumps)
 - 8) Technical manual(s), which detail service procedures for systems described in this OPEN CALL FOR BID
 - 9) Manufacturers’ product manuals and product literature for components
 - 10) Clean copies of record drawings
 - 11) Miscellaneous equipment drawings, custom fabrication drawings
 - 12) Miscellaneous equipment manuals
 - 13) Copies of approvals, stamps, inspection certificates
 - 14) Operational Instructions
 - 15) Include performance data on the completed system as specified under performance testing
 - 16) Final project schedule, change control log, issues management log
 - 17) Designations and settings for signal processing equipment, gain, zone, and controls.

- 18) Amplifier connections and test results including voltage during normal operation.
 - 19) Loudspeaker tap connections on speaker transformers, impedance test results for speaker circuits, and details regarding impedance matching networks.
 - 20) Step by step procedures for room configurations
 - 21) Network assignments and MAC addresses.
 - 22) Updated facility infrastructure drawings to “As Built” (include facility wiring, numbering schemes, and IP tables).
 - 23) Troubleshooting procedures including remedial actions.
 - 24) Include a full-size master functional schematic drawing. Laminate it with a rigid backing and a copy mounted in each equipment room, operations area and technical support area. The master functional drawing demonstrates the functionality and signal flow of systems and is for reference by operators. The master functional drawing shall be sized so that text is legible, minimum 10pt. Systems to be separated graphically and / or by colour for clarity.
- .4 Owner reserves the right to reproduce documents for internal corporate use.
- .5 For computer or microprocessor-based control or signal-processing systems for which custom programming is required, and provided under this contract, include:
- 1) Custom or specially licensed executables and libraries.
 - 2) Configuration, design or script files in uncompiled form.
 - 3) Setup files on USB drive, for modification and maintenance of this installation only, by Systems Designer.
- .6 After approval, deliver one PDF soft copy to Systems Designer and Owner and one hardcopy to Owner.
- .7 Provide a video capture of all AV Contractor training sessions, edit, and deliver to Owner on USB drive or link for their exclusive use.

1.6.8.3 Record Documentation

- .1 All record documentation must be submitted and kept in accordance with the requirements of the Owner.
- .2 Include:
 - 1) Shop drawings, revised to reflect as-built changes; metalwork drawings not required unless for specialized rigging bracket and customised mechanism system.
 - 2) Other drawings noted in the specification.
 - 3) Service Level Agreement (SLA)
 - 4) Any other diagram or information required for a complete description of system(s).

5) Designations and settings of signal processing equipment (analog and DSP based) and other controls

.3 Supply submitted drawings in both hard copy and soft copy. Hard copies of drawings shall be supplied at full-size, minimum size of Architectural D. Soft copies shall be supplied in AutoCAD format and PDF. Drawings are to be supplied in an uncompressed format, for example it is not permitted to use a program to zip the files or use a disk with compression.

.4 Acceptance of systems, systems design and performance are at the sole discretion of Systems Designer.

1.6.8.4 Licence of Programming Software and Programs

.1 Where software is purchased or supplied as a component of equipment that is required for the Project, the software shall be licensed in the name of Owner or their appointed representative.

.2 All custom software applications or designs specifically developed for the project are considered proprietary property of Owner. Maintain software on behalf of Owner ensuring updates or changes are documented and delivered to Owner upon completion.

.3 All custom software applications or designs specifically developed for the project are confidential and shall not be distributed in whole or part to any party beyond the immediate project implementation team under contract to Owner directly or through a third-party representative of Owner.

1.7 Quality Assurance

1.7.1 LEED Requirements

.1 There are no LEED requirements for AV systems.

1.7.2 Licensed Professionals

.1 Where the total suspended mass exceeds 90 kg, ensure that a seismic certified Structural Engineer having jurisdiction approves custom-built rigging fixtures used for overhead suspension where required.

.2 Provide stamped drawings as required for acceptance.

1.7.3 Preconstruction Testing

.1 Pre-assembled equipment rack testing and software to occur at Contractors' warehouse facilities.

.2 Coordinate inspections with Systems Designer, Systems Programmer, and Owner.

1.7.4 AV Contractor Performance

.1 Early procurement is expected to meet project delivery goals with off-site storage/warehousing by the AV contractor. Advance orders and delivery strategy to be agreed to and approved by Owner.

.2 Provide a complete and working system to comply with the operational capabilities, design and standards of quality specified.

.3 Provide equipment, labour and material required for the specified systems

.4 If the systems do not fulfill all aspects of this OPEN CALL FOR BID, make adjustments required to bring installation into conformance with the specification at no additional cost to Owner.

.5 Fabricate and install items in accordance with manufacturers' recommendations and the specifications.

.6 Fully test and align the equipment and connected cabling and infrastructure as outlined in this Specification and according to accepted trade practices to satisfaction of Systems Designer. Record and Document all tests on the As-built documentation.

.7 Correct deficiencies at no cost to Owner. Should there be violations or non-compliance to the Codes, correct these at no cost to Owner. Correct violations within ten days of receiving notice.

1.7.5 Conduct of Work

.1 Provide properly trained, certified, qualified, and professional installation technicians and trades people throughout the duration of this project. Observe and obey building codes applicable, safety rules & regulations, and the general rules of the facility as directed.

.2 Use of impact tools for cutting concrete or installation of inserts and use of powder, shot or power-actuated tools not permitted unless written permission obtained from Owner first.

.3 Ensure replacement or restoration to original condition any damage or alteration to the building and its contents, e.g. floor, ceiling, walls, furniture, caused by the installation process. Damage or disfigurement shall be remedied at AV Contractor's expense.

.4 Coordinate with Systems Designer and Owner on sensitive activities, such as high-SPL testing, or special requirements to operate the equipment in potentially unsuitable environmental or power conditions, to maintain the schedule.

.5 Send to Systems Designer and Owner statements and correspondence from suppliers and manufacturers concerning defects or delays.

.6 Confirm dimensions, distances and placement and report discrepancies to Systems Designer before installation.

.7 Maintain an orderly work area and ensure conditions meet industry standards and statutes for safety and work procedures.

1.7.6 Errors and Omissions

.1 Omissions or errors in the Open Call for Bid documents not reported at the time of response does not relieve Contractor of the responsibility for providing properly functioning systems as specified.

.2 Provide the equipment, installation material and labour required to fulfill the requirements and intent of the OPEN CALL FOR BID whether or not enumerated explicitly.

.3 Provide wiring, terminations, adapter assemblies and power supplies related to equipment functions.

.4 Upon award of contract, review reference drawings and site conditions and report discrepancies, including conduit routing and sizing, to Systems Designer. These discrepancies shall be reported as part of the review drawing submission.

1.8 Delivery, Storage, and Handling

1.8.1 Delivery and Acceptance Requirements

.1 Pay shipping charges associated with equipment and documentation to and from the required location.

1.8.2 Storage and Handling Requirements

.1 Supply secured metallic job box(es) for parts and tools. Owner is not responsible for loss of specified system components until permanently fastened to the building or signed over.

1.8.3 Packaging Waste Management

.1 Remove and properly dispose of waste products. Make every effort possible to recycle waste items like cardboard, metal, and plastic.

.2 Garbage disposal and associated fees; if applicable, fees are at AV Contractors expense.

1.8.4 Materials Control

.1 Equipment supplied under this document shall be new stock, except as indicated.

.2 Assist Owner in developing, logging and deployment of asset management tagging throughout the project.

.3 Deliver the equipment to the site and provide hoists and scaffolds necessary to install the equipment.

.4 Visually inspect equipment for damage or defects and report damaged or defective materials to Systems Designer and Owner before installation.

.5 Send to Systems Designer and Owner statements and correspondence from suppliers and manufacturers concerning defects or delays.

1.8.5 Asset Tagging

.1 Provide all AV equipment with asset tagging as per example below (or as directed by the Owner):

- 1) Field 1. Service tag: XXXXXXXX
- 2) Field 2. Asset tag [QR code only]: MED10[Service tag]
- 3) Field 3. Asset Make and System Model:
- 4) Field 4. Processor Model:
- 5) Field 5. Memory:
- 6) Field 6. HD Size:
- 7) Field 7. Warranty Expiry (# years):

.2 Draft and Final version asset tracking spreadsheets are required during the project and as part of Closeout documentation.

.3 As for the spreadsheet tracking the assets:

- 1) Manufacturer
- 2) Model
- 3) Serial number
- 4) Mac address
- 5) IP address
- 6) Host name

1.8.6 Site Access

- .1 Comply with Owners rules concerning:
 - 1) Acceptable hours to perform work to minimize disruptions of daily operations
 - 2) Site procedures – for example: sign in (if applicable)
 - 3) Security Procedures
 - 4) Parking location; if applicable, fees shall remain the AV Contractors responsibility.
 - 5) Material Storage; the AV Contractor shall remain solely responsible for material security.
 - 6) Sanitary Facilities
- .2 Upon acknowledgement of Substantial Performance of the Work, access to the site shall be granted only at the discretion of the Owner.

1.9 Warranty

- .1 Warrant work as defined by this specification for a period no less than one (1) year from the date of substantial performance. Warranty certificate shall be submitted as part of the Operating Manuals.
- .2 Options for additional warranty are requested.
- .3 Warranty for all devices and systems is to commence on a single date after AV Project completion (all floors) and Substantial Completion/ Performance has been granted by Designer, and Owner.
- .4 Warranty shall cover the installation and equipment to be free of defects resulting from faulty components, workmanship, installation, or incorrect calibration. Replacements and repairs shall be made without cost to Owner.
- .5 Should manufacturer offer a warranty longer than the warranty provided under this contract, notify Owner of these durations in the manual. Manage these warranties. Should manufacturer warranty work need to be performed outside of the AV Contractors warranty period, additional costs may be incurred by Owner should removal, shipping and re-installation be required.
- .6 Follow-up with Owner 90 days from substantial completion to investigate potential issues or concerns relating to the completed system.

.7 Provide preventative maintenance for the warranty period as stated at no additional cost to Owner. The system maintenance frequency shall take place every six months after substantial completion. **These events shall be scheduled for months of July and December outside of class schedules.**

.8 An extended warranty and/or service plan may be accepted by Owner before the conclusion of the warranty. Communication regarding this shall begin before warranty expiration.

.9 As part of the warranty service, update software and firmware to resolve bug fixes. Test updated software and firmware before installation onsite to ensure no unintended operation is created.

.10 Supplied equipment shall be obtained through lawful and manufacturer authorized distribution channels and the warranty shall be supported in the jurisdiction of Owner. Under no circumstances are “Grey Market” or “Refurbished” items acceptable.

2. PRODUCTS

2.1 Owner-Supplied Products

2.1.1 Computers noted below as OSE.

2.1.2 Devices noted below as OSE.

2.1.3 Devices noted below as existing.

2.2 Substitutions

.1 Equipment specified in terms of representative manufacturers or models that shall meet the functional and technical requirements of the project. Substitutions for different models shall be considered. Sufficient documentation is required to show proposed substitution is equivalent (or better) in terms of function and performance. Systems Designer has sole discretion as to whether the substitution shall be accepted. In the event that the substitution is not accepted, the original specified item shall be provided at no additional cost to Owner.

.2 Where the term “No Substitution” is used, no deviation from specified manufacturer or model shall be accepted.

2.3 IT Based Systems and Configuration

2.3.1 General

.1 The overall concept for the audio, video, and control systems are defined below.

.2 An IP Plan will be discussed including appropriate subnets required and VLANs to separate the networks being implemented based on best practice recommendations of the manufacturers of the equipment being installed. This plan will be submitted a minimum of 30 days prior to on site connections to the OWNER network and should include IP ranges at the direction of OWNER ITS Team.

.3 Along with the above mentioned IP plan, the AV Contractor will provide a routing plan to connect the AV Switch located in any other location that an AV Contractor provided switch is located. These switches will be Layer 3 and configured to point access for internet to the OWNER IT Provided Gateway as required. There may be more than 1 subnet on these switches based on best practice laid out above.

.4 Network requirements of the proposed manufacturers will be documented and delivered to OWNER IT team a minimum of 30 days prior to on site connections to OWNER network, this includes but is not limited to the items listed below.

- Configuration items identified by manufacturers as “optional” but are provided to “to make integration into mixed-use networks simpler” or to “assist in integration” should be considered mandatory.
- Any multicast management requirements including IGMP Snooping, IGMP Querier and any specific setting of those items that is required or recommended. Also, if PIM or other multicast management tools are required based on the implementation.
- Provide a complete listing of all DCSP Priority Requirements (QoS) as recommended by the proposed manufacturers and required Queue assignments. The AV

Contractors Network Specialist must be prepared to discuss any Quality of Service Requirements with the OWNER IT Team as it relates to other services.

- Provide external ports or other access requirements needed to complete the scope of the project including inbound access (if any). Also be prepared to discuss the communications requirements of the various equipment as it may be required to the OWNER IT Team.
- Advise on any other requirements such as turning off Green Ethernet support or other energy saving features and or other applications that may negatively affect the performance of the Audio Video solutions on the network.

2.4 Control System and Programming

2.4.1 General

- .1 Custom programming for the Extron Control System and Graphical user interfaces will be provided by Owner.
- .2 The overall concept for the control system is specified in this portion of the document. Specific hardware for each room type is discussed with the rooms.
- .3 Control systems, as specified in this document, implement dedicated hardware for graphical touch interfaces and control processors.
- .4 User Interfaces are be integrated to provide a control platform for the various multimedia and communication devices specified.
- .5 While this section is not relevant to every room type, it provides an overall concept of the control system that includes many different room types.

2.5 DSP Programming

2.5.1 General

- .1 Custom programming for the QSC open architecture DSP system will be provided by Owner.

2.6 Module A: Tiered Lecture Hall with Control Room

2.6.1 General

- .1 Install the systems to 1M101, Control Room 1M107 and AV Server Room 1M108.
- .2 This 128-seat tiered lecture hall is designed to engage the audience and includes state-of-the-art audio-visual technologies.
- .3 This lecture hall will be used for a variety of purposes, including lecture delivery to medical students; distance learning; panel discussions; Q&A sessions; keynote presentations; and break-out sessions and awards ceremonies.
- .4 A fully outfitted room is described here-in. AV equipment complement is listed as a base system with options for consideration by the Owner, noted below in Alternates and Add Options.
- .5 Existing components installed in the room will be integrated to new video, audio and control systems. Provide necessary interfaces and accessories.

- .6 This room will have built-in codec-based videoconferencing provisions for remote participants and/or distance learning.
- .7 Built-in multi-camera videoconferencing system to be fully integrated with the room AV systems.
- .8 Room overflow feeds shall be provided to lecture theatre 1M102
- .9 Room front projection and screens to support multi-signal display from varied video sources including document camera, computer, and videoconferencing content.
- .10 A permanently installed lectern/desk (existing), located at the front of room, will be the presenter / instructor main system access and control point, and will house AV devices as required. Desk and controls are to meet accessibility codes. A furniture mount rack will house in-lectern devices and room PC.
- .11 The Lectern/ Desk shall support the following devices:
 - 1) Control Touch Panel
 - 2) In-Room PC with keyboard and mouse
 - 3) Document camera (OSE/ Existing)
 - 4) Gooseneck microphone (OSE/ Existing)
 - 5) AV and Laptop inputs:
 - a) HDMI
 - b) USB-C
 - c) L+ R Audio
 - 6) Security alarm keypad (OSE/ Existing)
 - 7) Millwork style equipment rack (OSE/ Existing)
 - 8) IP Intercom Substation
 - 9) Session recorder and control panel (OSE/ Existing)
 - 10) Existing flush surface box for connections as described plus:
 - a) PowerNetwork (total of two network connections and connectors)
- .12 Flat panel confidence displays are located at the first row of audience seating providing instructor content display. These displays are built into an existing custom steel enclosure. New video system will provide signals to these displays.
- .13 A near field audio loudspeaker is mounted to the confidence display cabinet as per drawings
- .14 Wall mounted “near field” video displays, located below main projection screens; provide unstrained viewing for the front row.
- .15 AV systems are controlled via lectern and control room touch panels.
- .16 The audio system for the hall will be used for in-house audio processing and playback as well as integration with videoconferencing.

.17 Program audio will be reproduced through wall mounted speakers, left and right of the projection screen(s), with a lower-level signal fed to the ceiling speakers as a supplement.

.18 The hall has a blend of wired and wireless microphones for instructors and panel discussions.

.19 Boundary microphones with control buttons and LED indicator will be integrated to each students' desk at locations shown on drawings.

.20 By default, the student desk microphones LED indicators will be off. When students press their microphone button for request to speak, the LED indicator will flash, or light solid depending on status and provides a signal back to the control and DSP systems for system action. The student microphones are installed with a light to indicate the microphones status. The control system will provide different indicators to show the microphones placement in the queue as well as the on/off status.

- 1) Indicators are as follows:
 - a) Solid On: Microphone is on
 - b) Solid Off: Microphone is off
 - c) Quick flashing: Microphone is "next in queue"
 - d) Slow Flashing: Microphone is in the microphone queue
 - e) Double flash: Microphone queue is full. The microphone will not be placed in the queue
- 2) Student Operation of the Microphones:
 - a) Button Press: Request placement in the queue
 - b) Button Hold for 2 seconds: Remove the microphone from the queue

.21 Four Methods of microphone queueing will be provided by the Systems Programmer

- 1) Automatic (Dynamic Mode)

When a student presses their microphone button, their microphone is activated. If an additional microphone button is pressed they will be entered into the microphone queue. Once the first student has pressed their microphone button again the next microphone in the queue will become active automatically. Any microphone in the queue will flash slowly to indicate their presence in the queue.
- 2) Request to Speak

Request-to-Speak mode students to press their microphone button to enter the microphone queue. The user interface at the lectern or operator position will accept microphones by selecting them from the Q&A page.
- 3) Manual Mode

Manual mode will be controlled by the operator. Microphones will be turned on and off by the operator, the student buttons will be disabled in this mode. Student microphone indicator status will reflect the selection of the microphone by the operator.
- 4) Student Directed (FIFO)

This mode is controlled dynamically by the students. The maximum number of open microphones, or NOM, allowed to be on at the same time will be limited by the acoustic performance of the audio systems in conjunction with maximum number set on the administration page. If the number of microphones requested by students exceeds the NOM, the student will be placed into the microphone queue. As students exit the queue, by turning off their microphone, the next microphone in the queue will become active.

- .22 Audio mix-minus configuration will be utilized for in-room voice lift.
- .23 Participants voices will be Slightly, Moderately, or Highly amplified in the room, as distance to listeners increases. Voices will be amplified through ceiling loudspeakers. These amplification levels (in dB) will be determined on site by the audio programming team in coordination with the Owner, to ensure appropriate listening experience is provided across the entire room to Owner's satisfaction.
- .24 Control Room 1M107: The adjacent control room will house existing video/data projectors and 3 operator control positions for support for booth rooms 1M101 and 1M102. System includes full operator controls with talkback microphones. PTT talkback microphone activation shall mute local booth monitor speakers.
- .25 PTT microphones will allow operators addressing the room via ceiling loudspeakers.
- .26 AV Server Room 1M108: This adjacent room houses existing AV equipment racks.
- .27 AV facilities will be permanently installed.
- .28 Distance learning links to other facilities in 2025 are being planned and accommodated in systems design.
- .29 Each loudspeaker is managed by a dedicated DSP channel and amplification channel. Refer to drawings.
- .30 When sound from local content is reproduced through front loudspeakers, the amplification level via ceiling loudspeakers will be determined on site for a consistent coverage across the room. Time alignment will be managed by Systems Programmer to ensure a positive experience for all room users.
- .31 The HDMI and USB-C connections will connect to video distribution system, through AVoIP encoder, for local presentation and VC content sharing. These connections will be UHD 4K capable and will utilize the video projectors, displays, and loudspeaker system to address the audience.
- .32 Any AV source could be shown on any of the screens. Audio source will be selected and controlled via control touch panel.
- .33 Connection on the lectern will have an adapter ring to support devices with different connection types, including DisplayPort, Apple Lightning, and Apple USB-C.
- .34 Acoustic panels are installed in lectern to reduce device noise transferred to room.

- .35 Ventilation fans are installed for lectern equipment racks. Verify operation and capacity is appropriate for new systems.
- .36 PTZ cameras on room front and rear will capture participants and instructors' images.
- .37 At the room front displays and confidence monitors, the intent is to display the following images; image selection will be via the control system.
- 1) Wide shot of remote room – or – close-up of students asking a question (out of the room) with local Lecturer or student PIP or window
 - 2) Content
- .38 For the Content Channel, the input consists of the Lecturer's computer, a lectern source or source in the Control Room. The active device is selected at the Lectern Control Panel or in the Control Room. The content channel to be delivered to the distant end via an IP video encoder, VC Codec.
- .39 By default, the wide-angle room front camera will be selected at systems' start-up.
- .40 Program cameras for wide room shot (home position) during: Far-side speaking periods, multiple local participants talking at a time, or speaking participant(s) located outside of all programmed pre-sets using wireless microphones. Front camera wide shot will be selected in these conditions.
- .41 A compact PTZ camera installed above confidence monitors will capture the instructor's image while addressing remote participants shown on confidence displays.
- .42 Coordinate with Owner: Camera pre-sets, movement speed, and pre-set switching time for a smooth operation to Owner's satisfaction.
- .43 Provide buttons on control panels to manually select and adjust cameras, and to recall at least 7 pre-sets on each camera when camera automation is not used. Note that automated operation will require more than 7 presets programmed.
- .44 The Owner will confirm the default condition (Enabled or Disabled) for camera automation.
- .45 Provide an IP camera in the room. The IP camera will be used by the operators in the Control Rooms to observe the room when assistance is required. The IP camera is to be accessible from both local and remote campus Control Rooms.
- .46 Provide an IP based intercom to connect instructors in classrooms to operators in each Control Room. The intercom system will allow (with future expansions) classrooms from remote campuses calling local operators, local professors calling operators in remote campuses, or local operators calling remote operators.

2.6.2 Installation

- .1 Decommission existing equipment intended for replacement and handover or dispose as indicated by the Owner.
- .2 Install/ pull new wiring where required.
- .3 Install specified cables for Student Desks' microphones, LED rings and buttons, to ensure required quantities can be accommodated in existing conduits.
- .4 Integrate new and existing equipment to systems as required.

- .5 Provide all necessary interfaces, adapters and accessories required for complete integration of existing devices into new system for a fully functional solution to the Owner's satisfaction.
- .6 Verify operation and capacity of ventilation fans installed for lectern equipment racks to support for new systems. Inform Owner and/ or Systems Designer of any concerns.
- .7 Electrical boxes for AV and rack locations are inclusive of MUN Network drops. The AV contractor is to extend the network from the rack location to devices as required.
- .8 Coordinate quantities, types, bandwidth, terminations, and locations of Network drops with Owner. Provide a network port schedule to the Owner to communicate requirements and coordinate installation.
- .9 All wall blocking at displays is reported to be ¾" plywood.
- .10 Connect all equipment as shown on drawings.
- .11 Connect audio devices with Dante Primary and Secondary ports to the corresponding VLANS for redundancy. Avoid daisy-chaining devices using network ports.
- .12 Install Dante Domain Manager (DDM) on AV systems computer (OSE).
- .13 Configure Dante audio network and devices to ensure the number of Dante flows supported by the DSP (64x64) is not exceeded.
- .14 The Systems Contractor shall confirm and provide all systems cable. The Systems Contractor shall, sort, organize, test and terminate all systems cable.
- .15 Coordinate network requirements and configuration for audio, video, and control transport over Ethernet with Owner ITS. Including but not limited to QoS, IGMP Snooping, IGMP Query, Flow Control, Jumbo Frames, etc.
- .16 Configure devices as required, coordinate network settings and requirements with the Owner to prepare AV systems for programming team to upload files and test operation. Coordinate details with Owner and programming team. Assist programming team during systems testing as necessary.
- .17 Configure audio system for in-room voice lift mix-minus. Set levels to Owner's satisfaction.
- .18 Install PTZ cameras at the following locations:
 - 1) Two 24X zoom cameras on front wall,
 - 2) Two 24X zoom cameras on rear wall,
 - 3) One wide-angle camera on front wall,
 - 4) One 12X zoom camera on confidence monitors facing the professor.
- .19 Configure PTZ camera pre-sets as required to Owner's satisfaction.
- .20 Configure automated camera parameters (pre-sets, speed, transition time) to Owner's satisfaction. Coordinate details with programming team.

- .21 Provide PTZ camera multi-view software installed on a computer (supplied by the Owner) for operators to monitor cameras. Configure systems as required. Coordinate computer and network requirements and settings with the Owner.
- .22 Coordinate student desk microphone locations with brackets and components under the desks. Consider the student might be facing the room front centre when placing microphones on desks. Provide proposed microphone layout for Owner and Systems Designer review and acceptance before installation.
- .23 Provide cutouts on students' desks for boundary microphones and touch buttons.
- .24 Install electronics and cabling under students' desks in a discreet and safe manner to avoid damages from regular use.
- .25 Set all audio amplifiers outputs to low-impedance level. Ensure each loudspeaker is set to low impedance as required. Adjust if needed.
- .26 Calibrate audio levels as required for consistent coverage around the room to Owner's satisfaction. Coordinate details with programming team.
- .27 Connect audio amplifiers (remote ON/Off, Standby ports) to AV control relay interfaces. Amplifiers will go to standby/off mode when AV system is turned off or a fire alarm signal is received. Coordinate settings with programming team.
- .28 Connect fire alarm link system to AV control digital input port. Coordinate fire alarm signal conditions and interfacing with the Owner. Test operation to Owner's satisfaction.
- .29 Connect ceiling and front wall loudspeakers amplifiers' Fault Status port to AV control Digital Inputs. AV control system will be notified in case of device failure.
- .30 Connect ceiling and front wall loudspeakers amplifiers' Ethernet port to AV control network for monitoring and control. Coordinate settings with Owner and programming team.
- .31 Connect confidence monitor loudspeaker amplifier. Coordinate details with Owner,
- .32 Configure all amplifiers' built-in DSP to basic settings passing signals through all channels as required in preparation for programming team final deployment. Coordinate details with programming team.
- .33 Provide minimum 1m (3.5 feet) long cable tails on lectern top. Secure cables to prevent accidental disconnection from regular use.
- .34 Attach video adapter ring to HDMI cable on lectern using provided clamp.
- .35 Install IP Camera access software on computers indicated by the Owner. Test system operation and control as required.
- .36 Install IP intercom surface mount substation on the lectern. Coordinate exact location and installation details with the Owner.
- .37 Install IP intercom handset stations at each operator position in the control room.
- .38 Install IP intercom central unit (substation interface) on equipment racks.
- .39 Provide appropriate cabling gauge for substation considering distance to substation interface following manufacturer' specifications.
- .40 Configure intercom system as indicated by the Owner. Test complete intercom system operation to Owner's satisfaction.

- .41 Coordinate network configurations and requirements for IP camera and IP intercom with Owner.
- .42 Configure all control, video and audio networked devices as required in preparation for the programming team to deploy program files.
- .43 Perform complete Network Testing And Validation prior to control and audio software deployment. Coordinate with programming team. Coordinate network requirements and settings with the Owner before proceeding.
- .44 Network Test and Validation should start with physical connectivity and include the protocol stack. Each layer of the network architecture should be validated according to its intent to transport AV content.
- .45 Network Test and Validation should include at least 3 steps or levels: Verification, Functional Testing, and Unit Testing.
- .46 Prepare a Network Testing and Validation Report and submit to the Owner and Systems Designer for review and comments. The Reports should follow a professional format and include minimum:
- 1) Scope and objectives,
 - 2) Methodology, equipment, tools, and resources,
 - 3) Complete list of network settings as coordinated with the Owner,
 - 4) High Level Design (HLD),
 - 5) Detailed results supported with screenshots, logs, graphs, and tables.
 - 6) Results analysis and comments related to network preparedness to transport AV content.
- .47 The High Level Design (HLD) should include all AV Systems devices, their services on the network and the requirements for successful delivery of those services within the scope of the HLD. All service (e.g. networked audio, AVoIP, control) devices need to be identified, the routes and bandwidth calculations completed as well as all isolation, quality of service (QoS), management of service and delivery of service requirements must be documented. Each service needs its own distribution and bandwidth calculation. In the absence of the knowledge of the possible routing within the network environment, the design should be scaled to support anything to anywhere and any bandwidth limitations identified for consideration of re-design or design assistance.
- .48 Document all network configurations and setting coordinated with Owner as part of systems documentation.
- .49 Confirm with Owner cable labeling nomenclature and colour standards to be followed before submitting shop drawings.
- .50 Label and colour code connection and cables for easy identification by users.
- .51 Dress and manage all cabling and devices as required for a finished installation.
- .52 Test with the Owner the projected image on main screens using the screen fabric framed sample. Test using the contents indicated by the Owner, placing the fabric sample at multiple locations on the existing screens as indicated by the Owner.

2.6.3 Equipment

.1 Audio

Description	Type / Model	Qty.
Through table boundary layer microphone, cardioid pattern, RF shielded, phantom powered condenser, nickel finish. Confirm finish with Owner before ordering.	ClockAudio C-012E-RF	64
Through table boundary layer microphone. Nickel. Confirm finish with Owner before ordering. _ Spare	ClockAudio C-012E-RF	3
Rack mount stage box, 16x mic inputs, 8x line outputs, with Dante primary and secondary ports, redundant power supply.	Yamaha Rio1608-D2 or equivalent	4
Rack mount stage box, 16x mic inputs, 8x line outputs, with Dante primary and secondary ports – Spare	Yamaha Rio1608-D2 or equivalent	1
Audio Network Domain Manager	Audinate DDM Gold Package	1
DSP frame. Up to 128x128 Dante channels, VoIP support, media drive, AEC processors, USB ports.	QSC Q-Sys Core 610	1
DSP License. 128x128 Dante channels, 96 AEC processors	QSC Q-Sys SL-DAN-128-P	1
DSP Scripting licenses for AV devices (cameras)	QSC Q-Sys	As req'd
Analog 2x2 Dante converter, XLR INS/OUTS	RDL DD-BN22	1
Analog 2x2 Dante converter, XLR, TRS INS / XLR OUTS	RDL DD-BN2ML	4
32x32 Dante-Analog IO converter box	Tascam ML-32D	1
Dante converter breakout box with D-Sub cables required	Tascam BO-32DE	2
PTT desktop microphone	TOA PM-660U - Existing	1
PTT desktop microphone	TOA PM-660U	2
Over-the-ear headphones – Operator	Sennheiser HD200 PRO or equivalent	3
Dante headphone pre-amp with volume control	RDL AV-NH1	3
Operator desktop monitor (pair)	Existing. Focal CMS50	1 (OSE)
Lectern gooseneck microphone	Existing	1 OSE
Telephone hybrid adapter	Existing	1 OSE
Assistive Listening System	Existing	1 OSE
Wireless microphone systems	Sennheiser EW100 – Existing	2 OSE
Power amplifiers	Existing	4 OSE
Front wall loudspeakers	Existing. TOA SR-S4S	2 OSE
Ceiling loudspeakers. High ceiling	Existing. EV C8.2HC	4 OSE
Ceiling loudspeakers. Wide dispersion	Existing. Tannoy CMS501	11 OSE
Confidence display loudspeaker	Existing. Renkus Heinz CFX41	1 OSE
Portable I/O box. 16x8 channels, redundant Dante network, rubber bumpers and carry handle. Manages press feeds and panelists microphones.	Allen & Heath DT168	1

Description	Type / Model	Qty.
IP-based intercom – Operator handset, master station	TOA N-8600MS or equivalent	3
IP-based intercom – Lectern station, substation	TOA RS-160 or equivalent	1
IP-based intercom – Central unit, substation interface	TOA N-8000RS or equivalent	1
IP-based intercom – 2-gang surface mount box for substation	TOA or custom	1
Dante to USB 2x2 converter – Future UC computer	Audinate ADP-USB-AU-2X2	1
Audio Network switch, primary and secondary VLANS	OSE	As req'd (OSE)
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

.2 Video

Description	Type / Model	Qty.
PTZ camera. 24X Zoom, 4K/30P, IP control – Front and rear walls	Panasonic AW-UE40	4
Wide angle camera. 4K UHD resolution, HDMI out, serial control. With 131° lens and power supply – Front wall wide angle	Marshall Electronics CV380-CS + CS-3.2-12MP lens	1
PTZ camera. 12X Zoom, 4K/30, IP control – On confidence monitors	Panasonic AW-UE20	1
PTZ camera multi-view application	Panasonic PTZ Control Center	1
Computer (At Lectern)	Existing	1 (OSE)
AVoIP encoder. HDMI and USB-C inputs. Dante built in.	Visionary Solutions DUETE-5	As req'd
AVoIP wall plate encoder. HDMI and USB-C inputs	Visionary Solutions E5100	As req'd
AVoIP decoder. HDMI and USB-C outputs. Dante built-in	Visionary Solutions DUETD-5	As req'd
AVoIP decoder. HDMI and USB-C outputs	Visionary Solutions D5200	As req'd
Video projector, 15K lumens, LCD WUXGA with 4K enhancement. With zoom lens	Epson Pro L1750U (Existing)	2 (OSE)
Compact IP camera. PTZ, 5X zoom, PoE, built-in microphone. With ceiling mounting bracket and accessories.	Axis M5074	1
IP camera access software	Axis Companion	1
Computer – AV support (IP cam, PTZ cam multi-view)	OSE	2 (OSE)
27" video monitor - Operators	NEC, Samsung, LG	6
32" video monitor - Operators	NEC, Samsung, LG	3
Universal HDMI Adapter Ring 2.0 with 5 Cable Adapters.	Liberty Cable DL-ARDA	4
Videoconference Codec	Cisco Codec Pro CIS-CS-CODEC-PRO-NR-K9	2

Description	Type / Model	Qty.
AV recorder/streamer. Installed on lectern	Existing. Extron SMP 351	1 (OSE)
Network switch	Cisco / Aruba (OSE)	OSE As req'd
ALR projection screen fabric framed sample. 600x600mm minimum fabric dimensions.	Draper XH900X	1
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

.3 Control

Description	Type / Model	Qty.
Scripting licenses for PTZ camera control	QSC	As req'd
AV recorder control panel. Installed on lectern	Existing. Extron RCP 101	1
Control processor – Quad core CPU, 2 GB RAM, 8GB Flash	Extron IPCP Pro 555Q xi	1
Press button switch, with red LED ring. Coordinate finish with Owner before ordering.	Innovation Industries PB-30 (S-Button Type) or equivalent	64
Press button switch, with red LED ring. Coordinate finish with Owner before ordering. – Spare	Innovation Industries PB-30 (S-Button Type) or equivalent	5
17" Control touch panel, with mounting accessories and PoE injector – Lectern.	Extron TLP Pro 1725TG	1
Lectern touch panel finishing frame, black anodized aluminum with chamfered edges and discrete mounting hardware for masking legacy cutout	Custom	1
Control touch monitor interface – Operators.	Extron TLI Pro 101	3
24" Touch screen monitor –With articulating stand, cabling, and accessories – Operators.	Dell P2424HT	3
Digital 8x IO port and 8x Relay network expansion	Extron IPL EXP RIO8	8
Digital 8x IO port and 8x Relay expansion – Audio amps	Extron IPL EXP RIO8	1
Digital 8x IO port and 8x Relay network expansion – Spare	Extron IPL EXP RIO8	1
Control system server – Hardware	Virtual Machine - OSE	1 (OSE)
Control system server – Software and Support	Virtual Machine - OSE	1 (OSE)
Ethernet to RS485 converter – To access wide angle camera	Moxa, US Converters or equivalent	1
AV Systems computer	OSE	1 (OSE)
Remote PTZ camera controller	Panasonic AW-RP150GJ + AWPS551P power supply	1
Network switch	HP Aruba (OSE)	(OSE) As req'd
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

.4 Panels, Patches and Racks

Description	Type / Model	Qty.
Custom engraved student microphone plates	Custom. Confirm finish with Owner before ordering.	64
Custom engraved student microphone plates- Spare	Custom. Confirm finish with Owner before ordering.	3
Custom student mic rear boxes, coordinate with under table channel	Custom	64
Tamper resistant flat mounting screws for student mic. plates, polished nickel, or stainless steel with spanner drive head and tool	Granger Item #WWG5KY13 or equal	As req'd
Right-angle 3 pin XLR. Quantity including minimum spares.	Neutrik or Amphenol	75
Multipin connectors. Panel female and aerial male kit. Student desk microphone, LED, and button wiring. Quantity including minimum spares.	Amphenol or equivalent	75
Desk mounts for multi-monitors. 2 and 4 monitors	Chief or equivalent	As req'd
PTZ camera mount above confidence monitors	Chief, Vaddio or equivalent	1
PTZ camera wall mount shelf	Chief, Vaddio or equivalent	As req'd
Students' desks drilling	Custom	As req'd
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

2.7 Tiered Lecture Hall – Projection Screens – ADD OPTION

2.7.1 General

- .1 Provide pricing for projection screen fabric replacement for Owner's consideration.
- .2 Provide an on-site, screen test, mock up for Owner's acceptance as per base bid.
- .3 On-site screen test will utilize the existing Epson laser projectors.

2.7.2 Installation

- .5 Install one mock up testing screen for a side-by-side evaluation with the Owner.
- .6 Use content indicated by the Owner during test.
- .1 Re-align projected image before, during, and after test as required.
- .2 If accepted by the Owner, remove existing screen fabrics, and install new fabrics on existing screen frames (Draper Clarion), re-align and calibrate projectors as required.

2.7.3 Equipment

- .1 Video

Description	Type / Model	Qty.
ALR projection screen fabric. Mount to existing Clarion 100" x 160" screen frame.	Draper XH900X	2

Description	Type / Model	Qty.
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

2.8 Tiered Lecture Hall – UPS (uninterruptible power supply) – ADD OPTION

2.8.1 General

- .1 Provide pricing for UPSs to protect full loads of equipment racks, video projectors, operator desk, and lectern devices.
- .2 Provide devices per table below.

2.8.2 Installation

- .1 Install UPSs and connect existing power bars and AV devices as required.
- .2 Connect UPSs to control network for monitoring and alarm signals. Coordinate details with programming team.

2.8.3 Equipment

.1 Panels, Patches and Racks

Description	Type / Model	Qty.
Full rack load UPS. 120V in/out, minimum 1800W / 1920VA capacity, preinstalled network card, 4ms typical transfer time, rackmount 2RU, L5-20R and 5-20R receptacles.	APC Smart-UPS X SMX2KR2UNCX145 or equivalent	2
Full rack load UPS. 120V in/out, minimum 2700W / 2880VA capacity, preinstalled network card, 4ms typical transfer time, rackmount 4RU, 5-20R and L5-30R receptacles. Install on rack housing audio power amplifiers.	APC Smart-UPS X SMX3000LVNC or equivalent	1
Lectern UPS. 1RU rackmount, minimum 800W / 1000 VA capacity, line interactive topology, 4ms typical transfer time.	APC Smart-UPS SMT1000RM1U or equivalent	1
UPS for Laser Projector. 208V in/out, minimum 1980W, 2200VA capacity, line interactive topology, 6ms typical transfer time, preinstalled network card, IEC 320 C19 outlet. Rackmount 2RU or tower style	APC Smart-UPS X SMX2200R2HVNC or equivalent	2
UPS for operator desk. 1RU rackmount, minimum 800W / 1000 VA capacity, line interactive topology, 4ms typical transfer time. With under desk mounting hardware.	APC Smart-UPS SMT1000RM1U or equivalent	1
Projector UPS mounting cradle. Mounts to existing floor stand	Custom	2

2.9 Tiered Lecture Hall – Equipment racks – ADD OPTION

2.9.1 General

- .1 Provide pricing for new equipment racks replacing the existing units.

2.9.2 Installation

- .1 Pre-build equipment racks off-site with new equipment before on-site installation time. Transfer existing equipment to be re-used to new racks when on-site, to avoid service disruptions.
- .2 Remove existing racks and devices as required. Handover to the Owner or dispose as indicated by the Owner.

2.9.3 Equipment

.1 Panels, Patches and Racks

Description	Type / Model	Qty.
Equipment rack, with accessories, power distribution, shelves, and dual LED bar work lights.	Middle Atlantic BGR-45-32	3

2.10 Tiered Lecture Hall – Wireless Microphone Systems – ADD OPTION

2.10.1 General

.1 Provide pricing for six digital encrypted wireless microphone systems to be used around the room. Systems will include handheld and bodypack transmitters as listed below.

.2 These new systems will replace the existing wireless microphones.

2.10.2 Installation

.1 Scan RF conditions in the room before ordering wireless microphone systems. Select operating frequency range and model according to room RF conditions.

.2 Install wireless microphone systems and integrate to audio and control networks.

.3 Install wireless microphone chargers at location indicated by the Owner. Connect chargers to network and configure to communicate with control processor. Coordinate details with Owner and programming team.

.4 Sync each microphone transmitter to a receiver on encrypted mode. Label each synced pair using colour coded marks for ease of use.

2.10.3 Equipment

.1 Audio

Description	Type / Model	Qty.
Wireless microphone system – 4-channel Receiver. Digital technology, encrypted communication, Dante network, antenna loop-out, rack mountable. Select frequency range after scanning the room.	Sennheiser EW-DX-EM 4 Dante	1
Wireless microphone system – 2-channel Receiver. Digital technology, encrypted communication, Dante network, A-B antennas, rack mountable. Select frequency range after scanning the room.	Sennheiser EW-DX-EM 2 Dante	1
Wireless microphone system – Omi-Directional passive antenna. Frequency range 450 - 960 MHz	Sennheiser A1031-U	2
Wireless microphone system – Charging station. Network accessible, PoE powered, dual bays.	Sennheiser CHG 70N	3
Wireless microphone system – Li-Ion rechargeable battery	Sennheiser BA 70	6
Wireless microphone system – Li-Ion battery - Spare	Sennheiser BA 70	2
Wireless microphone system – Handheld transmitter, with programmable switch, 12-hour battery operation time.	Sennheiser EW-DX SKM-S	4

Description	Type / Model	Qty.
Wireless microphone system – Handheld transmitter capsule. Cardioid pattern, dynamic type, improved vocal presence.	Sennheiser MMD 935-1	4
Wireless microphone system – Bodypack transmitter, 12-hour battery operation time, TRS jack.	Sennheiser EW-DX SK	2
Wireless microphone system – Bodypack hanging kit	Sennheiser 700277	2
Wireless microphone system – Lavalier microphone. Omni-directional pattern, TRS plug.	Sennheiser ME 2	1
Wireless microphone system – Headworn microphone. Omni-directional pattern, TRS plug. Microphone and neckband.	Sennheiser SL HEADMIC 1 BE	1

2.11 Tiered Lecture Hall – Assistive Listening System – ADD OPTION

2.11.1 General

- .1 Provide pricing for a Wi-Fi based hearing assist system in the room.
- .2 Provide system and integration to audio system.
- .3 Coordinate configuration and requirements with the Owner.

2.11.2 Installation

- .1 Install Wi-Fi based hearing assistance station as required. Connect to audio system, control network and building data network. Coordinate with Owner.
- .2 Make control systems' driver for hearing assistance station available to programming team for their use.
- .3 Install hearing assistance App on receivers. Upload MUN logo indicated by the Owner into system, for splash screen and institutional identification.
- .4 Set receivers to Kiosk Mode running single App (hearing assistance). Coordinate settings and credentials with the Owner.
- .5 Set hearing assistance system to generate a 6-digit security code before each class for students to access system. Coordinate QR code locations in room with Owner.

2.11.3 Equipment

.1 Audio

Description	Type / Model	Qty.
Assistive Listening System – Wi-Fi based station. PoE powered, Dante network, Ethernet control, analog ins/outs	Sennheiser MobileConnect Station	1
Assistive Listening System – Receiver. With charger. Set to Single App (Kiosk) Mode	Samsung Galaxy S20 FE	5
On-ear headphones, 3.5mm plug. Black/grey colour.	JLab, Maxell or equivalent	5
Hearing assistance system control driver	Extron driver for Sennheiser MobileConnect	1
Wireless Access Point – To manage assistive listening audio	OSE	1 (OSE)

2.12 Tiered Lecture Hall – Power Amplifiers (Networked Audio) – ADD OPTION

2.12.1 General

- .1 Provide pricing for networked audio amplifiers to replace existing units.
- .2 Networked audio amplifiers will integrate to audio and control systems.

2.12.2 Installation

- .1 Set all audio amplifiers outputs to low-impedance level. Ensure each loudspeaker is set to low impedance as required. Adjust if needed.
- .2 Calibrate audio levels as required for consistent coverage around the room to Owner's satisfaction. Coordinate details with programming team.
- .3 Connect audio amplifiers (remote ON/Off, Standby ports) to AV control relay interfaces. Amplifiers will go to standby/off mode when AV system is turned off or a fire alarm signal is received. Coordinate settings with programming team.
- .4 Connect fire alarm link system to AV control digital input port. Coordinate fire alarm signal conditions and interfacing with the Owner. Test operation to Owner's satisfaction.
- .5 Connect ceiling and front wall loudspeakers amplifiers' Fault Status port to AV control Digital Inputs. AV control system will be notified in case of device failure.
- .6 Connect ceiling and front wall loudspeakers amplifiers' Ethernet port to AV control network for monitoring and control. Coordinate settings with Owner and programming team.
- .7 Connect confidence monitor loudspeaker amplifier to Dante audio network with access to AV control network for monitoring and control via control processor. Coordinate details and network requirements with Owner and programming team.
- .8 Configure all amplifiers' built-in DSP to basic settings passing signals through all channels as required in preparation for programming team final deployment. Coordinate details with programming team.

2.12.3 Equipment

- .1 Audio

<i>Description</i>	<i>Type / Model</i>	<i>Qty.</i>
Power Amplifier. 8x80W @ 8 Ohms, Dante network, rack mounted. Ceiling loudspeakers	LEA Professional CS88D	2
Power Amplifier. 2x700W @ 8 Ohms, Dante network, rack mounted. Front wall loudspeakers	LEA Professional CS702D	1
Power Amplifier. 2x100W @ 8 Ohms, Dante network, with rack mount. Confidence displays loudspeakers	Extron NetPA U 1002 8Ω	1

2.13 Module B: Flat Floor Interactive Learning Room

2.13.1 General

- .1 Install devices in room 1M102 and control booth 1M104
- .2 This Interactive Learning Room is designed to engage the audience and include state-of-the-art audio-visual technologies.

- .3 Existing components installed in the room will be integrated to new video, audio and control systems. Provide necessary interfaces and accessories.
- .4 Built-in multi-camera videoconferencing system to be fully integrated with the room AV system.
- .5 Room overflow feeds shall be provided to lecture theatre 1M101
- .6 This room will be used for a variety of purposes, including lecture delivery to medical students; distance learning; panel discussions; small group breakout sessions; and multimedia presentations.
- .7 A fully outfitted room is described here-in. AV equipment complement is listed as a base system with options for consideration by the Owner, noted below in Add Options.
- .8 This room will have built-in codec-based videoconferencing provisions for remote participants and/or distance learning.
- .9 Room furniture is movable, designed for rearrangement to support lecture style and specialized break-out group work layouts.
- .10 In group study mode, each group study table shall be assigned a wireless microphone to be used to address the entire room.
- .11 In lecture mode, students' desks will be arranged in 5 rows. Wired boundary microphones to capture student voices with buttons with LED indicators built into the desks will be used to activate microphones.
- .12 Room front projection and screens to support multi-signal display from varied video sources, including document camera, computer, student interactive displays/ white boarding and videoconferencing content
- .13 A permanently installed lectern (existing) is located at the front of room. This lectern/desk is the presenter / instructor main system access and control point. Desk and controls are to meet accessibility codes. A furniture mount rack houses in-lectern devices and room PC.
- .14 The Lectern/ Desk shall support the following devices:
 - 1) Control Touch Panel with custom finishing frame
 - 2) In-Room PC with keyboard and mouse
 - 3) Document camera (OSE/ Existing)
 - 4) Lectern gooseneck microphone (OSE/ Existing)
 - 5) AV and Laptop inputs:
 - a) HDMI
 - b) USB-C
 - c) L+R Audio
 - 6) Security alarm keypad (OSE/ by others)
 - 7) Millwork style equipment rack (OSE/ Existing)
 - 8) Existing flush surface box for connections as described plus:
 - a) Power
 - b) Network (total of two network connections and connectors)

- .15 A portable AV lectern (“intelligent” lectern shared with Lobby 1M100) to be placed at the audience front left or center of room and connected via AV floor boxes to room AV system(s). This unit will provide a secondary presenter / instructor AV system control point and is to be equipped with a cable interface for integration to power, network and AV rooms systems.
- .16 Provide a new gooseneck microphone for the movable lectern. Integrate to audio system.
- .17 The side walls and rear wall of room have permanently mounted flat panel displays with annotation capabilities, as well as local input and control panels at each display to support break-out and group work requirements. AV switching and control is to be flexible enabling routing to display various media in addition to content from break-out group sessions.
- .18 5-button decora style control panels and AV connections adjacent to each touch screen display on the walls, will be deleted.
- .19 Provide an HDMI spring cable at wall mount touch screen display. Connect spring HDMI cable and existing local mini-PC to an auto-switcher. Provide auto-switcher and connect to one HDMI input on the display.
- .20 Control systems will allow showing AV sources at wall mounted displays on main screens in the room.
- .21 The audio system for the hall will be used for in-house audio processing and playback as well as integration with videoconferencing and future UC conferencing.
- .22 The room will have a blend of wired and wireless microphones for lectures, presentations, panel and group work.
- .23 There will be integrated control and AV systems for audio video data processing, mixing / routing and control. Inclusive of room lighting control.
- .24 Audio playback will utilize a combination of wall loudspeakers, located in front of the hall, on each side of projection screens and speech reinforcement ceiling mounted speakers distributed throughout space.
- .25 Control Room 1M104: The adjacent control room will house video/data projectors, equipment racks and operator control position for support. System includes full operator control with talkback microphone. PTT talkback microphone activation shall mute local booth monitor speakers.
- .26 PTT microphones will allow operators addressing the room via ceiling loudspeakers.
- .27 New flat panel confidence displays on low profile carts will be located at the room front to support the presenter. New video system will provide signals to these displays.
- .28 AV systems are controlled via lectern and control room touch panels, and wireless tablet.
- .29 The audio system for the hall will be used for in-house audio processing and playback as well as integration with videoconferencing.

- .30 Boundary microphones with control buttons and LED indicator will be integrated to each students' desk at locations shown on drawings.
- .31 As student tables are movable, the microphone, LED and buttons wiring must have disconnect-points under the tables and on the floor boxes. All tables, wiring, patch cables and floor box connectors must be clearly numbered. The numbering information must be included in as-built-drawings and systems final documentation To help MUN's AV/IT support team assembling and disassembling the system. The consistent installation of the tables at the same locations is critical for the success of the camera tracking system.
- .32 By default, the student desk microphones LED indicators will be off. When students press their microphone button for request to speak, the LED indicator will flash or light solid depending on status. This concept mode of operation could be modified and confirmed for Owner's approval during control system programming coordination.
- .33 Audio mix-minus configuration will be utilized for in-room voice lift.
- .34 Participants voices will be Slightly, Moderately, or Highly amplified in the room, as distance to listeners increases. Voices will be amplified through ceiling loudspeakers. These amplification levels (in dB) will be determined on site by the audio engineering team in coordination with the Owner, to ensure appropriate listening experience is provided across the entire room to Owner's satisfaction.
- .35 A hearing assist system is installed in the room and will be integrated to new audio system.
- .36 Distance learning links to other facilities in 2025 are being planned and accommodated in systems design.
- .37 Each loudspeaker is managed by a dedicated DSP channel and amplification channel. Refer to drawings.
- .38 When sound from local content is reproduced through front loudspeakers, the amplification level via ceiling loudspeakers will be determined on site for a consistent coverage across the room. Time alignment should be observed by audio programming team to ensure good experience for all room users.
- .39 The HDMI and USB-C connections will connect to video distribution system, through AVoIP encoder, for local presentation and VC content sharing. These connections will be UHD 4K capable and will utilize the video projectors, displays, and loudspeaker system to address the audience.
- .40 Any AV source could be shown on any of the screens. Audio source will be selected and controlled via control touch panel.
- .41 Connections on the lecterns will have an adapter ring to support devices with different connection types, including DisplayPort, Apple Lightning, and Apple USB-C.
- .42 Acoustic panels are installed in lectern to reduce device noise transferred to room.
- .43 Ventilation fans are installed supporting lectern equipment racks. Verify operation and capacity is appropriate for new systems.
- .44 PTZ cameras on room front and rear will capture participants and instructors' images.

.45 Programming on AV control and audio DSP processors will read the location of a talking participant from active microphone. Location information will be used to provide PTZ camera automation via camera selection and pre-set recall.

.46 At the room front displays and confidence monitors, the intent is to display the following images; image selection will be via the control system.

- 1) Wide shot of remote room – or – close-up of students asking a question (out of the room) with local Lecturer or student PIP or window
- 2) Content

.47 For the Content Channel, the input consists of the Lecturer's computer, a lectern source or source in the Control Room. The active device is selected at the Lectern Control Panel or in the Control Room. The content channel to be delivered to the distant end via an IP video encoder, VC Codec.

.48 By default, the wide-angle room front camera will be selected at systems' start-up. This could be changed per Owner' request.

.49 Program cameras for wide room shot (home position) during: Far-side speaking periods, multiple local participants talking at a time, or speaking participant(s) located outside of all programmed pre-sets using wireless microphones. Front camera wide shot will be selected in these conditions.

.50 A compact PTZ camera installed above confidence monitors will capture the instructor's image while addressing remote participants shown on confidence displays.

.51 Coordinate with Owner: Camera pre-sets, movement speed, and pre-set switching time for a smooth operation to Owner's satisfaction. Coordinate with programming team.

.52 Provide buttons on control panels to select automation scenario, or to enable/disable camera automation as desired by operators.

.53 Provide buttons on control panels to manually select and adjust cameras, and to recall at least 7 pre-sets on each camera when camera automation is not used. Note that automated operation will require more than 7 presets programmed.

.54 The Owner will indicate the default condition (Enabled or Disabled) for camera automation.

.55 Provide an IP camera in the room. The IP camera will be used by the operators in the Control Rooms to observe the room when assistance is required. The IP camera is to be accessible from both local and remote campus Control Rooms.

.56 Provide an IP based intercom to connect instructors in classrooms to operators in each Control Room. The intercom system will allow (with future expansions) classrooms from remote campuses calling local operators, local professors calling operators in remote campuses, or local operators calling remote operators.

2.13.2 Installation

.1 Decommission existing equipment intended for replacement and handover or dispose as indicated by the Owner.

.2 Install/ pull new wiring where required.

- .3 Install all devices as listed and as per related drawings.
- .4 Provide disconnect points under students' desks and at floor boxes to allow disassembly/assembly according to room mode/layout needs. All tables, patch cables, connectors and floor box plates must be clearly numbered. Numbering must be documented on as-built drawings and systems final documentation.
- .5 Confirm with Owner cable labeling standards to be followed before submitting shop drawings.
- .6 Install IP intercom surface mount substation on the lectern. Coordinate exact location and installation details with the Owner.
- .7 Install IP intercom handset stations at each operator position in the control room.
- .8 Connect lectern substations to Substation Interface in Room 1M108 equipment racks. Refer to Tiered Lecture Hall section.
- .9 Provide appropriate cabling gauge for intercom substation considering distance to substation interface following manufacturer' specifications.
- .10 Install specified cables for Student Desks' microphones, LED rings and buttons, to ensure required quantities can be accommodated in existing conduits.
- .11 Integrate new and existing equipment as required. Report any existing equipment malfunction to the Owner.
- .12 Provide all necessary interfaces, adapters and accessories required for complete integration of existing devices into new system for a fully functional solution to the Owner's satisfaction.
- .13 Verify operation and capacity of ventilation fans installed for lectern equipment racks to support for new systems. Inform Owner and Systems Designer of any concerns.
- .14 Electrical boxes for AV and rack locations are inclusive of MUN Network drops. The AV contractor is to extend the network from the rack location to devices as required.
- .15 Coordinate quantities, types, bandwidth, terminations, and locations of Network drops with Owner. Provide a network port schedule to the Owner to communicate requirements and coordinate installation.
- .16 All wall blocking at displays is reported to be $\frac{3}{4}$ " plywood.
- .17 Connect all equipment as shown on drawings.
- .18 Connect audio devices with Dante Primary and Secondary ports to the corresponding VLANs for redundancy. Avoid daisy-chaining Dante devices.
- .19 Configure Dante audio network and devices to ensure the number of Dante flows supported by the DSP (64x64) is not exceeded. Coordinate with programming team.
- .20 The Systems Contractor shall confirm and provide all systems cable. The Systems Contractor shall, sort, organize, test and terminate all systems cable.
- .21 Coordinate network requirements and configuration for audio, video, and control transport over Ethernet with Owner. Including but not limited to QoS, IGMP Snooping, IGMP Query, Flow Control, Jumbo Frames, etc.
- .22 Configure devices as required, coordinate network settings and requirements with the Owner to prepare AV systems for programming team to upload files and test operation.

Coordinate details with Owner and programming team. Assist programming team during systems testing as necessary.

.23 Configure audio system for in-room voice lift mix-minus. Set levels to Owner's satisfaction. Assist programming team as necessary.

.24 Install PTZ cameras at the following locations:

- 1) Two 24X zoom cameras on front wall,
- 2) Two 24X zoom cameras on rear wall,
- 3) One wide-angle camera on front wall,
- 4) One 12X zoom camera on a confidence monitor facing the professor.

.25 Configure PTZ camera pre-sets as required to Owner's satisfaction.

.26 Configure automated camera parameters (pre-sets, speed, transition time) to Owner's satisfaction. Coordinate details with programming team.

.27 Provide PTZ camera multi-view software installed on a computer (supplied by the Owner) for operators to monitor cameras. Configure systems as required. Coordinate computer and network requirements and settings with the Owner.

.28 Coordinate student desk microphone locations with brackets and components under the desks. Consider the student might be facing the room front centre when placing microphones on desks. Provide proposed microphone layout for Owner and Systems Designer review and acceptance before installation.

.29 Provide cutouts on students' desks for boundary microphones and buttons.

.30 Install electronics and cabling under students' desks in a discreet and safe manner to avoid damages from regular use.

.31 Set all audio amplifiers outputs to low-impedance level. Ensure each loudspeaker is set to low impedance as required. Adjust if needed.

.32 Calibrate audio levels as required for consistent coverage around the room to Owner's satisfaction. Coordinate details with programming team.

.33 Connect audio amplifiers (remote ON/Off, Standby ports) to AV control relay interfaces. Amplifiers will go to standby/off mode when AV system is turned off or a fire alarm signal is received. Coordinate settings with programming team.

.34 Connect fire alarm link system to AV control digital input port. Coordinate fire alarm signal conditions and interfacing with the Owner. Test operation to Owner's satisfaction.

.35 Connect ceiling and front wall loudspeakers amplifiers' Fault Status port to AV control Digital Inputs. AV control system will be notified in case of device failure.

.36 Provide minimum 1m (3.5 feet) long cable tails on fixed and portable lectern tops. Secure cables to prevent accidental disconnection from regular use.

.37 Attach video adapter ring to HDMI cable on lectern using provided clamp.

.38 Install IP Camera access software on computers indicated by the Owner. Test system operation and control as required.

.39 Coordinate network configurations and requirements for IP camera and IP intercom with Owner.

.40 Configure all control, video and audio networked devices as required in preparation for the programming team to deploy program files. Perform complete network verification prior to systems' control software deployment. Coordinate with programming team. Coordinate network requirements and settings with the Owner.

.41 Perform complete Network Testing And Validation prior to control and audio software deployment. Coordinate with programming team. Coordinate network requirements and settings with the Owner before proceeding.

.42 Network Test and Validation should start with physical connectivity and include the protocol stack. Each layer of the network architecture should be validated according to its intent to transport AV content.

.43 Network Test and Validation should include at least 3 steps or levels: Verification, Functional Testing, and Unit Testing.

.44 Prepare a Network Testing and Validation Report and submit to the Owner and Systems Designer for review and comments. The Reports should follow a professional format and include minimum:

- 1) Scope and objectives,
- 2) Methodology, equipment, tools, and resources,
- 3) Complete list of network settings as coordinated with the Owner,
- 4) High Level Design (HLD),
- 5) Detailed results supported with screenshots, logs, graphs, and tables.
- 6) Results analysis and comments related to network preparedness to transport AV content.

.45 The High Level Design (HLD) should include all AV Systems devices, their services on the network and the requirements for successful delivery of those services within the scope of the HLD. All service (e.g. networked audio, AVoIP, control) devices need to be identified, the routes and bandwidth calculations completed as well as all isolation, quality of service (QoS), management of service and delivery of service requirements must be documented. Each service needs its own distribution and bandwidth calculation. In the absence of the knowledge of the possible routing within the network environment, the design should be scaled to support anything to anywhere and any bandwidth limitations identified for consideration of re-design or design assistance.

.46 Document all network configurations and setting coordinated with Owner as part of systems documentation. Make this information available to programming team.

.47 Dress and manage all cabling and devices as required for a finished installation.

.48 Install aircraft tether to each table fed via a floorbox extended to the floorbox receiver hook.

.49 Remove 5-button decora control panels, AV and USB plates adjacent to each wall mount touchscreen display. Provide blank plates to cover all exposed gang boxes. Coordinate colour with the Owner.

.50 Test with the Owner the projected image on main screens using the screen fabric framed sample provided for Lecture Hall 1M101. Test using the contents indicated by the

Owner, placing the fabric sample at multiple locations on the existing screens as indicated by the Owner.

2.13.3 Equipment

.1 Audio

Description	Type / Model	Qty.
Through table boundary layer microphone, cardioid pattern, RF shielded, phantom powered condenser, nickel finish. Confirm finish with Owner before ordering.	ClockAudio C-012E-RF	50
Through table boundary layer microphone. Nickel. Confirm finish with Owner before ordering. _ Spare	ClockAudio C-012E-RF	3
Rack mount stage box, 16x mic inputs, 8x line outputs, with Dante primary and secondary ports. Redundant power supply.	Yamaha Rio1608-D2 or equivalent	4
Rack mount stage box, 16x mic inputs, 8x line outputs, with Dante primary and secondary ports – Spare	Yamaha Rio1608-D2 or equivalent	1
Dante headphone pre-amp with volume control	RDL AV-NH1	3
Mobile lectern gooseneck microphone. Cardioid pattern, 15" length, phantom powered. Wind windscreen.	ClockAudio C33E/SR-RF or equivalent	1
Fixed Lectern gooseneck microphone	Existing	1 (OSE)
PTT desktop microphone	TOA PM-660U - Existing	1
Telephone hybrid adapter	Existing	1 (OSE)
DSP frame. Up to 128x128 Dante channels, VoIP support, media drive, AEC processors, USB ports.	QSC Q-Sys Core 610	1
DSP License. 128x128 Dante channels, 96 AEC processors	QSC Q-Sys SL-DAN-128-P	1
2x2 Analog to Dante converter – XLR	RDL DD-BN22	1
2x2 Analog to Dante converter – XLR and 3.5mm	RDL DD-BN2ML	3
32x32 Dante-Analog converter box	Tascam ML-32D	1
Dante-Analog converter BO box with D-Sub cables	Tascam BO-32DE	2
Dante to USB 2x2 converter – Future UC computer	Audinate ADP-USB-AU-2X2	1
Assistive Listening System	Existing	1 OSE
Wireless microphone systems	Sennheiser EW100 – Existing	6 OSE
Power amplifiers – Ceiling and front wall loudspeakers	Existing	3 OSE
Power amplifier, 2x 25W LoZ – Confidence monitor loudspeaker	Stewart Audio AV25-2	1
Front wall loudspeakers	Existing. TOA SR-S4S	2 OSE
Ceiling loudspeakers. High ceiling	Existing. EV C8.2HC	5 OSE
Ceiling loudspeakers. Wide dispersion	Existing. Tannoy CMS501	8 OSE
Confidence displays compact loudspeaker. With mounting accessories	Yamaha VXS3F or equivalent	1

Description	Type / Model	Qty.
Operator desktop monitor (pair)	Existing. Focal CMS50	1 (OSE)
Over-the-ear headphones – Operator	Sennheiser HD200 PRO or equivalent	1
Dante headphone pre-amp with volume control – Operator	RDL AV-NH1	1
Portable I/O box. 16x8 channels, redundant Dante network, rubber bumpers and carry handle. Manages press feeds and panelists microphones.	Allen & Heath DT168	1
IP-based intercom – Operator handset, master station	TOA N-8600MS or equivalent	1
IP-based intercom – Lectern station, substation	TOA RS-160 or equivalent	2
IP-based intercom – 2-gang surface mount box for substation	TOA or custom	2
IP-based intercom – Central unit, substation interface	TOA N-8000RS or equivalent	Included in Tiered Hall
Network switch	HP ARUBA (OSE)	OSE As req'd
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

.2 Video

Description	Type / Model	Qty.
PTZ camera. 24X Zoom, 4K/30P, network control	Panasonic AW-UE40	4
Wide angle camera. 4K UHD resolution, HDMI out, serial control. With 160° lens and power supply – Front wall wide angle	Marshall Electronics CV380-CS + CS-2.8-10MP lens	1
PTZ camera. 12X Zoom, 4K/30, network control	Panasonic AW-UE20	1
Presentation / Recording Computer	Existing	1 (OSE)
AVoIP encoder. HDMI and USB-C inputs. Dante built-in	Visionary Solutions DUETE-5	As req'd
AVoIP encoder. HDMI input	Visionary Solutions E5100	As req'd
AVoIP wall plate encoder. HDMI and USB-C inputs. Dante built in. White colour	Visionary Solutions DUETE-5-WP	As req'd
AVoIP decoder. HDMI and USB-C inputs. Dante built-in	Visionary Solutions DUETD-5	As req'd
AVoIP decoder. HDMI output	Visionary Solutions D5200	As req'd
Compact IP camera. PTZ, 5X zoom, PoE, built-in microphone. With ceiling mounting bracket and accessories.	Axis M5074	1
IP camera access software	Axis Companion	1
Computer – AV support (IP cam, PTZ cam multi-view)	OSE	2
Video monitor – Operators	Existing on wall mounts	2 (OSE)
Video projector, 15K lumens, LCD WUXGA with 4K enhancement. With zoom lens	Epson Pro L1750U (Existing)	2 (OSE)
Wall mount touch screen annotation displays	Sharp (Existing)	5 (OSE)
43' UHD display – Confidence display	LG 43UH5J or equivalent	2

Description	Type / Model	Qty.
Universal HDMI Adapter Ring 2.0 with 5 Cable Adapters.	Liberty Cable DL-ARDA	2
Videoconference Codec	Cisco Codec Pro CIS-CS-CODEC-PRO-NR-K9	2
AV recorder/streamer. Installed on lectern	Existing. Extron SMP 351	1 (OSE)
1x2 HDMI 4K distribution amplifier. At wall mount displays	C2G 41057 or equivalent	5
Network switch	Cisco / Aruba (OSE)	OSE As req'd
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

.3 Control

Description	Type / Model	Qty.
Scripting licenses for PTZ camera control	QSC	As req'd
AV recorder control panel. Installed on lectern	Existing. Extron RCP 101	1
Control processor – Quad core CPU, 2 GB RAM, 8GB Flash	Extron IPCP Pro 555Q xi	1
Press button switch, with red LED ring. Coordinate finish with Owner before ordering.	Innovation Industries PB-30 (S-Button Type) or equivalent	50
Press button switch, with red LED ring. Coordinate finish with Owner before ordering. – Spare	Innovation Industries PB-30 (S-Button Type) or equivalent	5
17" Control touch panel, with mounting accessories and PoE injector – Lectern.	Extron TLP Pro 1725TG	1
Lectern touch panel finishing frame, black anodized aluminum with chamfered edges and discrete mounting hardware for masking legacy cutout	Custom	1
Control touch monitor interface – Operators.	Extron TLI Pro 101	3
24" Touch screen monitor –With articulating stand, cabling, and accessories – Operators.	Dell P2424HT	3
Digital 8x IO port and 8x Relay network expansion	Extron IPL EXP RIO8	8
Digital 8x IO port and 8x Relay expansion – Audio amps	Extron IPL EXP RIO8	1
Digital 8x IO port and 8x Relay network expansion – Spare	Extron IPL EXP RIO8	1
AV Systems computer	OSE	1 (OSE)
Remote PTZ camera controller	Panasonic AW-RP150GJ + AWPS551P power supply	1
Ethernet to RS485 converter – To access wide angle camera	Moxa, US Converters or equivalent	1
Network switch	Cisco / Aruba (OSE)	OSE As req'd
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

.4 Panels, Patches and Racks

Description	Type / Model	Qty.
Equipment racks – Lectern	Existing	2 OSE
Custom engraved student microphone plates	Custom. Confirm finish with Owner before ordering.	50
Custom engraved student microphone plates- Spare	Custom. Confirm finish with Owner before ordering.	3
Custom student mic rear boxes, coordinate with under table channel	Custom	50
Right angle 3 pin XLR	Neutrik	50
Tamper resistant flat mounting screws for student mic. plates, polished nickel, or stainless steel with spanner drive head and tool	Granger Item #WWG5KY13 or equal	As req'd
Multipin connectors. Panel female and aerial male kit. Student desk microphone, LED, and button wiring. Quantity including minimum spares.	Amphenol or equivalent	57
Desk mounts for multi-monitors. 2 and 4 monitors	Chief or equivalent	As req'd
PTZ camera mount above confidence monitors	Chief, Vaddio or equivalent	1
PTZ camera wall mount shelf	Chief, Vaddio or equivalent	As req'd
Confidence display cart	Chief MFQ6000B	2
Display cart mount adapter	Chief MSB6241	2
Cable whips	Custom	As req'd
Students' desks aircraft cable tethers with dual twist-lock carabiner (custom length)	Custom	As req'd
Under table eye hook fastening plate	Custom	As req'd
In floorbox eye hook	Custom	As req'd
4-gang blank plates. White finish or as indicated by Owner.	Custom	5
Students' desks drilling	Custom	As req'd
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

2.14 Flat Floor Interactive Learning Room – Projection Screens – ADD OPTION

2.14.1 General

- .1 Provide pricing for projection screen fabric replacement for Owner's consideration.
- .2 Owner's acceptance will be based on results of test with screen fabric sample.

2.14.2 Installation

- .1 If accepted by the Owner, remove existing screen fabrics, and install new fabrics on existing screen frames (Draper Clarion), re-align and calibrate projectors as required.

2.14.3 Equipment

- .1 Video

Description	Type / Model	Qty.
ALR projection screen fabric. Mount to existing Clarion 87.5" x 140" screen frame.	Draper XH900X	2
Miscellaneous hardware, accessories, mounts, patch cables and other components required for a complete and fully functioning system	Custom	As req'd

2.15 Flat Floor Interactive Learning Room – UPS (uninterruptible power supply) – ADD OPTION

2.15.1 General

- .1 Provide pricing for UPSs to protect full loads of equipment racks, video projectors, operator desk, and lectern devices.
.2 Provide devices per table below.

2.15.2 Installation

- .1 Install UPSs and connect existing power bars and AV devices as required.
.2 Connect UPSs to control network for monitoring and alarm signals. Coordinate details with programming team.

2.15.3 Equipment

- .1 Panels, Patches and Racks

Description	Type / Model	Qty.
Full rack load UPS. 120V in/out, minimum 1800W / 1920VA capacity, preinstalled network card, 4ms typical transfer time, rackmount 2RU, L5-20R and 5-20R receptacles.	APC Smart-UPS X SMX2KR2UNCX145 or equivalent	1
Full rack load UPS. 120V in/out, minimum 2700W / 2880VA capacity, preinstalled network card, 4ms typical transfer time, rackmount 4RU, 5-20R and L5-30R receptacles. Install on rack housing audio power amplifiers.	APC Smart-UPS X SMX3000LVNC or equivalent	1
Lectern UPS. 1RU rackmount, minimum 800W / 1000 VA capacity, line interactive topology, 4ms typical transfer time.	APC Smart-UPS SMT1000RM1U or equivalent	1
UPS for Laser Projector. 208V in/out, minimum 1980W, 2200VA capacity, line interactive topology, 6ms typical transfer time, preinstalled network card, IEC 320 C19 outlet. Rackmount 2RU or tower style	APC Smart-UPS X SMX2200R2HVNC or equivalent	2
Projector UPS mounting cradle. Mounts to existing floor stand	Custom	2

2.16 Flat Floor Interactive Learning Room – Equipment racks – ADD OPTION

2.16.1 General

- .1 Provide pricing for new equipment racks replacing the existing units.

2.16.2 Installation

- .1 Pre-build equipment racks off-site with new equipment before on-site installation time. Transfer existing equipment to be re-used to new racks when on-site, to avoid service disruptions.
- .2 Remove existing racks and devices as required. Handover to the Owner or dispose as indicated by the Owner.

2.16.3 Equipment

- .1 Panels, Patches and Racks

Description	Type / Model	Qty.
Equipment rack, with accessories, power distribution, shelves, and dual LED bar work lights.	Middle Atlantic BGR-45-32	2

2.17 Flat Floor Interactive Learning Room – Wireless Microphone Systems – ADD OPTION

2.17.1 General

- .1 Provide pricing for six digital encrypted wireless microphone systems to be used around the room. Systems will include handheld and bodypack transmitters as listed below.
- .2 These new systems will replace the existing wireless microphones.

2.17.2 Installation

- .1 Scan RF conditions in the room before ordering wireless microphone systems. Select operating frequency range and model according to room RF conditions.
- .2 Install wireless microphone systems and integrate to audio and control networks.
- .3 Install wireless microphone chargers at location indicated by the Owner. Connect chargers to network and configure to communicate with control processor. Coordinate details with Owner and programming team.
- .4 Sync each microphone transmitter to a receiver on encrypted mode. Label each synced pair using colour coded marks for ease of use.

2.17.3 Equipment

- .1 Audio

Description	Type / Model	Qty.
Wireless microphone system – 4-channel Receiver. Digital technology, encrypted communication, Dante network, antenna loop-out, rack mountable. Select frequency range after scanning the room.	Sennheiser EW-DX-EM 4 Dante	1
Wireless microphone system – 2-channel Receiver. Digital technology, encrypted communication, Dante network, A-B antennas, rack mountable. Select frequency range after scanning the room.	Sennheiser EW-DX-EM 2 Dante	1
Wireless microphone system – Omi-Directional passive antenna. Frequency range 450 - 960 MHz.	Existing: Sennheiser A1031-U	2

Description	Type / Model	Qty.
Wireless microphone system – Charging station. Network accessible, PoE powered, dual bays.	Sennheiser CHG 70N	3
Wireless microphone system – Li-Ion rechargeable battery	Sennheiser BA 70	6
Wireless microphone system – Li-Ion battery - Spare	Sennheiser BA 70	2
Wireless microphone system – Handheld transmitter, with programmable switch, 12-hour battery operation time.	Sennheiser EW-DX SKM-S	4
Wireless microphone system – Handheld transmitter capsule. Cardioid pattern, dynamic type, improved vocal presence.	Sennheiser MMD 935-1	4
Wireless microphone system – Bodypack transmitter, 12-hour battery operation time, TRS jack.	Sennheiser EW-DX SK	2
Wireless microphone system – Bodypack hanging kit	Sennheiser 700277	2
Wireless microphone system – Lavalier microphone. Omni-directional pattern, TRS plug.	Sennheiser ME 2	1
Wireless microphone system – Headworn microphone. Omni-directional pattern, TRS plug. Microphone and neckband.	Sennheiser SL HEADMIC 1 BE	1

2.18 Flat Floor Interactive Learning Room – Assistive Listening System – ADD OPTION

2.18.1 General

- .1 Provide pricing for a Wi-Fi based hearing assist system in the room.
- .2 Provide system and integration to audio system.
- .3 Coordinate configuration and requirements with the Owner.

2.18.2 Installation

- .1 Install Wi-Fi based hearing assistance station as required. Connect to audio system, control network and building data network. Coordinate with Owner.
- .2 Make control systems' driver for hearing assistance station available to programming team for their use.
- .3 Install hearing assistance App on receivers. Upload MUN logo indicated by the Owner into system for splash screen and institutional identification.
- .4 Set HA receivers to Kiosk Mode running single App (hearing assistance). Coordinate settings and credentials with the Owner.
- .5 Set hearing assistance system to generate a 6-digit security code before each class for students to access system. Coordinate QR code locations in room with Owner.

2.18.3 Equipment

- .1 Audio

Description	Type / Model	Qty.
Assistive Listening System – Wi-Fi based station. PoE powered, Dante network, Ethernet control, analog ins/outs	Sennheiser MobileConnect Station	1

<i>Description</i>	<i>Type / Model</i>	<i>Qty.</i>
Assistive Listening System – Receiver. With charger. Set to Single App (Kiosk) Mode	Samsung Galaxy S20 FE	4
On-ear headphones, 3.5mm plug. Black/grey colour.	JLab, Maxell or equivalent	4
Hearing assistance system control driver	Extron driver for Sennheiser MobileConnect	1
Wireless Access Point – To manage assistive listening audio	OSE	1 (OSE)

2.19 Flat Floor Interactive Learning Room – HDMI Auto-switchers– ADD OPTION

2.19.1 General

- .1 Provide HDMI auto-switchers at wall mounted touch screen displays around the room.
- .2 Sources connected to HDMI auto-switchers will be: Existing compact computer and users' laptop (priority).
- .3 Users' laptop will connect to spring/coiled HDMI cable.
- .4 Auto-switcher output will connect to wall mount display.
- .5 Content shown on wall mount displays could also be shown on front wall main screens.

2.19.2 Installation

- .1 Install spring HDMI cable for users to connect portable devices at each wall touchscreen display. Secure to avoid damages to cable and/or auto-switcher due to regular use.
- .2 Install 2x1 HDMI auto-switcher giving priority to portable devices. Inform programming team on HDMI inputs used on wall mount displays.

2.19.3 Equipment

.1 Video

<i>Description</i>	<i>Type / Model</i>	<i>Qty.</i>
2x2 HDMI Auto-switcher. 4K capable, Install at wall mounted touchscreen displays.	StarTech VS222HD4K or equivalent	5
DELETE: 1x2 HDMI 4K distribution amplifier	C2G 41057 or equivalent	-5

.2 Panels, Patches and Racks

<i>Description</i>	<i>Type / Model</i>	<i>Qty.</i>
HDMI spring/coiled flex cable, 16" to 32" extension. For connections at wall mounted touchscreen displays.	Atomos ATOM4K60C6	5
HDMI wire harness	Custom	5
HDMI wall hook and Velcro band for storage	Custom	5

2.20 Flat Floor Interactive Learning Room – Power Amplifiers (Networked Audio) – ADD OPTION

2.20.1 General

- .1 Provide pricing for networked audio amplifiers to replace existing units.
- .2 Networked audio amplifiers will integrate to audio and control systems.

2.20.2 Installation

- .1 Set all audio amplifiers outputs to low-impedance level. Ensure each loudspeaker is set to low impedance as required. Adjust if needed.
- .2 Calibrate audio levels as required for consistent coverage around the room to Owner’s satisfaction. Coordinate details with programming team.
- .3 Connect audio amplifiers (remote ON/Off, Standby ports) to AV control relay interfaces. Amplifiers will go to standby/off mode when AV system is turned off or a fire alarm signal is received. Coordinate settings with programming team.
- .4 Connect fire alarm link system to AV control digital input port. Coordinate fire alarm signal conditions and interfacing with the Owner. Test operation to Owner’s satisfaction.
- .5 Connect ceiling and front wall loudspeakers amplifiers’ Fault Status port to AV control Digital Inputs. AV control system will be notified in case of device failure.
- .6 Connect ceiling and front wall loudspeakers amplifiers’ Ethernet port to AV control network for monitoring and control. Coordinate settings with Owner and programming team.
- .7 Connect confidence monitor loudspeaker amplifier to Dante audio network with access to AV control network for monitoring and control via control processor. Coordinate details and network requirements with Owner and programming team.
- .8 Configure all amplifiers’ built-in DSP to basic settings passing signals through all channels as required in preparation for programming team final deployment. Coordinate details with programming team.

2.20.3 Equipment

.1 Audio

Description	Type / Model	Qty.
Power Amplifier. 8x80W @ 8 Ohms, Dante network, rack mounted. Ceiling loudspeakers	LEA Professional CS88D	2
Power Amplifier. 2x700W @ 8 Ohms, Dante network, rack mounted. Front wall loudspeakers	LEA Professional CS702D	1
Power Amplifier. 2x100W @ 8 Ohms, Dante network, with rack mount. Confidence displays loudspeakers	Extron NetPA U 1002 8Ω	1

2.21 Network Switches – UNIT PRICE

2.21.1 General

- .1 Provide unit pricing for network switch(es).
- .2 Switches may be required to supplement current network configuration.

2.21.2 Installation

- .1 Install into AV racks as required.
- .2 Configure as needed for AV System.

2.21.3 Equipment

- .1 Network

Description	Type / Model	Qty.
48 port switch with 10Gig modular uplinks	NetGear M4250-40G8XF or HPE Aruba 2930M	1
Manufactures support- 1 Year	As per manufacturer	1

2.22 GENERAL SPECIFICATION

2.22.1 Introduction

- .1 The following contains equipment used by many systems and referred to in the previous sections of the specification.
- .2 Wiring, terminations and adapter assemblies related to equipment functions are required whether specified or not.

2.22.2 Technical Performance Criteria- Loudspeakers

Performance Criterion	Definition
Maximum Sound Pressure Level (SPL)	This is the maximum long term SPL capability as measured with a sound level meter, A weighted, slow response (average) Measured on axis of loudspeaker Measured at ear height at intended listening position. Measured in free field (direct plus reverberant) with omnidirectional microphone Measured after system is equalized to installed frequency response
Direct Sound Pressure Level (SPL)	This is the maximum long term SPL capability as calculated from manufacturer's data and location design data using inverse square law or approved computer design package, A weighted, slow response (average) Measured on axis of loudspeaker Measured at ear height at intended listening position. Measured after system is "equalized" to flat frequency response
Coverage Area	The area within which the off-axis attenuation of the direct sound of the loudspeaker is less than 6dB at 2kHz. Coverage of surfaces outside the stated listening area shall be strictly minimized.

Performance Criterion	Definition
Coverage Variation	Variation in A-weighted SPL due to listener location within the coverage area of the loudspeakers As measured in the room free field Measured at ear height at intended listening position
Passband (Bandwidth)	Nominal operating range of unequalized loudspeakers Determined by 3 dB down points of raw frequency response
Raw Frequency Response	Anechoic response as published by manufacturer
Installed Frequency Response	Measured on-site after optimization of aiming and equalization Unless stated otherwise, this shall be flat (maximum +1/-3dB on 1/3 octave intervals) within pass band at max. SPL
Loudspeaker Headroom	Nominal long term power handling capability above that needed to achieve max desired SPL, expressed in dB
Amplifier Headroom	The difference between the EIA power rating of power amplifier and the power required to achieve maximum SPL, expressed in dB

2.22.3 Loudspeakers

- .1 Install loudspeaker at locations indicated on drawings. Connect loudspeakers in zones as shown on the drawings.
- .2 Provide loudspeaker mounting hardware including safety cables as required.
- .3 Provide quantities of loudspeakers as specified for each room.
- .4 Coordinate with other trades to ensure loudspeaker infrastructure supports the loudspeaker model noted.
- .5 Coordinate with the Architect finish and final locations of loudspeakers.
- .6 Verify ceiling construction and adjust product style to suit ceiling condition.

Description	Specification	Typical Model
Ceiling recessed and wall mounted loudspeaker.	•	Existing

2.22.4 Amplifiers

- .1 Install amplifiers into racks.
- .2 Organize amplifiers to permit proper cooling.
- .3 Support amplifiers front and rear.

Description	Specification	Typical Model
Amplifier	<ul style="list-style-type: none"> • Dante network • Ethernet control port • Network monitoring • Mute/Off port • Rack mount accessories • Power and channel capacity as specified 	LEA Professional. Extron where specified

2.22.5 Microphones

- .1 Coordinate locations with Owner and Architect.
- .2 Interface microphones with signal converters and processing devices.
- .3 Orient microphones for optimal pick-up.
- .4 Microphones shall be RF protected and reject external interference which causes audible artefacts.

Description	Specification	Typical Model
Gooseneck microphone	<ul style="list-style-type: none"> • Cardioid pattern or as specified • RF shielded • Flexible neck • XLR connector 	ClockAudio, Shure
Gooseneck microphone base	<ul style="list-style-type: none"> • 	Existing

2.22.6 Wireless Microphones

- .1 Mount wireless microphone receivers in main equipment rack.
- .2 Locate and mount antennas as shown on the drawing.
- .3 Manage wireless frequencies such that multiple microphones may be used at the same time throughout the facility without interference.
- .4 Minimize cross-talk and interference.
- .5 Provide “combination kits” with both lavalier and handheld microphones.

Description	Specification	Typical Model
Wireless Microphone	<ul style="list-style-type: none"> • Digital operation • 256-bit Encrypted transmission • Dante network • Handheld and bodypack transmitters • Rack mounted • Network monitoring • Rechargeable batteries • Pick-up pattern options 	Sennheiser EW-DX

2.22.7 Audio DSP

- .1 Provide DSP devices as required. This may require the use of additional cards and / or additional units to ensure the required quantity of inputs and outputs is available.
- .2 Where DSP devices interface with conferencing systems ensure levels and calibration operate constructively with audio conferencing devices.
- .3 Provide echo cancelling either integrated into DSP or separated dedicated echo cancelling DSP.

<i>Description</i>	<i>Specification</i>	<i>Typical Model</i>
DSP Audio Processor	<ul style="list-style-type: none"> • Dante network compatible • Scalable mic/line inputs/outputs • Gain control per channel • Phantom Power (switchable) • Gain sharing automix capability • DSP can be gained as large central system or distributed • Logic Control inputs and outputs as required, • MS Windows programmable • Open DSP architecture • Online real-time control • Offline file creation, editing and saving • Ethernet connection for programming • External serial and Ethernet control • rack mountable • Echo Cancelling 	QSC Core

2.22.8 Assistive Listening System

- .1 Mount the hearing assistance antennas in accordance with the drawings.
- .2 Connect devices as required.
- .3 Coordinate finish with Architect.
- .4 Coordinate mounting location with General and Architect.
- .5 In each room, each system is specified in terms of a complete system. Provide the necessary radiators in accordance with the quantity specified on the drawings.
- .6 Provide hearing aid-compatible neck loops as specified.

.7 Provide one spare pair of headphones for every 10 pairs or one pair per room section, whichever is greater.

.8 Where multiple antennas/emitters are used manage the signals appropriately for a fully working system

Description	Specification	Typical Model
Hearing assistance system	<ul style="list-style-type: none"> WiFi based system QR code and numerical security code for restricted access 1000 users support Mobile App accessible to users 	Sennheiser MobileConnect

2.22.9 Video Processing Equipment

.1 Provide components required to switch, route, distribute and interface video signals as required.

.2 Distribute video signals to and from destinations via twisted pair analogue or digital transmission paths.

.3 Ensure signals arrive at their destination free of artefacts and are displayed free of distortion, loss of signal quality and maintain correct geometry.

.4 Where video signals are switched and or routed the time to switch shall be minimal and cannot impede workflow while in use.

Description	Specification	Typical Model
Video transports network	<ul style="list-style-type: none"> IP based 5-Series 	Visionary Solutions

2.22.10 Video Conferencing

.1 Provide a complete fully functional video conferencing system.

.2 Interface cameras with video processing equipment and control systems.

.3 Provide programming and end-to-end calibration to align audio DSP with interconnected devices where applicable.

.4 Provide interfaces required to ensure video images are correctly sized on intended display for each location.

Description	Specification	Typical Model
VC conferencing codec	<ul style="list-style-type: none"> H.264 H.323 protocols Codec Multiple AV ins and outs for integration Control interface supported Rack mountable Network and serial control ports 	Cisco

2.22.11 Lectern

.1 Lectern is OSE.

.2 Coordinate functionality with Owner.

- .3 Locate lectern as shown on the drawings.
- .4 Provide cable management
- .5 Provide disconnect panel.

Description	Specification	Typical Model
Lectern	<ul style="list-style-type: none"> • Owner supplied product • Cut-outs by AV 	Custom – Existing.

2.22.12 Equipment Racks

- .1 Provide AV equipment racks. Provide racking systems as required.
- .2 Provide power distribution within racks.
- .3 Provide rack space and shelf to support Owner’s PCs
- .4 Coordinate placement, ganging and plinth construction to accommodate equipment racks.
- .5 Coordinate rack locations in AV equipment rooms. Ensure sufficient height and clearances are provided.
- .6 Coordinate AV equipment room layouts with other trades as required.
- .7 Coordinate electrical connections with electrical trade.
- .8 Provide active cooling required maintaining safe operating temperatures while equipment is operating. Ensure cooling is quiet.
- .9 Provide grills to cover fan openings to prevent operational hazards
- .10 Coordinate cooling/ ducting systems with mechanical trade.
- .11 Coordinate millwork requirements for racks with Owner and other trades.
- .12 Install racks into millwork as required.
- .13 Provide gang kits and spacers as required.
- .14 Use spacers between racks to ensure adequate cooling and space for cabling.
- .15 Adjust plinth to suit rack footprint.
- .16 Provide sequenced power on UPS fed power distribution paths.
- .17 Ensure equipment is operating at specified normal operating temperatures and provide active low noise cooling as required at rack locations to maintain manufacturer specified operational temperatures while equipment is operational.
- .18 Supplied equipment shall meet the following general specifications:

Description	Specification	Typical Model
Rack	<ul style="list-style-type: none"> • 42 - 45 RU • 32-inch depth • Gangable 	Middle Atlantic BGR Series

Description	Specification	Typical Model
Credenza Frame Rack	•	Existing
Accessories	• cable tie bars for horizontal cable transitions and vertical lacing bars	Middle Atlantic
Vent Panels	• two RU vent panel top and bottom of every rack, panel finish black enamel or anodized	Middle Atlantic
Blank Panels	• fill empty rack space with blank panels, each rack to contain 1 RU blank, 2 RU blank and 3 RU blank	Middle Atlantic
Drawer	• Provide a 2 RU steel pull-out drawer, one per 4 full height racks	Middle Atlantic
Work Light	• LED work light with switch. Mount one at the top and one at centre of each rack	Middle Atlantic
AC Distribution	• Vertical power distribution within racks	Middle Atlantic
Sequence Power	• Sequence Power rack unit • Main sequencing controller • Non-controlled	Middle Atlantic PDC-915R-6 USC-6R PD-815R-PL
Non Sequenced Power	• Non isolated power distribution with cord	Middle Atlantic PD-815A-PL or PD-920R as required
Rack Rails	• Provide adjustable rail sets which extend the full length of the rack	
Ground Buss Bar and Bonding	• Provide copper ground buss bar with tapped holes. • Provide copper cable clamps ("Burndy") for connection to equipment • Provide 12 AWG stranded copper strap between buss bar and each rack mount component.	
Miscellaneous	• Provide mounting hardware and rack screws with nylon washers.	

2.22.13 Panels

.1 Provide input panels at location identified.

Description	Specification	Typical Model
Laptop Input	• HDMI Connection • 1/8" Stereo Audio	Extron, ALTINEX, Legrand
Audio Input	• 1/8" Stereo Audio	Extron, ALTINEX, Legrand

Description	Specification	Typical Model
Furniture Mounted Enclosure	<ul style="list-style-type: none"> Cable Management for power, data, computer 	Extron, Legrand
Desktop enclosure for touch panel	<ul style="list-style-type: none"> As specified 	Per manufacturer

2.22.14 Control System Hardware

- .1 Provide a complete functioning control system.
- .2 Provide interface hardware and electronics to communicate with AV system components with external control capability.
- .3 Control system architecture shall be organized and proven for a complete and working system.
- .4 Provide wired control panel at lectern. Locate processor in central equipment racks or lectern.
- .5 Provide Ethernet or bi-directional serial communications connections to the following sub-systems, where specified for each room type:
 - 1) Audio/Video Switching
 - 2) Video Displays & projectors
 - 3) PTZ Cameras
 - 4) Audio Processing
 - 5) VC Codecs
 - 6) Lighting Control
- .6 Provide Relay connections to the following sub-systems, where these systems are included:
 - 1) Projection Screens
 - 2) Projector & display lifts

Description	Specification	Typical Model
Lectern or Wall Control Panel	<ul style="list-style-type: none"> Size as specified PoE power 	Extron
Control Processor	<ul style="list-style-type: none"> Integrated Com, LAN, relay, IR ports Built in Web server pre-emptive multi-threaded/multitasking kernel support for 9 simultaneously running programs rack mounted SNMP Enterprise grade 	Extron

Description	Specification	Typical Model
Touch Control Panel - 24"	<ul style="list-style-type: none"> • Black in colour • Approx. 24" diagonal monitor • External Extron Control Interface • Capacitive touch screen • Adjustable stand • Provide mounting hardware, plates and adapters as required 	Extron interface and Dell touch monitor
Touch Control Panel - 10"	<ul style="list-style-type: none"> • Black in colour • Approx. 10" diagonal • Capacitive touch screen • PoE power • Wall or table as required • Provide mounting hardware, plates and adapters as required • Built in control processor 	Extron
Touch Panel Media Transmitter	<ul style="list-style-type: none"> • 	
Control Processor Serial Expansion	<ul style="list-style-type: none"> • 	
Ethernet Interface for Control Processor	<ul style="list-style-type: none"> • 	
Control Processor I/O Expansion	<ul style="list-style-type: none"> • As specified 	Extron, Moxa
IP Relay	<ul style="list-style-type: none"> • Ethernet port • Dry contact RLY • Separate control of each contact. 	Extron, Moxa
USB Extender	<ul style="list-style-type: none"> • Decora or box format as required • Fully USB 3.0/2.0 capable • Allows file transfers as well as HID data • Where plate style is required coordinate colour with Architect 	Icron Technologies, Extron, Legrand

2.22.15 Displays

.1 Provide displays as noted in drawings. Coordinate mounting locations and infrastructure required to support displays with Owner and other trades.

.2 Note that some monitors may be mounted in millwork; ensure sufficient ventilation to dissipate heat. Coordinate with the millwork contractor.

.3 Displays to be HD in 16:9 format. Where content is not native 16:9, e.g. 4:3 format, the image is to be displayed in its native aspect ratio with black bars on the side or top/bottom to maintain the proper aspect ratio. It is not permissible to stretch the image to fill the screen.

Description	Specification	Typical Model
Video display	<ul style="list-style-type: none"> • 4K UHD resolution or per specified model • HDCP capable • Multiple digital video inputs • Network control interface 	LG, Samsung, NEC

2.22.16 Spare Equipment

.1 Provide spare components as indicated.

Description	Specification	Typical Model
Video display	<ul style="list-style-type: none"> • As specified 	Per manufacturer
Paging loudspeaker	<ul style="list-style-type: none"> • As specified 	Per manufacturer
Power supply	<ul style="list-style-type: none"> • As specified 	Per manufacturer
Wireless microphone batteries	<ul style="list-style-type: none"> • Provide spare set of rechargeable batteries 	Per manufacturer
Video display	<ul style="list-style-type: none"> • As specified 	Per manufacturer

2.22.17 AV Systems PC

- .1 Provide a compact rack mount PC.
- .2 Include hardware to mount PC central equipment rack.
- .3 System PC will provide an interface and control audio visual systems.
- .4 Fully configure and install system hardware and software.
- .5 Install AV system software required for the build, configuration, and maintenance on system PC.
- .6 Provide system display monitor, keyboard and mouse.
- .7 Provide a KVM extension between PC and Operator position.
- .8 Coordinate location of KVM with Owner.

Description	Specification	Typical Model
AV Systems Computer	<ul style="list-style-type: none"> • Form Factor: Rack mountable • Digital video output • USB 3.0 ports • Gigabit Ethernet port • Windows OS latest version 	Dell, HP or equivalent

Description	Specification	Typical Model
KVM Over IP	<ul style="list-style-type: none"> • Uses CAT5,6 Twisted pair to interface transmit receive • Includes cables to connect devices • 50 m or greater • Able to extend USB and audio 	ATEN or equivalent

2.22.18 Ethernet Switches

.1 Rack locations shall include an Ethernet switch to interconnect various system components.

.2 Provide sufficient quantity of ports to support system connections with 30% spare at each location.

Description	Specification	Typical Model
Ethernet switch	<ul style="list-style-type: none"> • Managed • Minimum 48 ports • PoE as required 	Existing: OSE New: HPE Aruba, NetGear, Cisco
Support	<ul style="list-style-type: none"> • Manufacturers support 	Manufacturer

2.22.19 Uninterruptible Power Supply (UPS)

.1 Each equipment area having microprocessor equipment shall have a UPS device that will service the DSP and computer components located in each area.

.2 The UPS shall provide a minimum backup time of 10 minutes while connected to working load.

.3 Supply the UPS and mount into the rack.

.4 Rated for entire rack loading of all devices.

.5 Provide separate circuiting in racks for UPS feeds to equipment as required.

Description	Specification	Typical Model
Rack load UPS	<ul style="list-style-type: none"> • Rack mount UPS • Line interactive topology • 4ms typical transfer time or as specified. • 120V operation • Field-replaceable hot-swappable internal batteries • 3-year warranty • Inrush Current Elimination • Network monitored • Temperature sensor • Battery status report 	APC SmartUPS-X

Description	Specification	Typical Model
Portable UPS for Laser Projectors	<ul style="list-style-type: none"> • 208V input and output • Line interactive topology • 6ms typical transfer time or as specified. • Network monitored 	SmartUPS-X
Lectern UPS Operator desk UPS	<ul style="list-style-type: none"> • Rack mount UPS • Line interactive topology • 4ms typical transfer time or as specified. • 120V operation • Field-replaceable hot-swappable internal batteries • 3-year warranty 	APC SmartUPS

2.22.20 Cable Plant

- .1 Provide a commercial grade professional cable plant with sufficient bandwidth capacity to meet or exceed equipment specified. Product selection to anticipate future upgrades.
- .2 Provide wire and cable required to interconnect systems and devices.
- .3 Provide patch cables to interconnect portable devices and patch bays.
- .4 Provide fibre optic cable (where required). Provide spare strands at each location.
- .5 Provide data paths and connectivity directly related to AV systems.
- .6 Provide connection between facility LAN and AV systems as required.
- .7 Provide cable management devices beyond cable raceways supplied by others.
- .8 Provide connectors and termination of AV equipment.
- .9 Provide connectors and termination at locations where Data is extended to AV equipment.
- .10 Provide extension of Data connections from local LAN point provided.
- .11 Install cable and wire to best industry practice into conduit and cable paths provided.
- .12 Facility Data and voice connection points are provided under a separate communication contract. Coordinate data requirements with Owner and Communication Contractor.
- .13 Coordinate AV data paths with Owner and install per facility wide practices.
- .14 Coordinate cable paths and ensure wire provided throughout is installed to regulatory codes and requirements.

.15 Coordinate cable paths and raceways with other trades to ensure cables are installed in accordance with manufacturer's specifications.

Description	Specification	Typical Model
Cable and wire	<ul style="list-style-type: none"> See drawings 	Belden, Extron
Connectors	<ul style="list-style-type: none"> As required 	Amphenol, Belden, Extron
Cable fasteners, hardware and cable management	<ul style="list-style-type: none"> As required 	As required

2.22.21 Tabletop Boxes

- .1 The table top box(es) shall be provided by the owner in all rooms.
- .2 Provide cable management
- .3 Provide cable pass troughs, patch cables, panels and connectors for each location.
- .4 Coordinate with Architect and Owner.
- .5 Where possible install product(s) into millwork with edges flush to millwork surface.

Description	Specification	Typical Model
Table Top Box	<ul style="list-style-type: none"> Metal access box Pass through patch cable Integrated dual AC outlet with USB charge ports Retractable lid 	Owner supplied equipment

2.22.22 Panels

- .1 Systems are accessible via connector panels mounted to walls and other surfaces, as shown on the drawings.
- .2 Provide connector panels as shown on the drawings and as required to provide required functionality.
- .3 Provide connector panels for floor boxes where AV equipment is installed.
- .4 Provide blank panels at back box locations as required.
- .5 Provide connector panels complete with connectors at floor box locations.
- .6 Provide cover panels for AV junction boxes.
- .7 Coordinate finish with Architect.
- .8 Coordinate installation with General Contractor.
- .9 Field located connections shall be panel mounted except where located in millwork. At these locations connections will be made to equipment via cable mounted connections.
- .10 Junction box locations shall have covers and panels with sufficient opening for cable to pass. Protect cables from sharp edges. Finish panel as instructed by Architect.

Description	Specification	Typical Model
Panels	•	See dwgs.
Floor Box panels	•	See dwgs.

2.22.23 Jackfields (where specified)

.1 Video

Description	Specification	Typical Model
Jackfield	<ul style="list-style-type: none"> • rack mount, 2 row, 24 video jacks per row front, • BNC rear, non-normal, • professional grade, • labelling strip allowing three lines of text 	Kings KS-4848-019-000 Trompeter ADC
Label	<ul style="list-style-type: none"> • custom label strips, • machine-printed black on white, • each jack designated clearly with the distant end description and a unique tie line number, three lines of text, • secured behind transparent cover. 	Custom
Cable Management System	<ul style="list-style-type: none"> • Support structure for dressing cable • Fasten each cable to relieve strain from BNC Connector 	Custom Kings
Patch Cord	<ul style="list-style-type: none"> • 1 m long • Quantity at 10% of jacks 	Kings KPC-9393-170363 Trompeter ADC
Patch Cord Hanger	<ul style="list-style-type: none"> • Middle Atlantic 	Middle Atlantic CLAW, Trumpeter

.2 Audio

Description	Specification	Typical Model
Jackfield	<ul style="list-style-type: none"> • rack mount • 48 point per row • professional grade • “Bantam” style long frame 6mm (1/4”) • tip/ring/sleeve jacks with long life palladium normal contacts • prewired to solder connections or approved punchdown system • labelling strip allowing three lines of text 	Audio Accessories (WQP-07-P-C-48-N-2)
Label	<ul style="list-style-type: none"> • custom label strips • machine-printed black on white • each jack designated clearly with the distant end description and a unique tie line number • three lines of text • secured behind transparent cover 	
Patch Cord	<ul style="list-style-type: none"> • 1 m long or as required • Neutrik nickel plated ends • Mogami or Canare cable • Quantity at 10% of jacks 	
Patch Cord Hanger	<ul style="list-style-type: none"> • 	Middle Atlantic CLAW, Trompeter

2.22.24 Connectors

.1 Video Interconnect

Description	Specification	Typical Model
COAX BNC Panel mount	<ul style="list-style-type: none"> • crimp type • to suit wire gauge • Isolated Ground 	Canare, Kings, Amphenol or equal
COAX BNC Cable Mount	<ul style="list-style-type: none"> • Crimp type • To suite wire gauge 	Kings, Amphenol or accepted substitution

.2 Data Interconnect

Description	Specification	Typical Model
Control Connectors	<ul style="list-style-type: none"> • 	AMP CPC Type
RJ-45 (rugged use)	<ul style="list-style-type: none"> • Connection protected when in use • Fully compliant with TIA 568B 	Woodhead ENSPIF5 Neutrik EtherCON
RJ-45 (standard use)	<ul style="list-style-type: none"> • Keystone format 	AMP

3. EXECUTION

3.1 Examination

3.1.1 Verification of Conditions

.1 Confirm dimensions distances and placement before the installation of equipment. Report discrepancies to Systems Designer.

3.2 General

.1 Execute the methods, requirements and testing described.

.2 Install equipment to present no safety hazards to the public, operating personnel, equipment or other trades.

.3 Ventilate for operating under worst-case power dissipation.

.4 Materials and equipment required for a complete system but not specified as to quality shall be of high commercial standard and quality.

.5 Fabricate and install items in accordance with manufacturers' recommendations and Consultant specifications. Consult with trades doing adjoining work and coordinate with Consultant to provide an installation of first class quality. Workmanship is as important as functionality.

3.3 Technical Standards

3.3.1 Software Standards

.1 Before system is deemed complete and ready for final acceptance, software and hardware issues shall be rectified by Contractor and reviewed by Systems Designer.

.2 Where security features with passwords are employed, ensure that each level is properly assigned and that users have access as directed by Systems Designer. Submit security features for review before commissioning. Unless otherwise noted, keep a set of passwords that permit full access to system for technical support to Systems Designer.

.3 Where DSP systems replace analogue equivalent loudspeaker-processing devices, consult manufacturer of loudspeaker system to obtain recommended settings for that loudspeaker system. Settings shall be implemented as algorithm 'Blocks' in DSP. These settings shall be printed in a tabular format and included in system manuals.

3.3.2 Computer Systems

.1 Ensure that systems are backed up regularly throughout process.

3.3.3 Computer Hardware

.1 Do not install computer systems during construction, especially where there is dust and debris.

.2 Computer system components shall be of premium quality and sourced from an established vendor.

.3 Computer based systems shall meet Owner's standards and specifications.

.4 Unless otherwise noted computer systems and control hardware shall be industrial 19" rack mounted type.

3.3.4 Control and Interface Hardware

.1 Various systems and components shall be controlled directly from a touch panel or via a dedicated control system. These devices are key components in delivering a usable system. Therefore, their successful implementation is of great importance.

.2 Software standards and review process as described previously shall apply to these systems.

.3 Hardware components used to control and interface with computer system or other hardware components shall be tested and fully functional before installation on site.

.4 Unless otherwise noted, software programs that control operable machinery require tally from mechanism being controlled. Software program shall report status of mechanism to user via a graphic display. Where injury or damage to equipment may occur, control program shall include safety features that reverse motion or stop movement until problem is rectified.

3.3.5 Wiring and Cable Termination

.1 Take necessary precautions to prevent electromagnetic and electrostatic interference in both long and short term. Care shall be taken in wiring and installation to prevent damage to wire or equipment.

.2 Terminations of shielded twisted pair cables, regardless of location, shall consist of a Teflon, PVC or neoprene sleeve covering shield drain wire and an overall heat shrink or elastic neoprene sleeve covering point at which cable jacket and shield end. (This makes it very difficult to inadvertently ground a shield and is an important aspect of audio system wiring.) At termination unshielded leads shall be less than 50 mm in length.

.3 Wiring entering racks shall have a two meter service loop (slack) folded after cable has been terminated, allowing future rewiring. This slack wire shall be neatly harnessed into place.

.4 Cable and cable bundles shall be neatly and logically routed and organized. Bundles of varying signal level shall be spaced at least 10 cm apart and secured to dedicated tie bars. Wiring in racks shall not be left unsupported.

.5 No splices in shielded twisted pair or coaxial cable are allowed – runs shall be continuous.

.6 Audio terminations shall be made with rosin-core solder or an approved mechanical connector. Temperature controlled soldering stations are recommended. Crimp only with manufacturer's recommended crimping tool having a controlled crimp cycle.

.7 RF terminations shall be made with screw-on BNC connectors on cables and isolated thru-panel BNC-BNC connectors on panels.

.8 Ensure appropriate cables and distribution amplifiers are selected to guarantee quality of signal delivery over long distances.

3.3.6 Audio Interconnection

- .1 Microphone and line level wiring extending beyond racks shall be balanced and floating, unless otherwise indicated.
- .2 Microphone and line level wiring to be balanced, except where specified equipment has unbalanced terminations.
- .3 Unless otherwise noted, field microphone and line level connections to be via XLR connectors.
- .4 Where audio signal cables share a conduit with control cables, take appropriate precautions to prevent pops, clicks and noise in system. Control circuits that require a reference shall not use audio shields as their reference.
- .5 Shielded signal cables shall have their shields isolated from both conduit system and other shielded cables. Unless otherwise specified, shields shall be continuous from source to input points. Line level cable shields shall be connected at input (load) end only, with shields lifted at output (source). Microphone wiring shall have continuous shields from microphone outlet to microphone patching point. If microphone wiring is passed through a normal jack, to a console microphone input, it shall be continuous from patch point to jack as well from microphone input to jack. This shall supply a safety ground for microphones and other equipment that users may come in contact with. No "doubling up" of ground points on multi-pin connectors or terminal blocks shall be allowed. Pin 1 on XLR type connectors shall not be connected to connector case. Tie line patches shall have continuous shield connections from one patch to another, with no permanent connection to chassis ground.
- .6 Detail shield ground scheme in approval drawings for review by Systems Designer.
- .7 If equipment is not fitted with XLR connectors, or if direct XLR connection contributes to a noise problem, supply XLR adapter to match. Wiring modifications are made in this adapter only and shall be appropriately identified.
- .8 Unless otherwise specified by an equipment model number, audio line output impedances shall be less than or equal to 200 ohms and shall be capable of driving loads of 600 ohms. audio line input impedances shall be greater than or equal to 600 ohms, and preferably ten times greater than source impedance. Similarly, microphone output impedances shall be less than or equal to 200 ohms and capable of driving loads of 1000 ohms or greater. Microphone input impedances shall be greater than or equal to 1000 ohms. Values specified here are measured rather than "nominal" values. Systems Designer shall review exceptions to above before acceptance for commissioning.
- .9 The polarity convention for connectors in balanced circuits shall be defined as follows and clearly noted on each wiring diagram and in manuals. Polarity or pin assignment schemes of other connectors shall be detailed in approval drawings.

	Shield	Hot (+)	Return (-)
XLR type connectors	pin 1	pin 2	pin 3
One-quarter inch phone plugs and jacks	sleeve	tip	ring

3.3.7 Video Interconnection

- .1 BNC type video connectors shall be of high quality with a crimp style strain relief
- .2 Other “line level” type video connectors shall be of high quality with opposing mating surfaces composed of similar metal types.
- .3 Ensure video transmission paths are properly terminated with appropriate device.

3.3.8 RF Interconnection

- .1 BNC type RF connectors shall be of high quality with a screw on style strain relief.
- .2 Other “line level” type RF connectors shall be of high quality with opposing mating surfaces composed of similar metal types.
- .3 Ensure RF transmission paths are properly terminated with appropriate device.

3.3.9 Control and Data Interconnection

- .1 Data and control connectors shall be of high performance and quality.
- .2 Opposing mating surfaces shall be of similar metals
- .3 Connections shall maintain telecommunication industry defined impedances for that particular circuit type and connection.
- .4 Data and Digital transmission paths are properly terminated with appropriate impedance device.

3.3.10 Fibre Optic Connections (Where Required)

- .1 Connectors shall be of premium quality and performance.
- .2 Terminations shall be made by field-experienced personnel using fused pigtail approach. No field termination shall be permitted.
- .3 Only industry standard connection methods shall be permitted.

3.3.11 Wireless Systems

- .1 Contractor is responsible for successful implementation of wireless systems specified.
- .2 Ensure that RF systems, whether part of a single system or multiple systems, shall operate simultaneously without system having an effect on another’s performance. This includes performance, communication and control systems of this system, or other system presently used in building.
- .3 Ensure connections and RF cables meet or exceed manufacturer recommendations.
- .4 Wireless antenna systems to be tuned to operating frequencies of devices to which they are connected.
- .5 Ensure devices in RF signal path are tuned to operating band for which they are to be used.
- .6 Consult with manufacturer to evaluate and / or survey site to determine best operating frequency range(s) for facility. This information to be documented and forwarded to Systems Designer before commissioning.

- .7 Demonstrate that RF system shall not affect RF systems in adjacent spaces.

3.3.12 Power

- .1 Although AC power cable and wiring installation on site, except within racks, is not responsibility of Contractor, verify that it is serving the systems and report concerns to Systems Designer before final acceptance testing.
- .2 Equipment rack(s) shall be wired to dedicated AC circuits.
- .3 AC power distribution within racks is responsibility of Contractor. In case of fixed racks, this distribution shall be accomplished with junction boxes for supply termination and plug strips that shall be free of switches, fuses and circuit breakers (as found on some power bars, for example). AC circuits shall be exclusively switched and protected by AC Breaker in Panel board serving rack.
- .4 Power cords of rack-mounted equipment shall be neatly bundled so that plug can be immediately associated with a particular piece of equipment. If this is not possible, tag plug to identify equipment.
- .5 Coordinate location of AV cabling to ensure that AC cabling does not interfere with AV signals.
- .6 UPS and surge suppression equipment to provide sinusoidal output and shall not bleed harmonics to ground.

3.3.13 AV System Grounding

- .1 Grounding method adopted shall be consistent throughout.
- .2 Ensure Electrical Contractor permanently bonds conduits containing audio and visual systems wiring to electrical safety ground.
- .3 Where isolated technical power systems are provided ensure that racks shall be isolated from conduit, building steel and other conducting elements. Racks shall be grounded only by isolated fine braid 2 AWG ground wire, which accompanies power wiring.
- .4 Portable electronic equipment shall exclusively receive its technical ground via equipment ground conductor run to AC outlets.
- .5 Ensure that AV cabling systems are properly grounded and shielded to maintain isolation and prevent interference from other systems, e.g. AC power.

3.3.14 Data Network System Grounding and Bonding

- .1 Implement a data ground and bond system.
- .2 Ground / bond system shall be used to ground data cable shields, equipment, racks, cabinets, raceways and associated hardware, which has potential to carry current.
- .3 Ground / bond system shall be implemented in accordance with recommendations contained in the TIA/EIA 607 Telecommunications Bonding and Grounding standard.
- .4 Each technical closet or location shall contain a copper buss bar which supplies local reference point.

.5 Each copper buss bar is connected to building service entrance via an insulated 4/0 fine strand copper wire.

.6 Racks, metallic backboards, cable sheaths, raceways, structural support and conduits entering or residing in technical closet shall be grounded to respective local buss bar. Bond shall be supplied using #6 stranded copper bonding conductor and compression connectors.

.7 Equipment and panels mounted in equipment racks shall be bonded to equipment rack using #12AWG stranded copper wire and crimp terminals. Paint shall be removed where there is an insufficient galvanic contact point.

.8 Ground / bond cables and buss bars to be labelled and documented.

3.3.15 Rigging and Overhead Equipment

.1 Ensure that system elements which are suspended overhead, use load-rated metallic fittings, to achieve a designed load safety factor of five or greater. Fasteners shall be minimum grade 8 steel.

.2 Where the total suspended mass exceeds 90 kg, ensure that a Structural Engineer having jurisdiction approves custom-built rigging fixtures used for overhead suspension.

.3 Provide review drawings detailing proposed suspension methods.

3.3.16 Portable Cabling

.1 Unless otherwise specified, portable cable to be flexible, durable for heavy use and colour black.

.2 Portable cable shall be stranded copper.

.3 Portable cable where conductors are exposed to damp environments shall be tinned copper.

.4 Jackets shall be sized with an overall outside diameter to fit within the strain relief mechanisms of the connectors they are to be mated.

.5 Portable cable, where used for AC power distribution, shall meet the requirements of National and Provincial regulations.

.6 Portable cables shall be permanently identified with system information and function. Labels shall be heavy-duty type and covered with clear shrink-wrap.

.7 Jackets shall be sized with an overall outside diameter to fit within strain relief mechanisms of connectors.

3.3.17 Fire Stop

.1 Supply firestop where required.

.2 Penetrations through fire rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This applies to through penetrations and membrane penetrations. Penetrations such as riser slots and sleeves, cable trays, raceways and conduits shall be firestopped according to local codes.

.3 Firestop systems shall be cUL classified and in accordance with local authority having jurisdiction.

.4 Firestop systems shall be in accordance with manufacturer's recommendations and shall be completely installed and available for inspection by local authority having jurisdiction before cable plant acceptance and commissioning.

3.4 Marking

3.4.1 Equipment

.1 Label equipment in accordance with drawings, so that every patch point can be immediately associated with a specific piece of equipment. Connector shall be identified with device to which it is normally mated.

.2 Operating controls, switches, jacks and plugs shall be permanently marked in a clear logical manner using engraved, laser etched, screened, or lamacoid label strips.

3.4.2 Wall and Patch Panels

.1 Ensure each wall panel including microphone, line, loudspeaker, video, and control panel outlets are engraved and filled or silk screened to indicate physical location of outlet, its designation and circuit numbers it terminates. Patch field panels shall have a label strip as shown in drawings, with a transparent retaining cover. Font shall be Bold Arial, 1/4" for panel location and designation and 3/16" for circuit numbers.

.2 Alternatively, laser engraving, die cut overlays or a combination of both may be used. Style or "look" shall be uniform throughout facility.

.3 Submit samples to Systems Designer for approval before manufacturing.

3.4.3 Jack fields

.1 Ensure jack fields are labelled using CAD-generated label strips. Labels shall indicate name and function or circuit number of each circuit. Font shall be Bold Arial, sized 1/8" or as space permits. Submit scheme to Systems Designer for approval before manufacturing.

3.4.4 Wire

.1 Ensure without exception, audio, video, data and control system cables to be individually, uniquely, logically and permanently marked by Contractor. Wires shall be marked as documented on cable risers and system drawings. Spare wires shall be marked "spare" at both ends and numbered consecutively. A "spare schedule" shall be included on risers indicating spare wire numbers, locations and types. Wires shall be marked with slip-on or other permanent type sleeves. Cloth or vinyl tape type markers are not adequate and shall be replaced by a more permanent type. Wiring shall be properly identified in junction boxes and at terminal blocks and wherever accessible.

3.4.5 Network Cabling

.1 Ensure new network cable naming and marking conventions are consistent with building infrastructure. Stringently adhere to methods of physical installation and identification currently used by Owner.

3.5 Equipment Packaging

3.5.1 General

.1 Ensure that, unless otherwise noted, equipment is securely mounted and fastened into racks using original manufacturer's rack mounting kits or custom fitted mounting kits. Unless otherwise noted, it is unacceptable to put equipment loosely on shelves or stacked on top of other rack-mounted equipment.

3.5.2 Loudspeakers

.1 Unless otherwise noted, loudspeaker colours and finishes to be coordinated with Architect.

.2 Loudspeakers shall have grill covers made of acoustic foam with protective metal screen behind or as directed by Systems Designer.

.3 Exposed hardware such as rigging fixtures to be finished to match loudspeaker or as approved by Architect. Finish shall not impede proper operation of loudspeaker or rigging components.

.4 Unless otherwise specified, loudspeakers to have two connectors, an input and a link connector.

.5 Unless otherwise noted where multiple tap loudspeakers are installed, tap selection to remain accessible after loudspeaker is installed.

3.5.3 XLR and Multiconnector Panels (where specified)

.1 Supply and install multichannel connector panels, as shown in drawings. Provide balanced lines inside rack extending each channel to rack devices or patch bays. Except where lines are connected to patch bays, cables to terminate to XLR of gender appropriate to direction of signal flow, including spares. Cut cable to harnessed length plus 24".

.2 Panels to be 19" by 2RU in height, of #16 C.R.S. folded back 1/2" top and bottom, with black enamel finish, having (24) XLRs rear-mounted in two rows of twelve male and twelve female respectively. Terminate connectors to multichannel connectors as shown in drawings.

.3 Panels, regardless of type, to have a self-contained integrated "tie-bar" to support cables at rear of panel.

.4 Jack panel designations shall be silk-screened or include a label strip above each row.

3.5.4 Portable Systems Racks (where provided)

.1 Provide modular steel equipment racks complete with pairs of formed dress panels, removable sides and a bottom dress skirt as required for a completed professional look and finish. Top panel shall be either solid or vented depending on equipment cooling requirements. Rear doors with flush key locks are required, perforated, unless cooling scheme requires solid doors.

.2 Cabinets to be not more than 22" wide and 24" deep unless specified otherwise. Top and bottom planes of cabinet to incorporate recess on rear edge to permit passage of cables while cabinet is located against rear surface.

.3 Portable cabinets to be fitted with four high-quality, non-marring locking casters, 4" wheel diameter.

.4 Supply colour samples to Architect for approval.

.5 Supply Approval drawing of this equipment for review by Systems Designer before construction.

3.5.5 Installed (Fixed) Racks (where specified)

.1 Where freestanding racks are required, supply modular steel equipment racks complete with pairs of formed dress panels, removable sides and a bottom dress skirt as required for a completed professional look and finish. Top panel shall be either solid or vented depending on equipment cooling requirements. Rear doors with flush key locks are required, perforated, unless cooling scheme requires solid.

.2 Where wall mounted racks are required, supply swing-out steel racks with locking front doors and louvered sides. Front door may be perforated depending on equipment cooling requirements

.3 Supply racks, which have chip-resistant satin enamel finish, colour as specified.

.4 Supply a permanent work light with switch mounted at rear top of rack to assist in service.

.5 Supply racks, which have adjustable front and rear mounted rails tapped with #10-32 mounting holes.

.6 Supply racks fitted with isolated ground power distribution bars and ground busses (where isolated ground technical power is provided) as shown in drawings. Supply a standard 20A/120VAC duplex courtesy outlet at front base of rack uniquely identified as an isolated ground outlet.

.7 Supply blank or perforated metal vent panels, (dependent on cooling requirements) and install a one-rack unit panel above and below each power amplifier. Supply fine perforated metal security panels to cover equipment with front mounted controls to prevent tampering with final settings by inexperienced users.

.8 Unless specified otherwise, supply racks 32" deep.

.9 Supply cable management to dress and support cables.

3.5.6 Multichannel Cables (where specified)

.1 Multichannel cables for audio, video and RF shall incorporate an individual jacket with shield for each circuit and an overall flexible outer jacket.

.2 Where cables enter racks, secure cable with Kellems-type strain relief grip mounted in a 16 C.R.S. panel, top and bottom folded back 1/2", finished in black enamel consistent with other panels in system.

.3 Where cables enter connectors, supply strain relief affixed to connector housing that extend a minimum of 6" out from connector along length of the cable.

3.5.7 Provide shop drawing of this equipment for approval before construction.

3.5.8 Line Level Patch bays (where specified)

.1 Supply and install TRS-type jack fields with hinged faces. Terminate patch points to multi-channel connectors as shown in drawings. Make normal connections between patch points as shown in drawings and directed by Systems Designer.

.2 Dress cables to hinge area to allow smooth operation of hinged face. Supply approval drawing to Systems Designer showing cable harness scheme before construction.

.3 Provide jack panels fitted with fully labelled designation strips contained in aluminum retaining channels permanently affixed above each row, except where designation strip impedes operation of jack.

.4 Supply "mults" and spares on jack field.

.5 Supply TRS and XLR patch cords 2' and 3' long or as required. Multi-channel Cables (where specified).

3.5.9 Rack and Bulkhead Panels

.1 For panels for mounting into equipment racks and multi-panel bulkheads, except floor boxes, ensure:

- 1) Nominal panel dimensions to be 19" wide and 1.75" (1 RU), 3.5" (2 RU), 5.25" (3 RU) or 7" (4 RU) high, as required. To ensure proper fit, actual panel height shall not exceed nominal dimension, and is usually a multiple of 1.75" less 0.031". Refer to EIA Standard RS-310-C for allowable tolerances and other details.
- 2) Panels shall be made of #16 C.R.S. folded back ½" top and bottom.
- 3) Panels to be satin black and have a finish equal to or better than baked enamel unless specified otherwise and approved by Systems Designer and Architect.
- 4) Panels regardless of type shall have a self-contained integrated "tie-bar" to support cables at rear of panel. This bar shall be of sufficient depth not to impede connector wiring.
- 5) Jack panel designations shall be silk-screened or include a label strip above each row.
- 6) Provide perforated metal vent panels as required to implement rack ventilation scheme when convection cooling is required. If equipment is forced air-cooled blank panels between equipment shall be solid.
- 7) Blank and vent panels shall be of consistent colour and finish.
- 8) Panels of four or less Rack Units height shall be used to enclose remaining rack openings after equipment is installed.

3.5.10 Field panels

.1 For panels that are not standard gang AV panels or mounted in racks or multi-panel bulkheads, ensure:

- 1) Field panels shall be 0.125" aluminum stock with 1/8" bevelled edges. Anodized finishes shall be vertically brushed.
- 2) Panels to be engraved and paint filled. Font shall be Bold Arial, ¼" for panel location and designation and 3/16" for circuit numbers.
- 3) Panels in public areas shall have a finish as approved by Architect.
- 4) Panels in technical areas shall have a finish as approved by Systems Designer.

- 5) Pre-manufactured attenuator plates shall have a finish as approved by Systems Designer.

3.5.11 Fasteners

.1 Ensure exposed screws, such as rack and panel mounting hardware, are of quality finish, such as stainless steel or nickel plate. Standard Zinc plating is unacceptable. Fasteners to be of premium grade Philips, Robertson, hex (Allen) head fasteners only. Black oxide finish is preferred. Nylon washers of equivalent colour shall be used to protect front face of rack-mounted equipment.

3.5.12 Connector Mounting

.1 XLR connectors shall be inserted into panels from rear. Ensure that labelling strips do not interfere with operation of connector release mechanisms. Holes shall be sized to suit male or female shell interchangeably.

.2 On a given panel, XLR latches shall be oriented to top or left, as required.

.3 RF connectors shall maintain nominal circuit impedance required for application in which they are used.

.4 On a given panel, connectors shall be oriented with alignment key up.

3.5.13 Power Amplifiers

.1 Install power amplifiers in appropriate equipment racks. Support weight of amplifier(s) with angle brackets attached to side rails of equipment rack or with rear support flanges so front panel of amplifier is not subject to torsion. Attach label, as specified elsewhere, to faceplate of each amplifier to indicate function.

3.5.14 Metal work

.1 Metal work shall be manufactured to a minimal dimensional tolerance of 0.63 mm (0.025"). Edges shall be smooth and free from burrs and other imperfections and shall have a minimum 0.005" radius.

.2 Panels shall have holes lined up on centres with consistent spacing as shown on drawings.

.3 After manufacture panels shall have a permanent finish applied which is equal to or better than baked enamel and to satisfaction of Architect. Black anodized aluminum is acceptable. Finished panel surfaces shall be free of scratches, nicks, gouges and dents.

.4 Connector panels shall be black unless approved otherwise.

.5 Aluminum panels shall be 0.125" stock. Anodized finishes shall be vertically brushed. Single, dual and triple gang plates shall have same finish as panels, except 70.7V attenuator plates.

3.5.15 Multi-pin Connectors

.1 Multi-pin connectors shall include a protective cap. Affix cap to same panel as connector with flexible chain or wire rope. Do not share fasteners with those used to mount the connector to the panel.

.2 Where two mated multi-pin contacts are used, both contacts shall be of same material.

.3 Multi-pin cables shall be rated for function they are to perform. They shall meet or exceed required current, data throughput, bandwidth, voltage and general construction strength for which they shall be used.

.4 Inline multi-pin connectors shall contain integrated cable strain relief.

.5 Unless otherwise specified multi-connectors shall have field replaceable crimp style pins and sockets.

3.6 Testing and Adjustments

3.6.1 General

.1 Tests performed are to ensure a fully functional and operational system is delivered to Owner which reflects best industry practices. To achieve this objective Owner supplies this document as a minimum standard. It is not the intention of System Designer to direct Contractor to verify manufacturers' performance specifications on an individual component level unless it is a necessary process to identify and resolve a system fault. Systems Designer will carry out system performance verification as part of the commissioning process using a random check method. Test set-ups and methods employed by Contractor shall be reproducible.

.2 Supply test equipment.

.3 Perform specified adjustments and tests.

.4 Assist Systems Designer with additional testing if required.

3.6.2 Test Equipment

.1 As a minimum, the following test equipment is required during onsite testing and performance acceptance.

- 1) Sencore 495 Audio Consultant with software suites enabled and installed.
- 2) Sound-level meter (peak and average reading) c/w calibrated microphone and microphone calibrator.
- 3) Low distortion audio signal generator capable of sine wave, swept sine. Include a complete selection of generator output to standard audio adapters.
- 4) Portable square wave and pink noise output.
- 5) Digital Dual trace Oscilloscope, minimum 100 MHz, with selection of audio, video, data to BNC adapters and proper test probes in good working condition.
- 6) High quality VOM capable of accurate AC measurement to 10kHz
- 7) Audio/ Media player (includes cables and audio interface adaptors).
- 8) Portable Random-noise generator.
- 9) Dual Channel FFT Windows PC based measurement system with necessary interface electronics, adapters and cables, such as SysTune or Smaart®. System shall include the computer and measurement microphones with stand(s). During testing, have at least one technician with

a proficient understanding of the measurement equipment used. Other measurement methods shall not be acceptable.

- 10) "Pulse" type phase checker generator/receiver set.
- 11) Waveform / vectorscope monitor.
- 12) Video Test signal generator
- 13) Cable continuity meter capable of remote status indication
- 14) Multimeter
- 15) Impedance meter (Gold Line model ZM1)
- 16) PIC Monitor (High-Quality)
- 17) AES/EBU Monitor
- 18) Portable cart

.2 Include necessary cables and specialty adapters.

.3 Non-professional test equipment or "home-built kit" gear is not acceptable.

3.6.3 Documentation

.1 As part of shop drawing package, submit checklists of testing activities to be undertaken for review and approval by Systems Designer.

.2 Before the acceptance testing, forward to Systems Designer a complete report on testing specified in this section and referenced to it by section number. Report shall indicate that systems meet requirements of this specification and installation is complete in details and ready for inspection. Contractor's Installation Supervisor shall sign report.

.3 At time of submitting test report, include a list of equipment to be used on-site during system commissioning for use of Systems Designer and Contractor.

.4 Supply a list of equipment in a tabular format including model, manufacturer, serial number and location installed.

.5 Test wiring for continuity and shorts between conductors and shields. These tests shall also confirm isolation between conductors, including shields and their associated back boxes or conduit systems through which they pass.

.6 Ensure industry standard connections and wire colour codes are followed.

.7 Test wiring in raceway and conduits. Test results shall be documented using report format based on project cable run lists.

.8 Each cable shall be accurately documented with test results. Submit photocopies of resulting document as part of test report.

.9 Equipment that combines test functions in one sequence may be used. However, these devices shall have the ability to test and display complete isolation as described.

3.7 Testing Procedures

3.7.1 Testing of Power, Cable Systems and Isolated Ground Integrity

- .1 Contractor is responsible for ensuring Electrical Contractor has installed and tested fully functioning electrical system. Once tests are complete and electrical system is ready for use, verify Technical Power System ground integrity.
- .2 Tests shall be performed before equipment is connected and power applied.
- .3 Test AC outlets for correct phase, neutral and ground wiring.
- .4 With power removed from racks and system, mains power switched off and locked down, perform a ground isolation test to verify isolated ground system integrity.
- .5 Test each wire in raceway, conduit within racks and shall document results using a report format as described previously. Technician shall initial chart while testing. Submit photocopies of resulting document as part of test report.

3.7.2 Testing of Audio Systems

- .1 Loudspeakers to be installed overhead shall be tested thoroughly before installation. It is important that rigging systems are inspected for structural integrity and that fasteners are secured. Once installed, loudspeaker shall again be tested for correct polarity.
- .2 Verify that audio systems are free of audible hums, buzzes, transient oscillations, clicks, thumps or other distortions in configurations and phases of operation. Correct deficiencies.
- .3 An oscilloscope with minimum bandwidth of 100 MHz and loudspeaker monitor shall be used to verify that systems' outputs are free of spurious oscillation and RF pick-up.
- .4 Perform and document polarity testing to ensure that portions of audio system, including microphone and tie lines, loose cables, wiring, loudspeakers, loudspeaker wiring and cables are in-polarity.
- .5 Using broadband music, drive each audio system to 1/3 of rated output for one hour and ensure that equipment ventilation is adequate to prevent front panels from becoming too hot to touch.
- .6 Using music, drive each system to its maximum long-term sound pressure level and eliminate buzzing, audible distortion, rattles and other undesirable noises. Repeat this procedure, but substituting a slow sine wave sweep from 20Hz to 8000 kHz at approximately 15 dB below system rated output.
- .7 Adjust audio systems at direction of Systems Designer.
- .8 Adjust gain of line level systems components to nominal unity. Assume console output to be +4dB. Using pink noise and dual channel FFT analyzer with calibrated microphone(s), or other approved measurement system, equalize sound reinforcement system to flat, within nominal flat frequency band of loudspeaker system. Optimize signal processing and amplifier gains for best system signal-to-noise ratio and consistent amplitude throughout audience seating areas.
- .9 To ensure proper gain structure throughout system perform an end-to-end system test with amplifiers turned off. Use an oscilloscope to measure max output of first gain stage(s) and compare those results with final gain stage at input of amplifiers. Ensure no distortion is introduced into signal path at maximum levels.

.10 Using a dedicated test instrument intended for loudspeaker impedance measurement, perform impedance measurements on distributed loudspeaker lines. Disconnect amplifier and measure line impedance at 200 Hz and 1 kHz. Document verify test results are within standard tolerances and expected loads. Remedy discrepancies before commissioning.

3.7.3 Testing Distributed Loudspeaker Circuits

.1 Using a multimeter, test loudspeaker lines for shorts between conductors and between conductors and conduits. Document results. Remedy discrepancies before commissioning.

.2 Using a dedicated Impedance meter, test distributed loudspeaker lines for proper loads. Ensure installed circuit load does not exceed source equipment power ratings. Remedy discrepancies before commissioning.

3.7.4 Testing of Distribution Outputs

.1 Ensure outputs are operating properly, free of noise and perform to specification.

3.7.5 Software Testing

.1 Software programs and their associated hardware components shall be fully installed, programmed and configured. Where a network system is used connections to hardware and software shall be tested and fully operational.

.2 Provide network and physical access to the Owner's System programmer such that software may be fully tested on Contractor's premises before testing on-site. A report shall be submitted regarding this shop testing. Systems Designer may choose to witness testing or have shop testing repeated, at his/her discretion.

3.7.6 Computer System Hardware Testing

.1 Fully test computer based systems and software systems off site and submit report to Systems Designer. Systems Designer may choose to witness testing or have shop testing repeated, at his/her discretion

.2 Network cabling, connectors and components shall be tested for full bandwidth and full functionality using industry standard test methods and equipment.

3.7.7 Testing Control and Switching Systems

.1 Verify each path of switching and muting equipment. Verify logic functions.

.2 Confirm communication and control functions between panels and switchboards for controllable devices and sub systems.

.3 Verify camera lens and pan/tilt remote control functions.

3.7.8 Testing Video System (where required)

.1 Check video lines (including trunks) for continuity and shield integrity and confirm end-to-end specifications of typical paths.

.2 Perform equipment alignment and timing calibration.

.3 Optimize and align viewing characteristics of monitors, projectors and screens.

- .4 Check and adjust distribution amplifiers for unity gain and cable length equalization.
- .5 Configure switchers and controls with basic operational setups. Confirm switcher continuity by testing path and switching performance from inputs to one output, then from one output to inputs.
- .6 Confirm switcher operation by testing cross points.
- .7 Perform other tests and adjustments recommended by equipment manufacturers to optimize overall performance.
- .8 Perform end-to-end tests on several typical paths.
- .9 Check paths for differential gain and differential phase
- .10 Document tests performed with results, identifying signal paths, test signals and test conditions to ensure repeatability of future tests.
- .11 Test cross points and signal routes to verify signal arrival and that combinations are compliant with video encryption and copyright standards

3.7.9 Testing RF Systems

- .1 Verify that wireless systems (where specified) are free of drop out and interference within intended areas of operation. Change frequencies or relocate transmitters/antennas if necessary to correct such problems. Ensure that proper frequencies are operational in areas of assembly.
- .2 Check, RF lines for continuity, shield integrity, and confirm end-to-end specifications of typical paths.
- .3 Test RF transmission levels
- .4 Test complete RF systems with other known local RF transmission systems operating. Check for cross talk and interference between systems.
- .5 Optimize and confirm alignment.
- .6 Optimize reception/transmission to ensure consistent performance throughout intended area of operation.
- .7 Confirm patch points.
- .8 Perform other tests and adjustments recommended by equipment manufacturers to optimize overall performance.

3.7.10 Testing Video and Audio Conferencing Systems

- .1 Check video end to end call quality.

3.7.11 Testing of Digital Audio Signal Systems

- .1 Test Digital Audio signals for proper operation between devices. Ensure no additional noise is introduced into analogue audio and digital signal paths when devices are interconnected for normal operation.
- .2 Ensure signals throughout digital audio path are functioning at designed levels. Unless otherwise specified DSP components shall function at +4dBu nominal with 0dBu FS at +22dBm. Consumer signal paths shall function at -10dBu nominal. Where the two are interfaces impedance and level matching devices shall be implemented.

3.7.12 Testing of Control Application

- .1 Verify operation of control system.
- .2 Ensure correct operation of system presets.
- .3 Test interface controls for optimized operation.
- .4 Submit a copy of control or DSP program and operator GUI to Systems Designer before commissioning.

3.7.13 Testing Network Cable Systems

- .1 Cables and termination hardware shall be completely tested for defective installation and verify installed cable performance.
- .2 Category 6 data cable shall be performance verified using an automated test set.
- .3 Test results shall be automatically evaluated by test set using TIA/EIA standards and present result as a pass or fail.
- .4 Test results shall be printed directly from test set or as download file using an application included by test instrument manufacturer.
- .5 Test document shall include tests performed, target test result, and actual test result achieved.
- .6 Verify end-to-end channel performance with Fluke model DSP-4000 or similar.

3.7.14 HDBaseT Cabling Plant - Copper

- .1 Cable used in implementation shall be signed off in writing as approved by manufacturer of video equipment, or listed as approved cable model on manufacturers approved literature.
- .2 Cable plant for HDBaseT signals shall meet or exceed ANSI/TIA-568-C.2 Standard.
- .3 Cable, patch cables, connectors, patch bays, jacks and other in line device shall be shielded.
- .4 Cable shall be installed and tested for and pass tests for the following in a sampling of links (10% or more):
 - 1) Insertion Loss (IL)
 - 2) Near End Crosstalk (NEXT)
 - 3) Power sum crosstalk (PSNEXT)
 - 4) Attenuation crosstalk ratio (ACRN)
 - 5) Power Sum Attenuation to Crosstalk Ratio (PSACR-N)
 - 6) Far End Crosstalk (FEXT)
 - 7) Attenuation to Crosstalk Ratio (ACRF)
 - 8) Power Sum Attenuation to Crosstalk Ratio (PSACRF)
 - 9) Return Loss (RL)
 - 10) Wire Map

- 11) Propagation Delay
 - 12) Delay Skew
 - 13) Length
- .5 Alien Crosstalk tests shall include a sampling of links from areas of system (10% or more).
- .6 NEXT and Return Loss are to be tested from both ends of cable.
- .7 Test and report on patch cords.
- .8 Test for alien cross talk in 4K video applications:
- 1) Power Sum Alien Near End Crosstalk (PSANEXT)
 - 2) Power Sum Alien Attenuation to Cross Talk Ratio (PSAACRF)
- .9 The ground / bond system shall be used to ground data cable shields, equipment, racks, cabinets, raceways and other associated hardware, which has potential to carry current.
- .10 The ground / bond system shall be implemented in accordance with recommendations contained in TIA/EIA 607 Telecommunications Bonding and Grounding standard.
- .11 Install cables to manufacturer specifications.
- .12 Avoid coiling of cables.
- .13 Avoid running cables by motors or EMI-creating devices.
- .14 Cable bundles shall not be larger than 6+1 per (TIA-568 Alien Crosstalk Bundle) unless heavier cable versions such as CAT 6A S/FTP are used.
- .15 Where possible separate HDBaseT cables into smaller bundles to lessen alien crosstalk.
- .16 Copper tape shall be applied to each end for STP cables to ensure correct termination and shielding.
- .17 No cable used shall have insertion loss of more than 32.8dB at 250 MHz for 100m.
- .18 Where possible run direct to equipment to reduce patch points. If patch points for plates or rack bays shall be used there shall be no more than two in a run and infrastructure cable shall be <90 m; patches shall be <5 m.
- .19 Horizontal cable management methods used for 10G Base T shall be used.
- .20 Reports from video matrix showing results of link shall be included in testing reports and used as an additional step for system verification.
- .21 Verify end-to-end channel performance with:
- 1) Fluke model DSX-5000 or similar
 - 2) Quantum Data 780C

3.8 Closeout Activities

3.8.1 Acceptance and Commissioning

- .1 Perform systems testing, adjustments and fine-tuning required to optimize the overall system performance and functionality. Submit test report to Systems Designer detailing the tests and optimizations performed. Include with this report, or under separate cover, a project deficiency list. This is required before scheduling final commissioning and acceptance.
- .2 Reports shall be signed by the AV Contractor's Project Manager, before issuance to Systems Designer.
- .3 Failure to provide reports may result in the postponement of commissioning, in the sole discretion of Systems Designer.
- .4 After Systems Designer has received and accepted AV Contractor's reports on system testing, commissioning and deficiencies, a final commissioning and acceptance session will be conducted by Systems Designer or Owner.
- .5 During final commissioning and acceptance session, AV Contractor may also be required to repeat portion or portions of the testing.
- .6 Acceptance by Systems Designer, in writing, shall denote substantial performance.
- .7 Should the Work not be substantially complete at time of first inspection, AV Contractor responsible for consulting and transportation costs incurred during subsequent inspection or inspections.
- .8 If system does not fulfil specifications, make adjustments to bring installation into conformance with Specification.
- .9 Before final acceptance, after notifying AV Contractor, Owner may require use of system for testing or other purposes. AV Contractor shall not waive responsibility because of this temporary use of system, and it shall not be construed as evidence of acceptance.
- .10 The Work shall be deemed complete when:
 - 1) Systems are fully functional.
 - 2) Systems have been tested, commissioned, and approved by Systems Designer or Owner.
 - 3) System manuals and as built drawings have passed review and acceptance by Systems Designer.
 - 4) Work stipulated in Part 3 of this document has been completed.
 - 5) Systems are ready for operation by Owner.
 - 6) Deficiencies have been rectified and signed off by Systems Designer or Owner.

3.8.2 Training

- .1 Submit an agenda to Systems Designer for review before scheduling training session(s).

- .2 Instruct Owner's representatives on operation, general assistance and care of system drawn from a bank of no less than 30 hours for duration of project.
- .3 Provide a video capture of all AV Contractor sessions, edit, and deliver to Owner for their exclusive use.
- .4 Formally organize training time with Owner representatives, divided into two-hour segments as a minimum.
- .5 Provide complete manuals for review with Owner's representatives.

END OF DOCUMENT

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AV SYSTEM DRAWING LIST

DRAWING NUMBER	TITLE
AV-000	AV SYSTEM DRAWING LIST
AV-001	DRAWING LEGENDS & DETAILS
AV-201	LEVEL 1 KEY PLAN
AV-210A	LECTURE HALL 1 DEVICE LOCATIONS - PLAN
AV-210B	LECTURE HALL 1 DEVICE LOCATIONS - RCP
AV-210C	LECTURE HALL 1 CONTROL & SERVER ROOM DEVICE LOCATIONS - PLAN & RCP
AV-210D	LECTURE HALL 1 STUDENT TABLE MICROPHONE LAYOUT
AV-210E	LECTURE HALL 1 CONCEPT SIGHTLINE STUDY
AV-210F	LECTURE HALL 1 CONCEPT SIGHTLINE STUDY
AV-211A	LECTURE HALL 2 DEVICE LOCATIONS - PLAN
AV-211B	LECTURE HALL 2 DEVICE LOCATIONS - RCP
AV-211C	LECTURE HALL 2 CONTROL ROOM DEVICE LOCATIONS - PLAN RCP
AV-211D	LECTURE HALL 2 STUDENT TABLE LAYOUT
AV-211E	LECTURE HALL 2 CONCEPT SIGHTLINE STUDY
AV-211F	LECTURE HALL 2 CONCEPT SIGHTLINE STUDY
AV-400	INSTALLATION DETAILS
AV-600	BLOCK FUNCTIONAL DIAGRAMS
AV-601	BLOCK FUNCTIONAL DIAGRAMS
AV-602	BLOCK FUNCTIONAL DIAGRAMS

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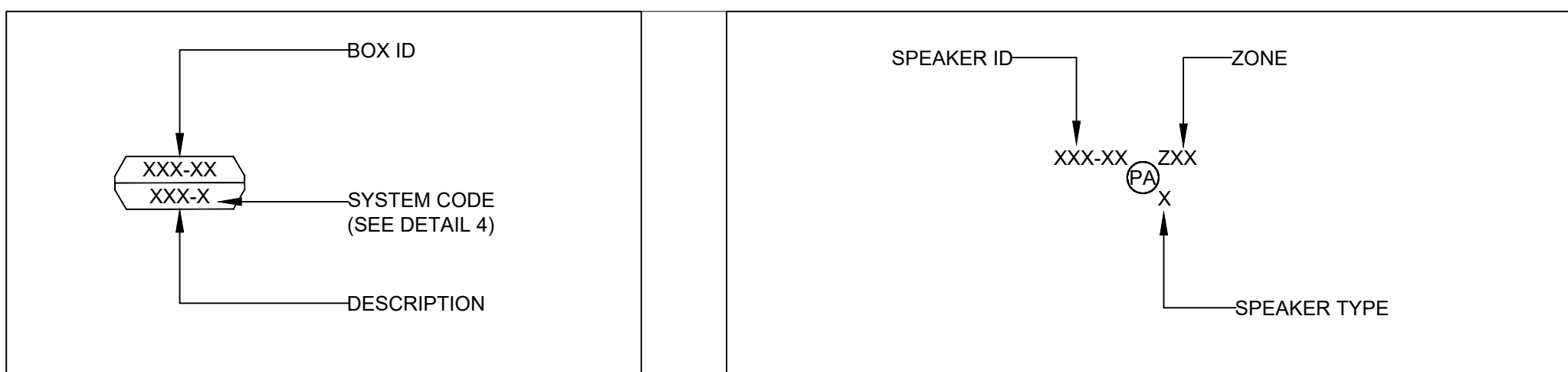
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Chief Consultant, Memorial University of Newfoundland
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AV SYSTEMS DRAWING LIST

PROJECT NO. 2205
DRAWN BY Author
DATE 2023-09-08
SHEET NO. **AV-000**

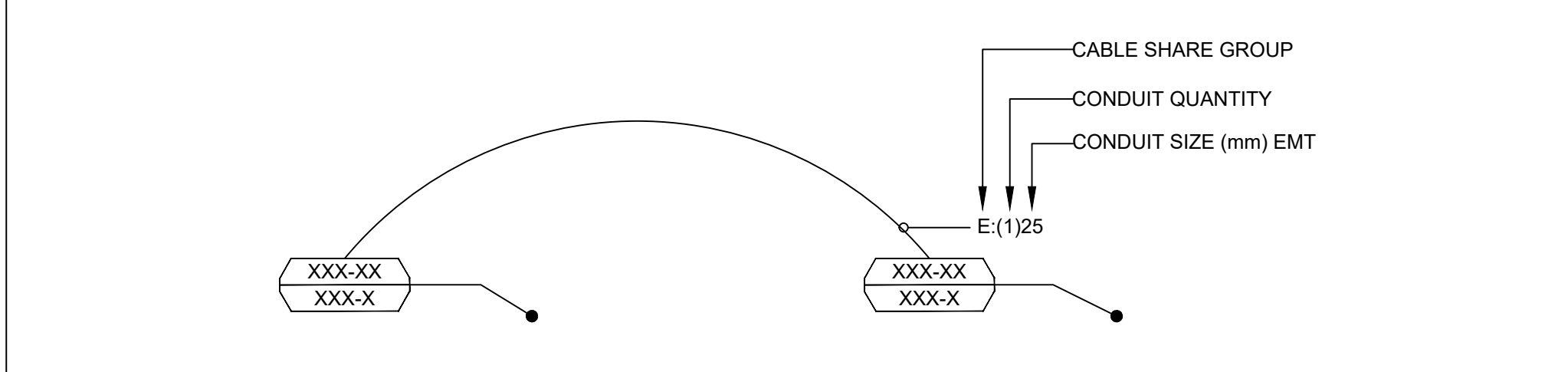
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PLOT SCALE CHECK





1 AV BOX LEGEND
SCALE: NONE

2 LOUDSPEAKER LEGEND
SCALE: NONE



3 CONDUIT LEGEND
SCALE: NONE

SYMBOL	DESCRIPTION
	AV MULTI SYSTEM CONNECTION BOX. # INDICATES TYPE. REFER TO SCHEDULE FOR BOX SIZE
	MICROPHONE CONNECTION. # INDICATES TYPE. REFER TO DETAILS
	FLAT PANEL DISPLAY(S). # INDICATES TYPE. REFER TO DETAILS FOR ELECTRICAL AND PHYSICAL INSTALLATION INFORMATION
	PTZ CAMERA / VC CAM REQUIRES STRUCTURE TO STRUCTURE RIGID SUPPORT. # INDICATES TYPE. REFER TO DETAILS
	WALL MOUNTED CONTROL PANEL. CUSTOM BACKBOX BY AV CONTRACTOR
	WALL MOUNTED LOUDSPEAKERS. # INDICATES TYPE. REFER TO DETAILS FOR ELECTRICAL BOX LOCATION DETAILS
	FLOORBOX. # INDICATES TYPE. REFER TO AV-400 DETAILS
	SINGLE WALL BOX TO FEED WALL MOUNTED ROOM FRONT DEVICES. SIZE VARIES-REFER TO SCHEDULE FOR EXACT BOX SIZE
	AV EQUIPMENT RACK. # INDICATES TYPE. REFER TO DETAILS FOR COORDINATION INFORMATION
	RECESSED CEILING PROJECTION SCREEN
	FIXED POLE MOUNTED CEILING DATA/VIDEO PROJECTOR. ABOVE CEILING 305x305 WITH DUPLEX OUTLET. FLEX TO 1.5" NPT PIPE FOR PROJECTOR MOUNT
	ELECTRICAL JUNCTION BOXES. REFER TO SCHEDULE FOR BOX SIZE
	AUX INPUT PANEL. REFER TO SCHEDULE FOR BOX SIZE
	WIRELESS MICROPHONE ANTENNA CONNECTION. REFER TO SCHEDULE FOR BOX SIZE
	EMS CAMERA JUNCTION BOX. REFER TO SCHEDULE FOR BOX SIZE
	HEARING ASSISTANCE. # INDICATES TYPE. REFER TO SCHEDULE FOR BOX SIZE
	CONDUIT STUB
	CEILING LOUDSPEAKER. # INDICATES TYPE. REFER TO DETAILS FOR MORE INFORMATION

NOTES:
3.1 MINIMUM BACK BOX DEPTH IS 3" (75MM).
3.2 ALL BACKBOXES IF WALL MOUNTED SHALL BE MOUNTED FLUSH TO WALL.

4 AV SYSTEMS AND DEVICE TYPE LEGEND
SCALE: NONE

SYSTEM CODE	DESCRIPTION
	120V 15A TECH POWER DUPLEX RECEPTAL (BY OTHERS)
	208V 15A TECH POWER DUPLEX RECEPTAL (BY OTHERS)
	120V 15A TECH POWER QUAD RECEPTAL (BY OTHERS)
	120V DIRECT CONNECT POWER (BY OTHERS)
	240V 20A TECH POWER TWIST LOK (BY OTHERS)
	LAN/DATA (BY OTHERS). "F" DESIGNATES QUANTITY OF UNIQUE DROPS (SEE NOTE 5.1)
	3D REQUIREMENTS (BY OTHERS). "F" DESIGNATES QUANTITY OF UNIQUE DROPS (SEE NOTE 5.1)
	ANALOG PHONE LINE (BY OTHERS). "F" DESIGNATES QUANTITY OF UNIQUE DROPS (SEE NOTE 5.1)
	5Mbps QoS DEDICATED DATA DROP FOR VIDEO CONFERENCING (BY OTHERS). # DESIGNATES QUANTITY OF UNIQUE DROPS
	SECURITY TAB. # INDICATES QUANTITY

NOTES:
5.1 SYMBOLS AND LOCATIONS ARE PROVIDED SOLELY FOR THE COORDINATION OF OTHER TRADES AND ARE NOT PROVIDED BY THE AV SYSTEMS CONTRACTOR.

5 ELECTRICAL & COMMUNICATIONS SYMBOL LEGEND
SCALE: NONE

ITEM OF WORK	AV CONTRACTOR	ELECTRICAL CONTRACTOR	GENERAL CONTRACTOR	OWNER
AV SYSTEMS ELECTRONICS, HARDWARE, RACKS PERMANENT AND PORTABLE	PROVIDE	PROVIDE POWER AND INFRASTRUCTURE AS REQUIRED	-	-
AV CONTROL SYSTEM, PAGE DESIGN AND TESTING	PROVIDE. WRITE ALL PROGRAMMING CODE DESIGN AND IMPLEMENT	-	-	-
CEILING FLUSH MOUNT LOUDSPEAKER BACKBOXES- DRYWALL CEILINGS	PROVIDE	-	-	-
CEILING FLUSH MOUNT LOUDSPEAKER BACKBOXES- T-BAR CEILINGS	PROVIDE	-	-	-
MILLWORK - TEACHING STATION (PODIUM)	TEACHING STATION ASSEMBLY BY OWNER. EQUIPMENT, FIT UP AND CONNECTIVITY BY AV CONTRACTOR.	-	-	SUPPLY
AV WALL CONNECTOR PLATES. CUSTOM OR STANDARD	PROVIDE. COORDINATE FINISH WITH ARCHITECT	-	-	-
AV FLOOR BOX CONNECTOR PANELS. CUSTOM OR STANDARD	PROVIDE CUSTOM FINISHED FLOOR PLATES AS REQUIRED	-	CUT CHANNEL AND FILL FLOOR AS REQUIRED	-
AV SYSTEMS BACK BOXES AND CONDUIT	-	PROVIDE. PULL FISHSTRING THROUGH EMPTY CONDUIT.	-	-
AV SYSTEMS CABLE (LOW VOLTAGE) EXCEPT FOR CEILING SPEAKERS. MOTORIZED PROJECTION SCREEN AND MOTORIZED PROJECTOR LIFT.	PROVIDE	-	-	-
POWER FOR PROJECTION SYSTEMS AND DUPLEX OUTLETS	-	PROVIDE	-	-
POWER FOR AV SYSTEMS RACKS AT AV RACK LOCATIONS	SUPPLY AND INSTALL POWER BAR DISTRIBUTION WITHIN RACKS	PROVIDE WITH TWIST LOCK AND/ OR DUPLEX OUTLETS AS PER DWGS	-	-
WALL MOUNT LOUDSPEAKERS	PROVIDE	-	PROVIDE BLOCKING	-
LIGHTING SYSTEMS	CONNECT PROVIDED CABLE TO AV CONTROL SYSTEM	PROVIDE ALL CABLE/CONDUIT/ BACKBOX; PROVIDE LIGHTING SYSTEM AND RS232 INTERFACE	PROVIDE BLINDS SYSTEM AND SHADE MOTOR GROUP CONTROLLERS (MGC)	-
PROJECTORS AND MOUNTING SYSTEMS	PROVIDE	-	-	-
FIXED WALL PROJECTION SCREENS	SUPPLY AND INSTALL	-	PROVIDE FLAT SURFACE FOR INSTALL. PROVIDE BLOCKING	-
WALL/CEILING MOUNT VIDEO DISPLAYS AND PTZ CAMERAS	SUPPLY AND INSTALL DISPLAYS AND PTZ CAMERAS	PROVIDE POWER	PROVIDE FLOOR TO CEILING BLOCKING AS REQUIRED	-

THE SCOPE OF WORK OF THE VARIOUS TRADES THAT RELATE TO THE AUDIO VISUAL (AV) SYSTEMS IS DESCRIBED IN THE TABLE ABOVE. THE TERM "PROVIDE", AS IT IS USED IN THIS DOCUMENT, DENOTES "SUPPLY, INSTALL, TERMINATE, TEST AND COMMISSION"

6 DIVISION OF RESPONSIBILITY
SCALE: NONE

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7 GENERAL NOTES
SCALE: NONE

CABLE ID	APPLICATION	PRODUCT	CABLE DESCRIPTION	O.D. (mm)	PLENUM RATED VERSION
AV-CAT	AV/IP; HDBASET	Extron XTP DTP 24P	CAT6+ 475 MHz BANDWIDTH, 24 AWG, STP	6.8	Y
AV-CAT	AV/IP; HDBASET	BELDEN 10GX813	CAT 6A 625MHz BANDWIDTH, 23 AWG, UTP	6.7	Y
AV-SMF	AV/IP; HDBASET	BELDEN B9W045	SMF OS2 1310nm, 9/125µm, PLENUM, 6 FIBERS	4.4	Y
AV-MMF	AV/IP; HDBASET	BELDEN F4D009P9	MMF OM4 850/1300nm, 50/125µm, PLENUM, 6 FIBERS	4.8	Y
PA-CAT	PUBLIC ADDRESS/PAGING CONSOLE	Extron XTP DTP 24P	CAT6+ 475 MHz BANDWIDTH, 24 AWG, STP	6.8	Y
CTRL-CAT	ETHERNET, CONTROL	Extron XTP DTP 24P	CAT6+ 475 MHz BANDWIDTH, 24 AWG, STP	6.8	Y
A-CAT	ETHERNET, AUDIO	Extron XTP DTP 24P	CAT6+ 475 MHz BANDWIDTH, 24 AWG, STP	6.8	Y
M-ANT	MICROPHONE ANTENNA COAX	BELDEN 89913	10 AWG SOLID, 50 OHM, BARE COPPER, RG-6/U COAX	9.1	Y
MA	ANALOG MICROPHONE AUDIO	BELDEN 9451P	2C 22 AWG TWISTED, ANALOG AUDIO/ FOIL SHIELD	3.2	Y
LA	ANALOG LINE AUDIO	BELDEN 9451P	2C 22 AWG TWISTED, ANALOG AUDIO/ FOIL SHIELD	3.2	Y
BUT + LED	PUSH BUTTON WITH LED RING	BELDEN MRTA3P23S	3-PAIR 23 AWG Str. MULTI-PAIR CONTROL, BRAID SHIELD	5.2	N
LSA-12	LOUDSPEAKER LEVEL AUDIO	BELDEN 6100UE	2C 14 AWG TWISTED, BARE COPPER, AUDIO	5.3	Y
LSA-16	LOUDSPEAKER LEVEL AUDIO	BELDEN 6200UE	2C 16 AWG TWISTED, BARE COPPER, AUDIO	4.5	Y
LSA-18	LOUDSPEAKER LEVEL AUDIO	BELDEN 6300UE	2C 18 AWG TWISTED, BARE COPPER, AUDIO	3.9	Y
SRL	SERIAL CONTROL COMMUNICATIONS, RS232, RS485	BELDEN 6502FE	4C 22AWG, BARE COPPER, COMMERCIAL APPLICATION	3.7	Y

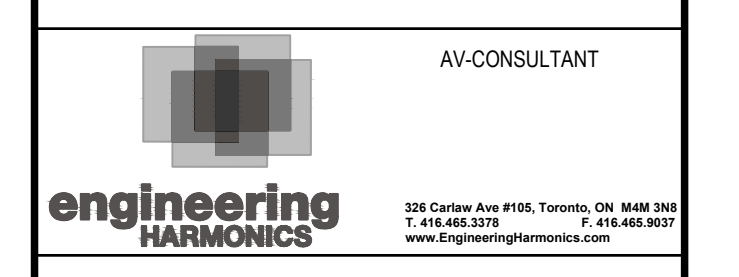
8 CABLE TYPES
SCALE: NTS

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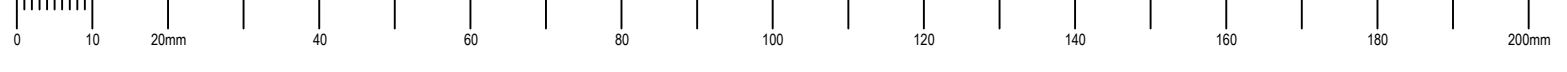
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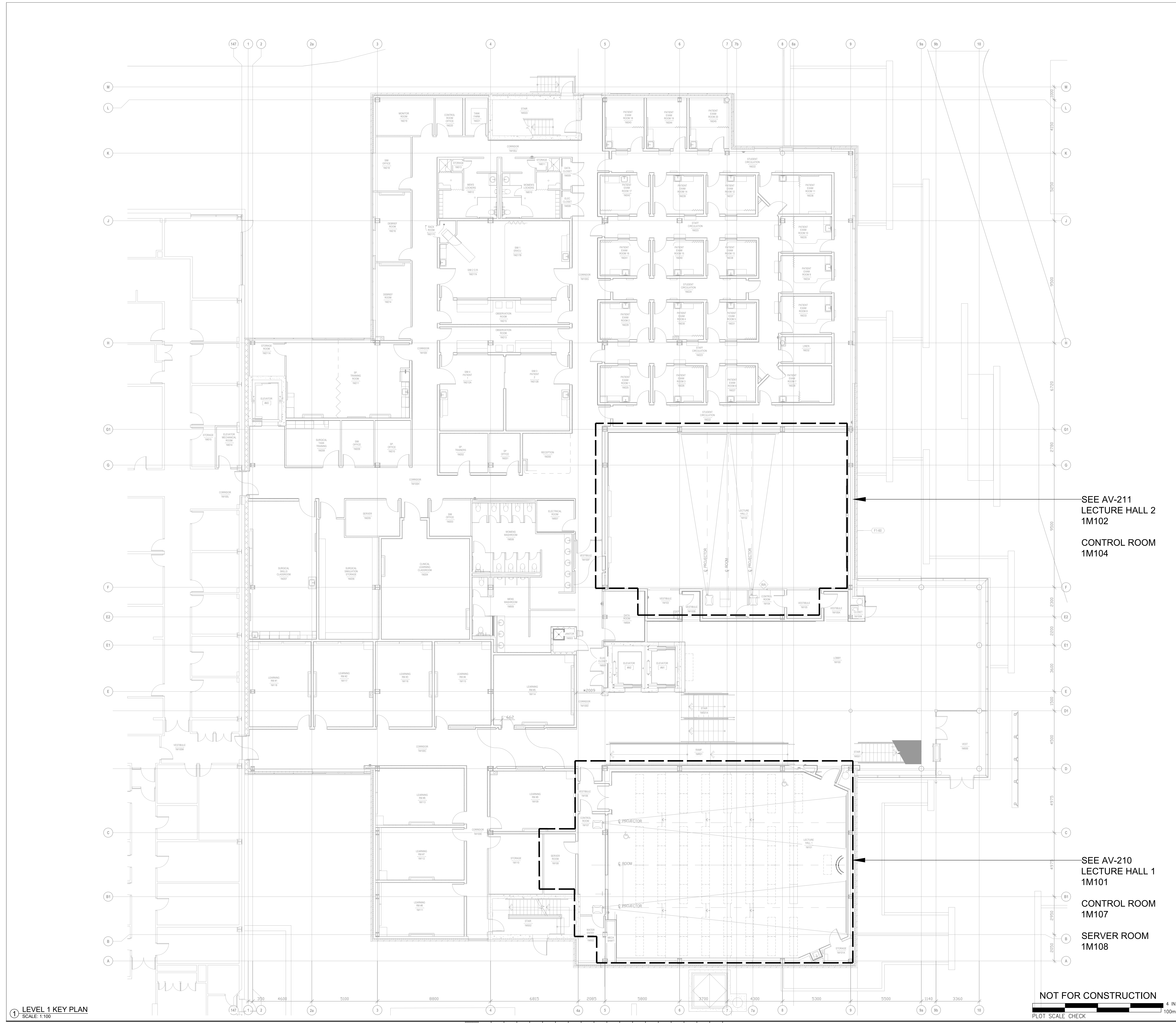
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Department of Facilities Management

PROJECT TITLE
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Green Crescent, Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
CPO

SHEET TITLE	
AV SYSTEMS LEGENDS & DETAILS	
PROJECT NO.	2205
DRAWN BY	Author
DATE	2023-09-08
SHEET NO.	AV-001

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1 LEVEL 1 KEY PLAN
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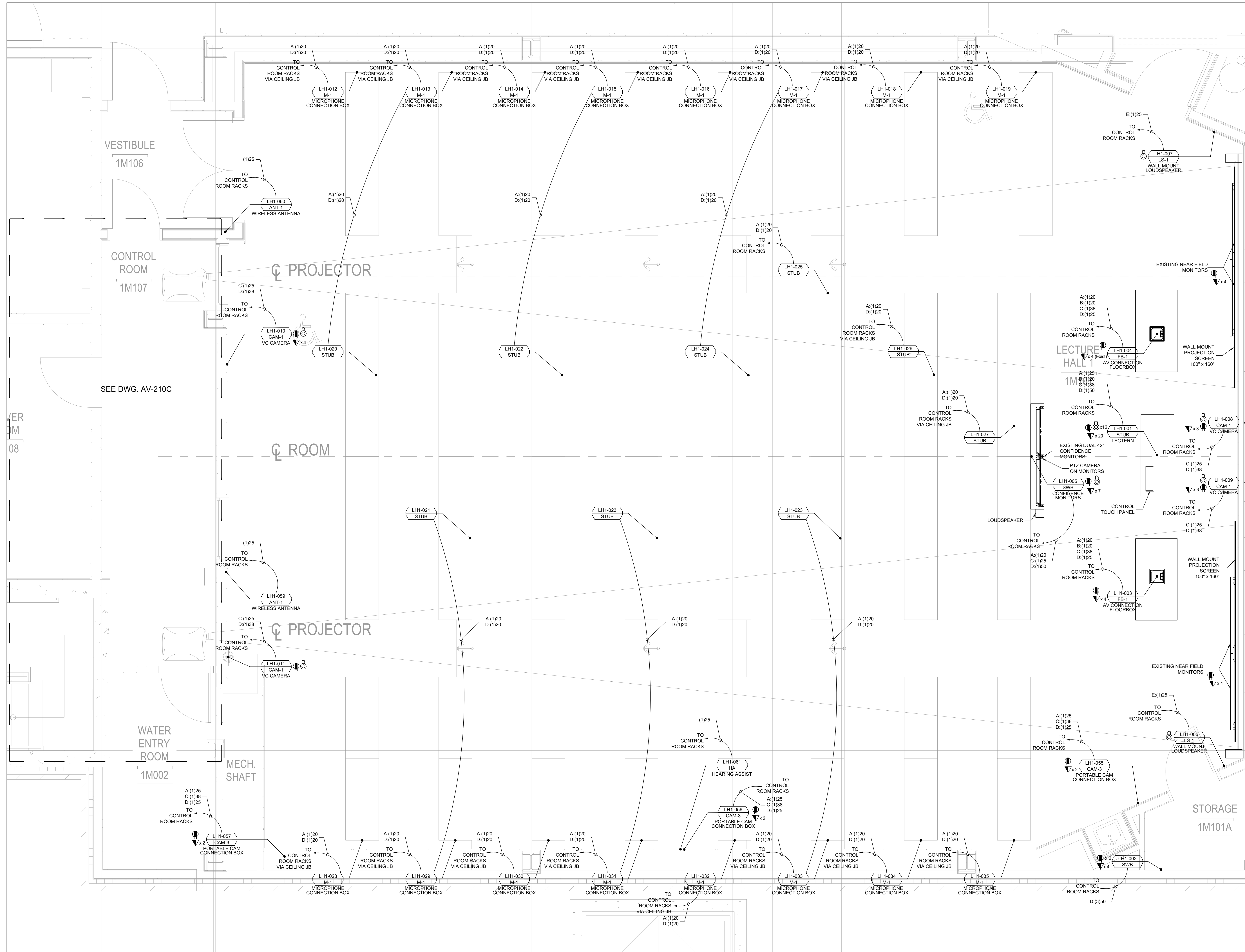
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Centre for Human Genetics
Chief Consultant, Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
A1B3X9

SHEET TITLE
LEVEL 1 KEY PLAN

PROJECT NO.	2205
DRAWN BY	RL
DATE	2023-09-08
SHEET NO.	AV-201



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1 AV DEVICE LOCATIONS - PLAN
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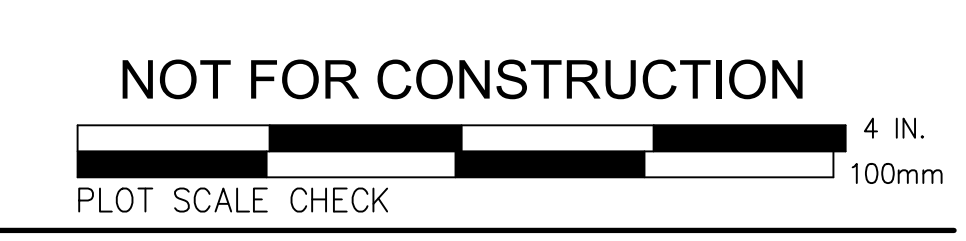
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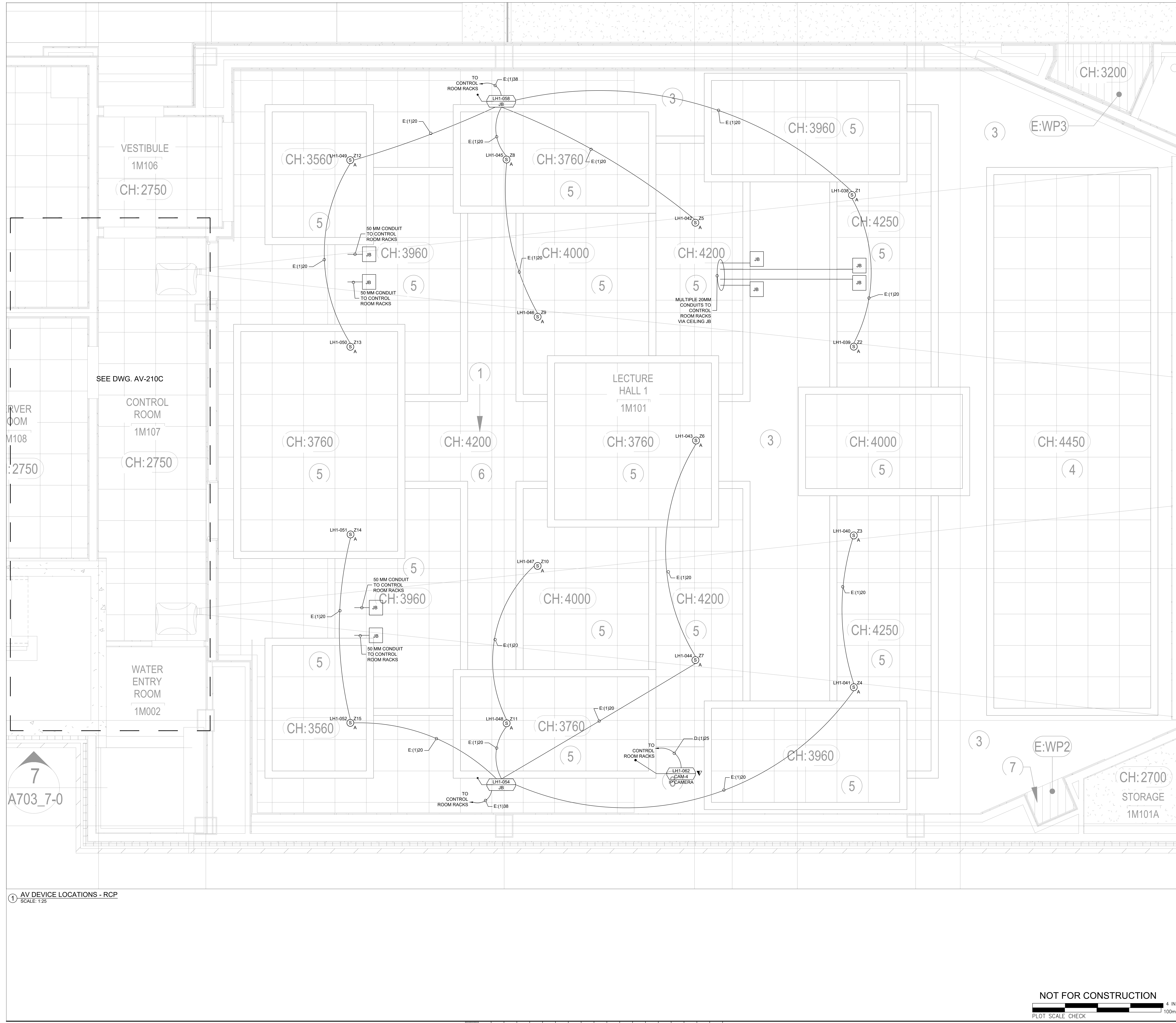
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PROJECT TITLE
 Faculty of Medicine Expansion and the Centre for Human Genetics
 Queen's University, Kingston, Ontario

SHEET TITLE
**LECTURE HALL 1 (1M101)
 DEVICE LOCATIONS - PLAN**

PROJECT NO.	2205
DRAWN BY	RL
DATE	2023-09-08
SHEET NO.	AV-210A





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① AV DEVICE LOCATIONS - RCP
SCALE: 1:25

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4 IN.
100mm
PLOT SCALE CHECK

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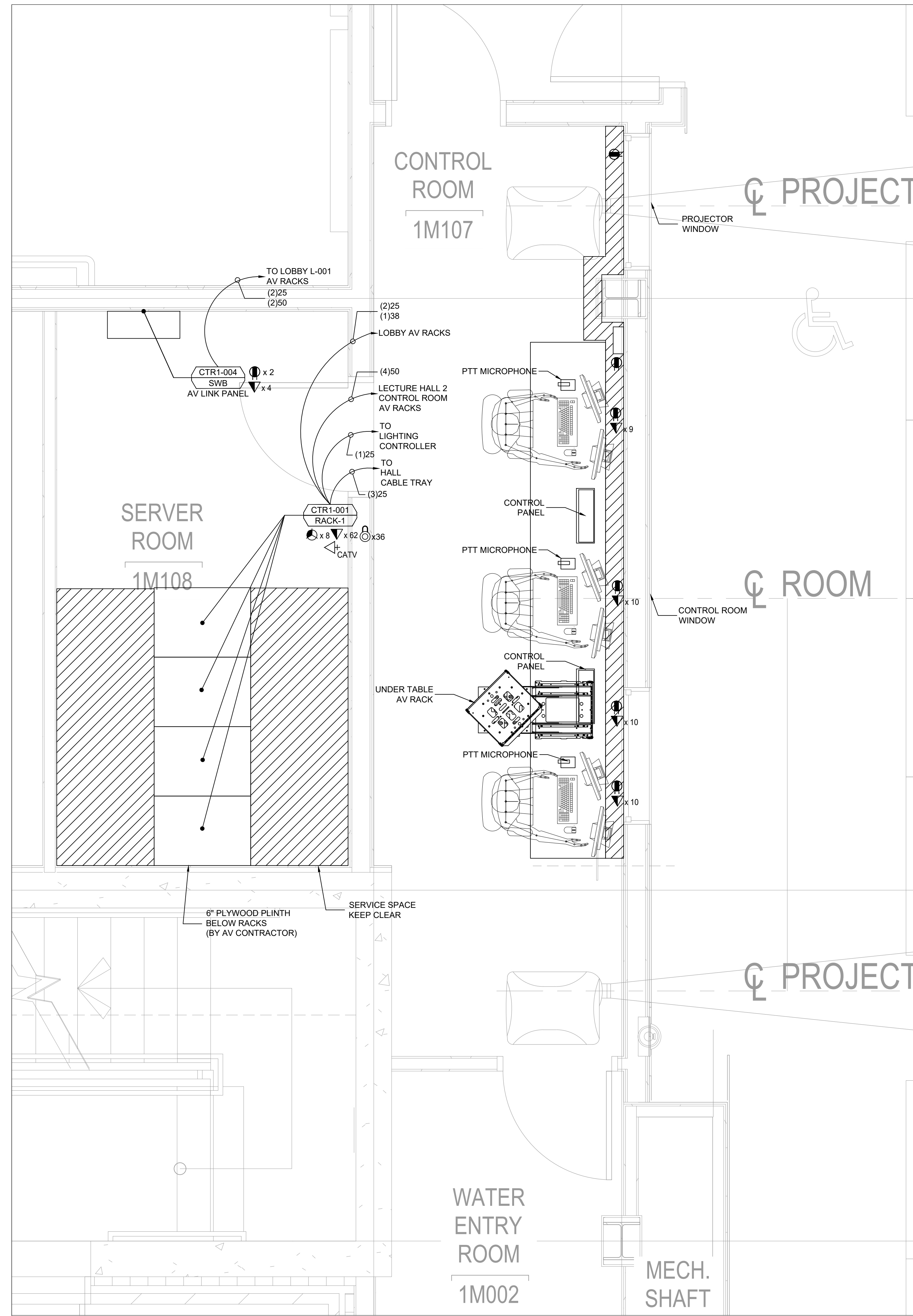
INTERIOR DESIGN CONSULTANT

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**MEMORIAL
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Department of Facilities Management

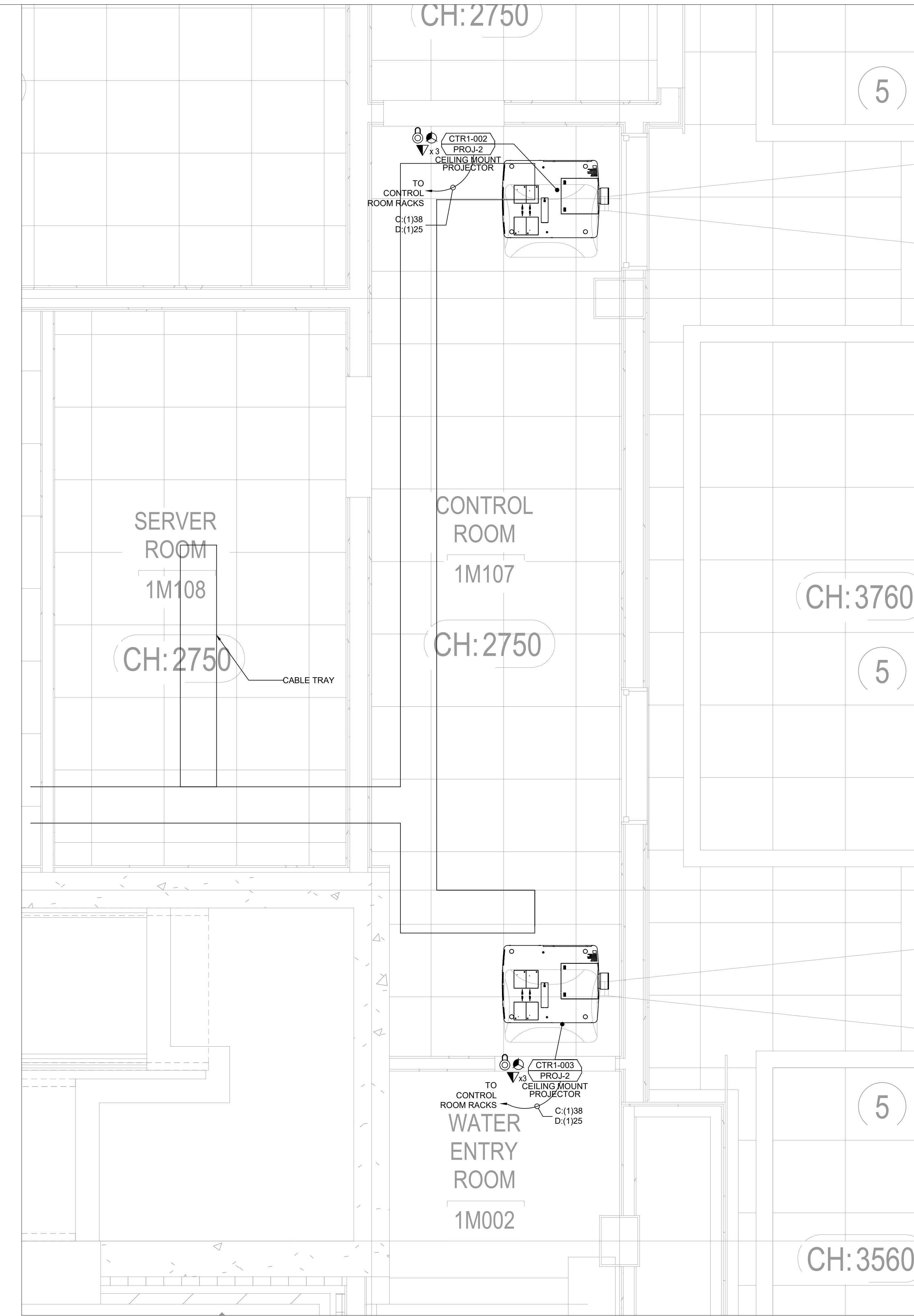
PROJECT TITLE
**Faculty of Medicine Expansion and the
Centre for Human Genetics**
Christ Chalmers Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
CPLS

SHEET TITLE
**LECTURE HALL 1 (1M101)
DEVICE LOCATIONS - RCP**

PROJECT NO.	2205
DRAWN BY	RL
DATE	2023-09-08
SHEET NO.	AV-210B



1 AV DEVICE LOCATIONS - PLAN
SCALE: 1:20



2 AV DEVICE LOCATIONS - RCP
SCALE: 1:20

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Department of Facilities Management

PROJECT TITLE
Faculty of Medicine Expansion and the
Centre for Human Genetics
Christ Chalmers Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
CPS

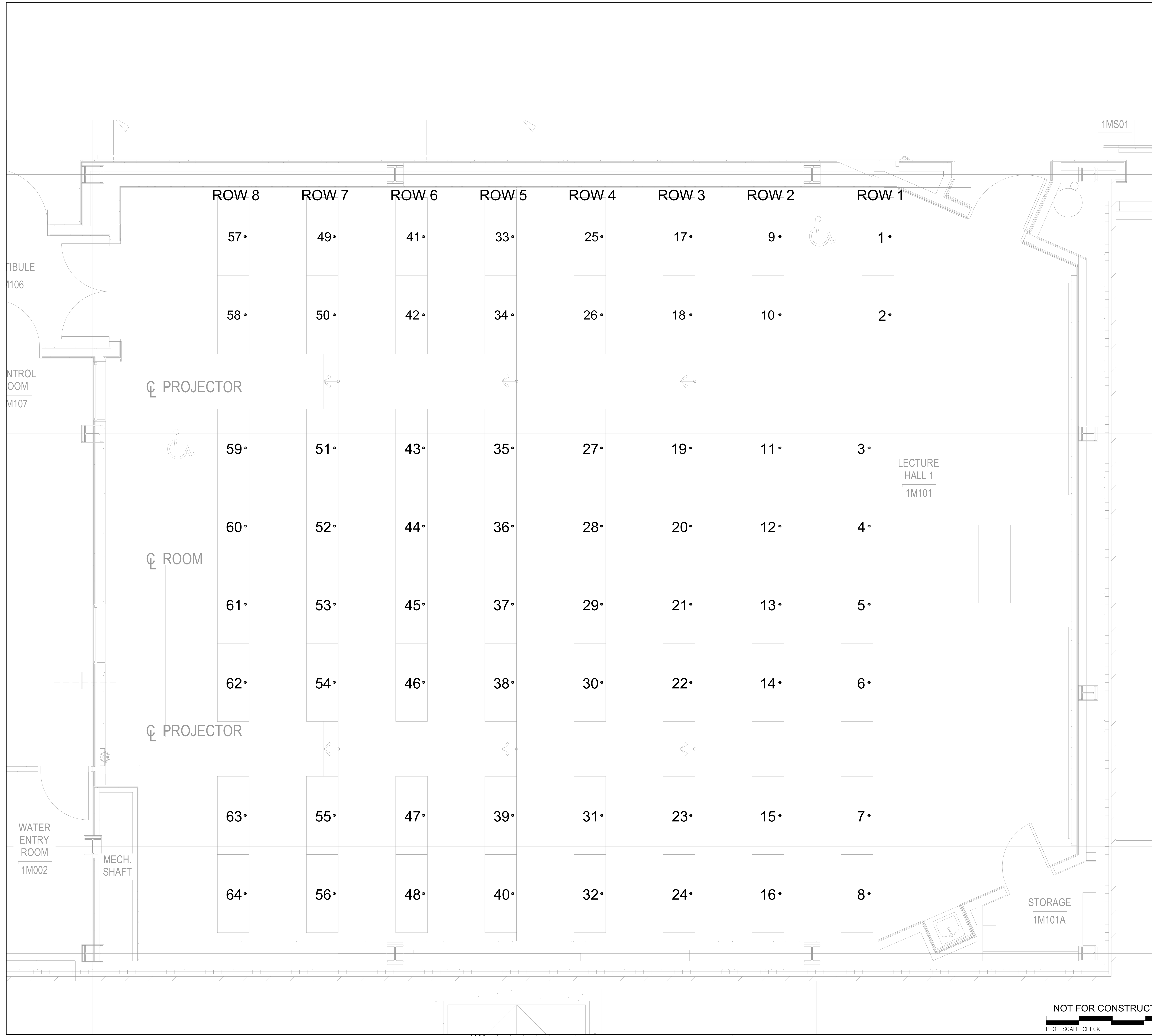
SHEET TITLE
LECTURE HALL 1
CONTROL & SERVER ROOM
DEVICE LOCATIONS - PLAN & RCP

PROJECT NO.	2108
DRAWN BY	RL
DATE	2023-09-08
SHEET NO.	AV-210C

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4 IN. = 100mm

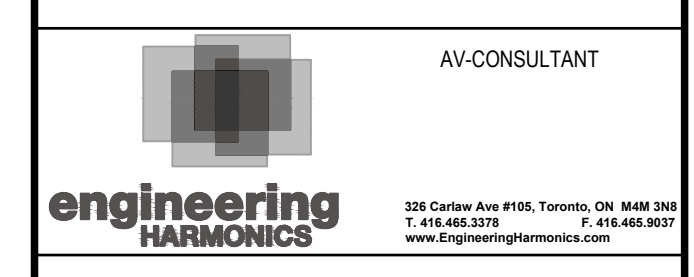
PLOT SCALE CHECK



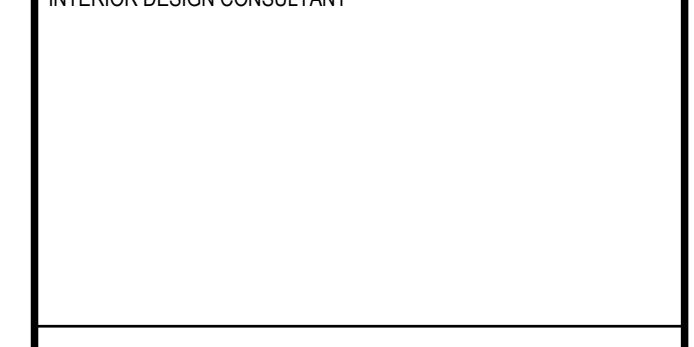
- GENERAL NOTES**
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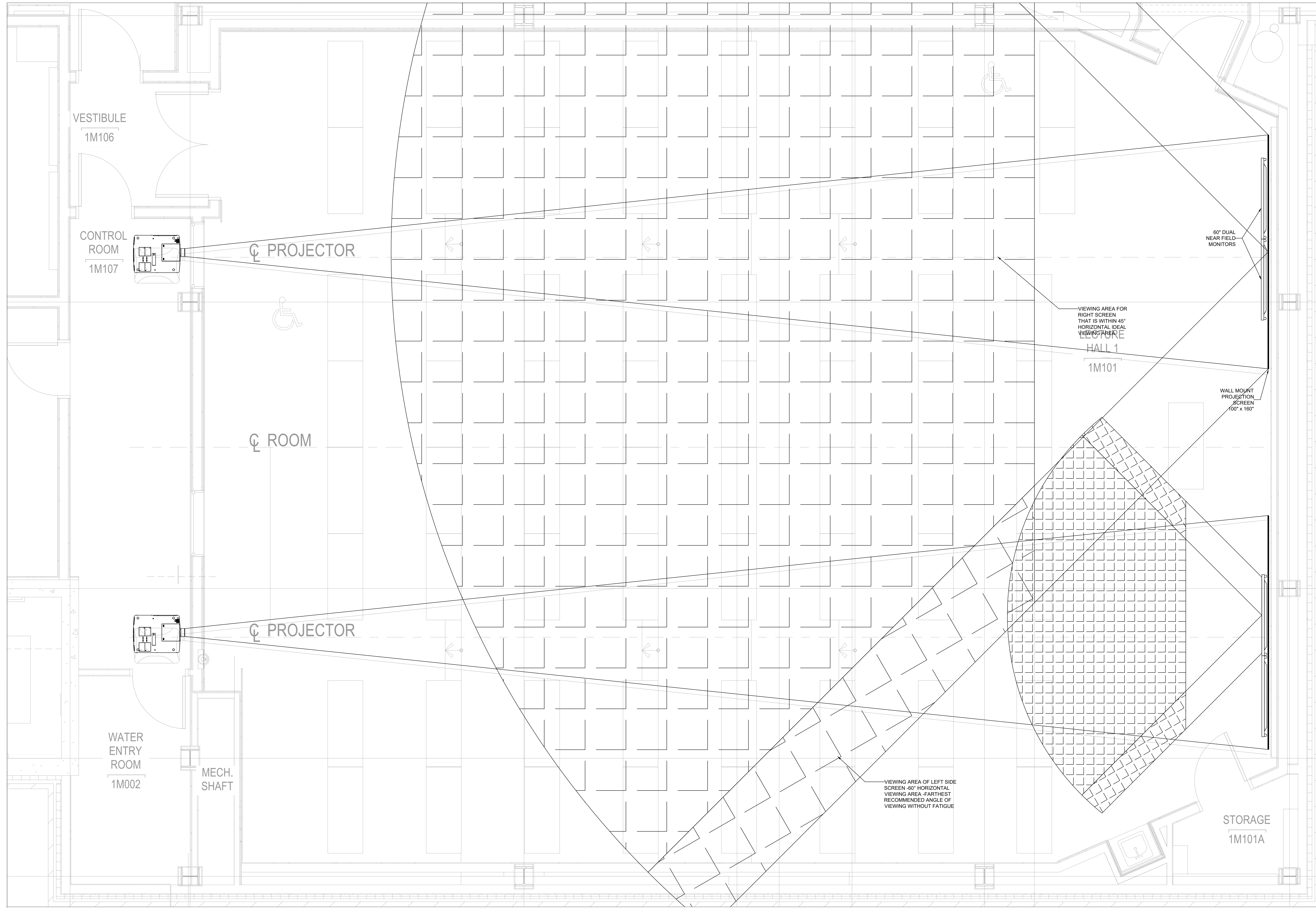


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Department of Facilities Management
PROJECT TITLE
Faculty of Medicine Expansion and the Centre for Human Genetics
Client: Assistant Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
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SHEET TITLE	LECTURE HALL 1M101 LOCATIONS CONCEPT
PROJECT NO.	2205
DRAWN BY	RL
DATE	2023-09-08
SHEET NO.	AV-210D

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4 IN.
100mm
PLOT SCALE CHECK

① TABLETOP MICROPHONE LOCATIONS CONCEPT - PLAN
SCALE: 1:25



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SHEET TITLE

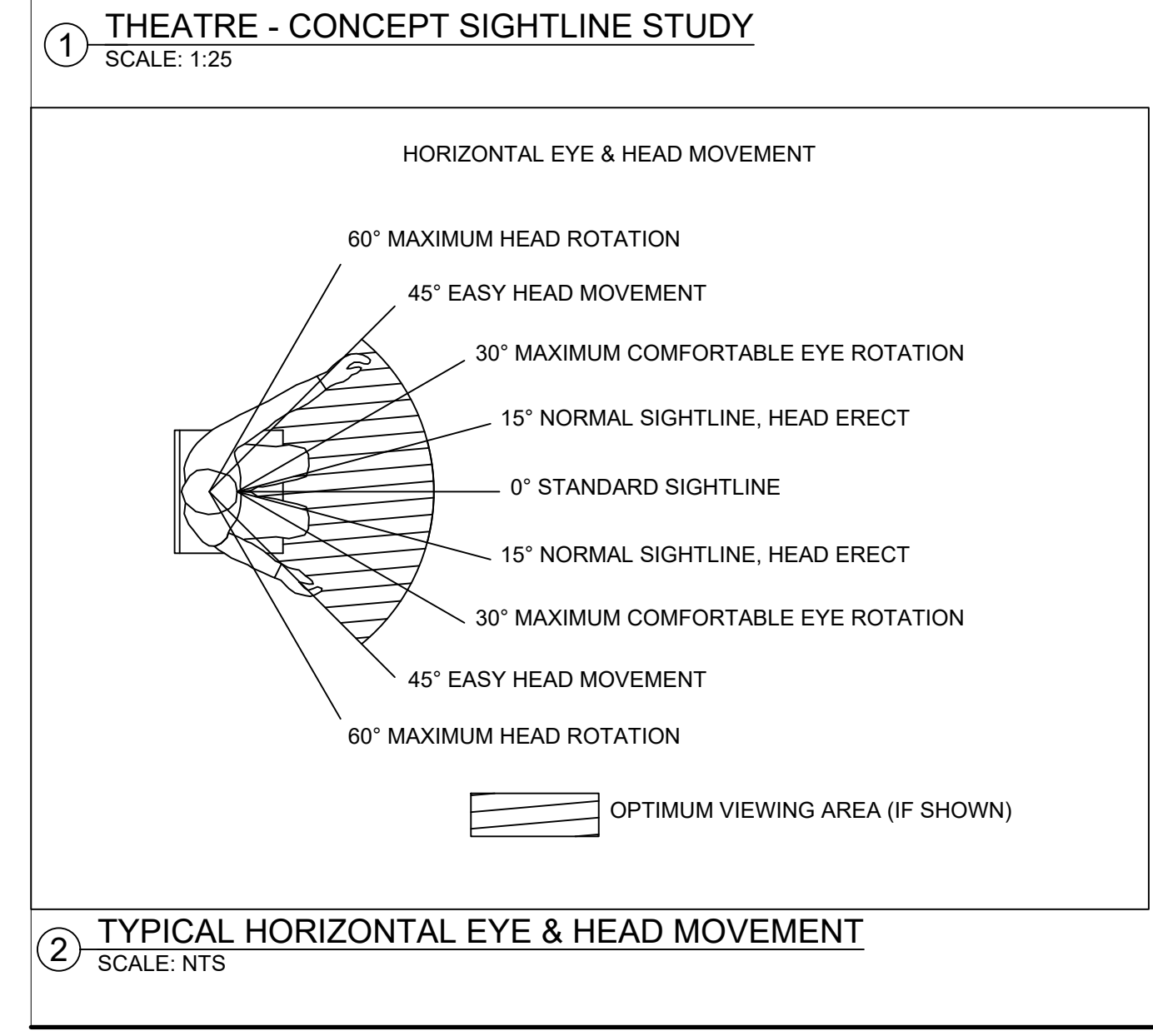
**LECTURE HALL 1
CONCEPT SIGHTLINE STUDY**

PROJECT NO. 2205

DRAWN BY RL

DATE 2023-09-08

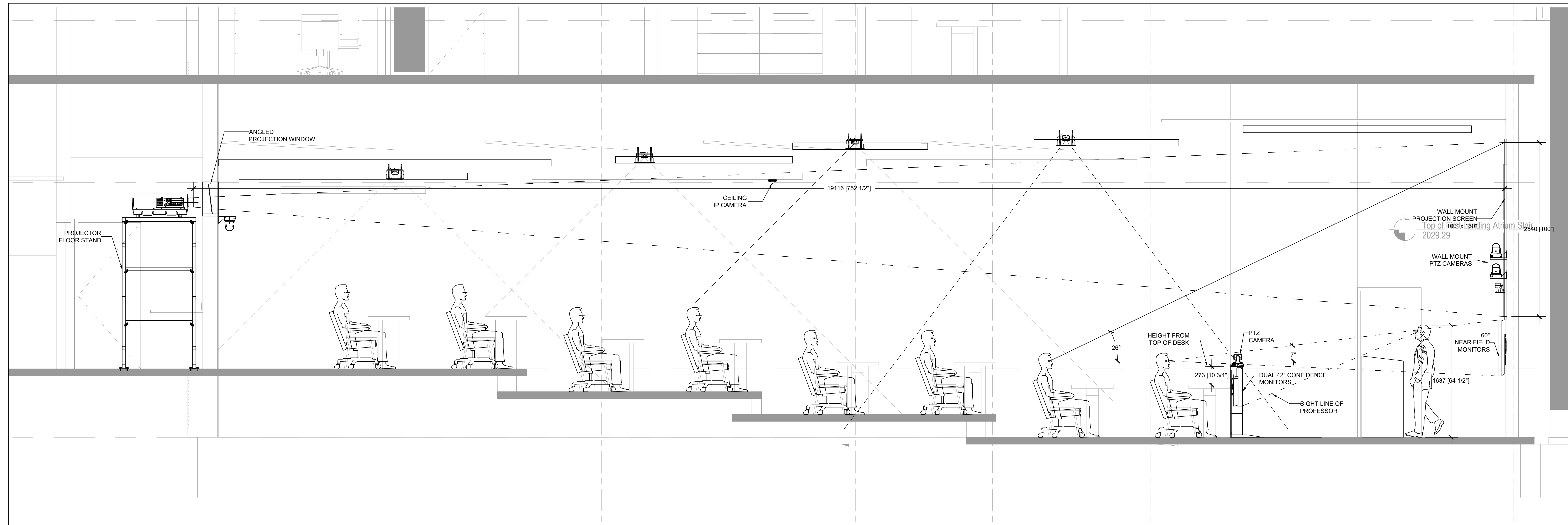
SHEET NO. **AV-210E**



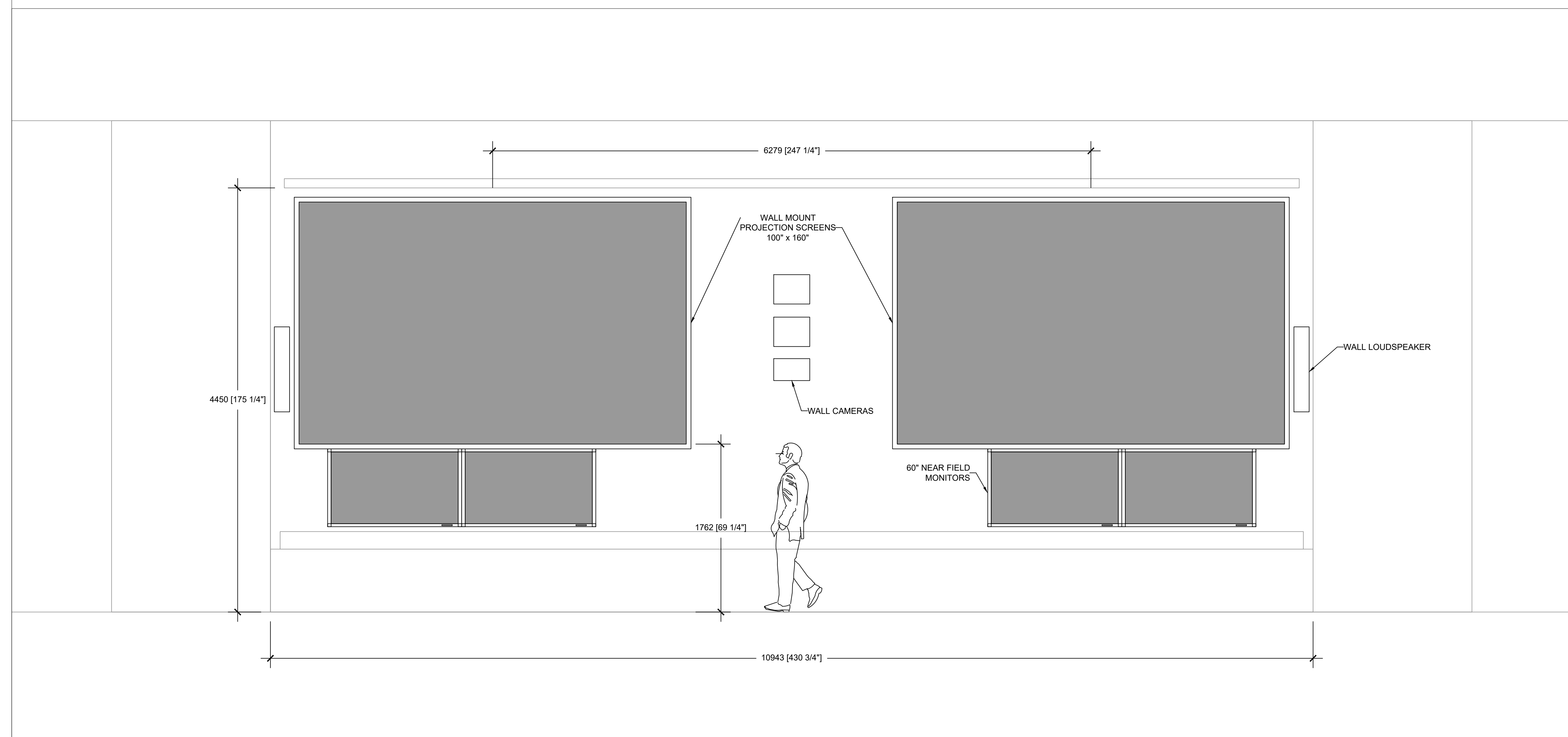
NOT FOR CONSTRUCTION

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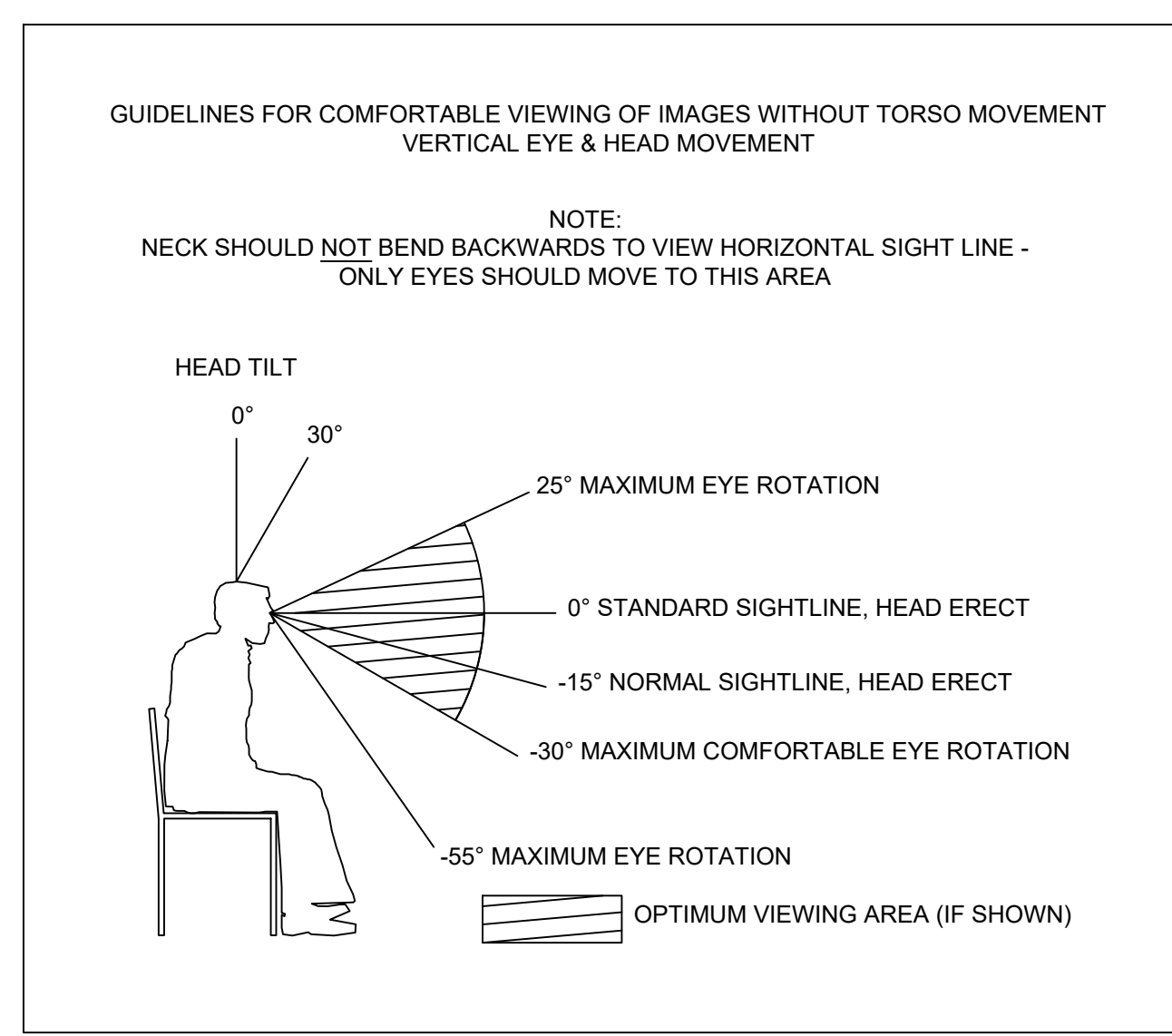
PLOT SCALE CHECK



1 LECTURE HALL 1 - CONCEPT SIGHTLINE STUDY - SECTION
SCALE: 1:25



2 LECTURE HALL 1 - CONCEPT SIGHTLINE STUDY - ELEVATION
SCALE: 1:25



3 TYPICAL VERTICAL EYE & HEAD MOVEMENT
SCALE: NTS

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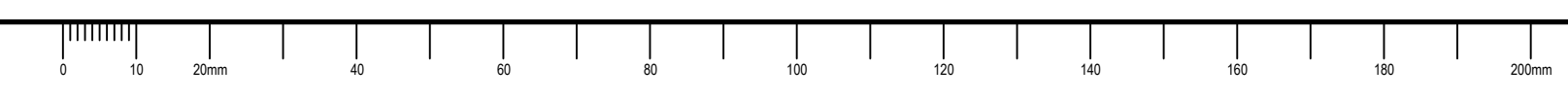
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MEMORIAL UNIVERSITY
Department of Fashion Management

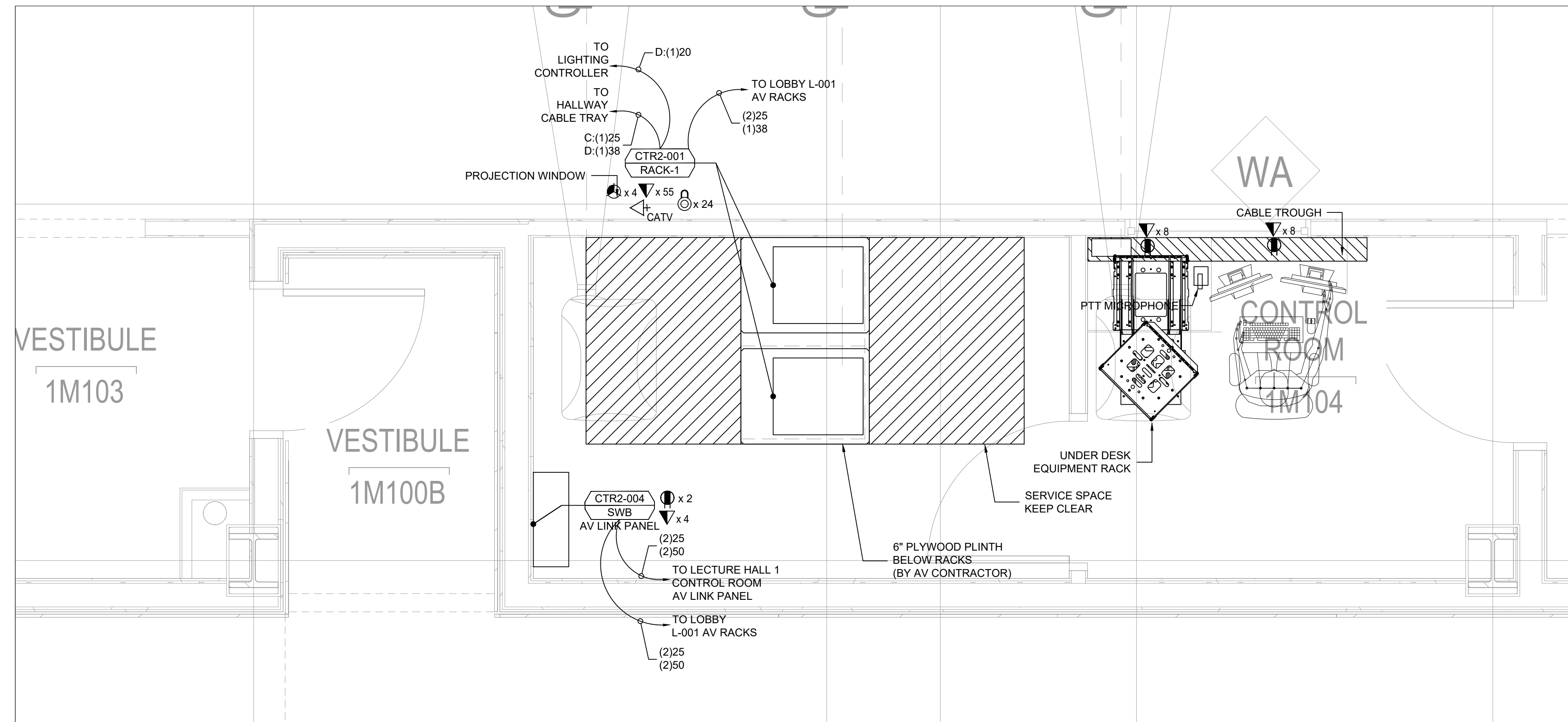
PROJECT TITLE
Faculty of Medicine Expansion and the Centre for Human Genetics
Christ Chalmers Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
CNS

SHEET TITLE
**LECTURE HALL 1
CONCEPT SIGHTLINE STUDY**

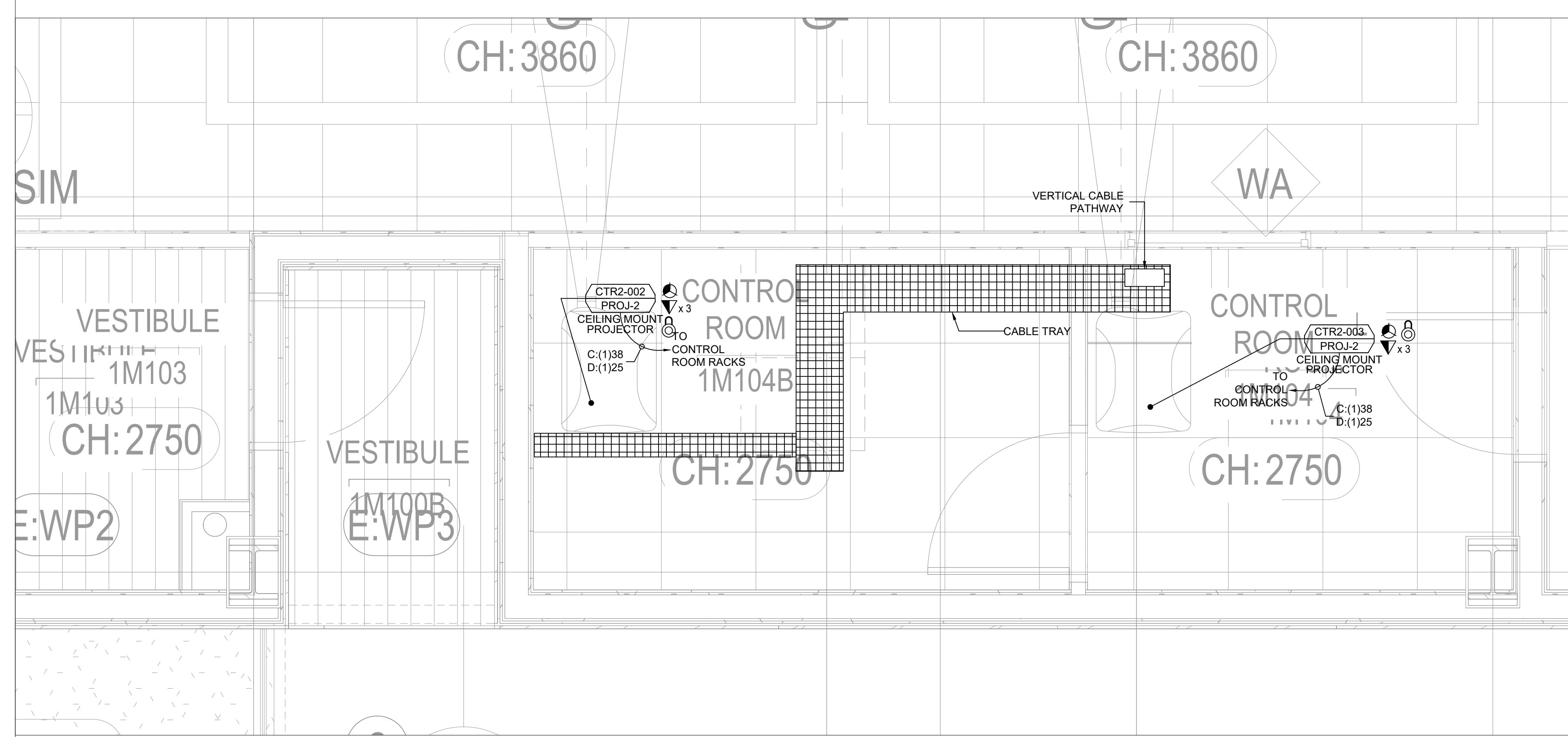
PROJECT NO.	2206
DRAWN BY	RL
DATE	2023-09-08
SHEET NO.	AV-210F

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PLOT SCALE CHECK





1 LECTURE HALL 2 CONTROL ROOM DEVICE LOCATIONS - PLAN
SCALE: 1:20



2 LECTURE HALL 2 CONTROL ROOM DEVICE LOCATIONS - RCP
SCALE: 1:20

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PROJECT TITLE
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CPS

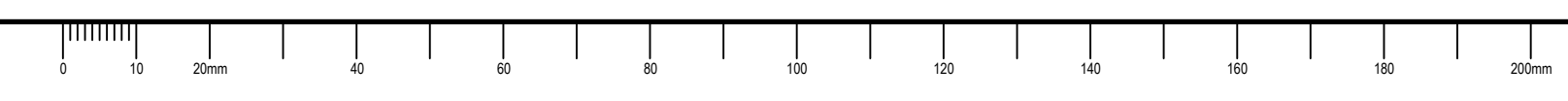
SHEET TITLE
LEVEL 1 LECTURE HALL 2
CONTROL ROOM
DEVICE LOCATION - PLAN & RCP

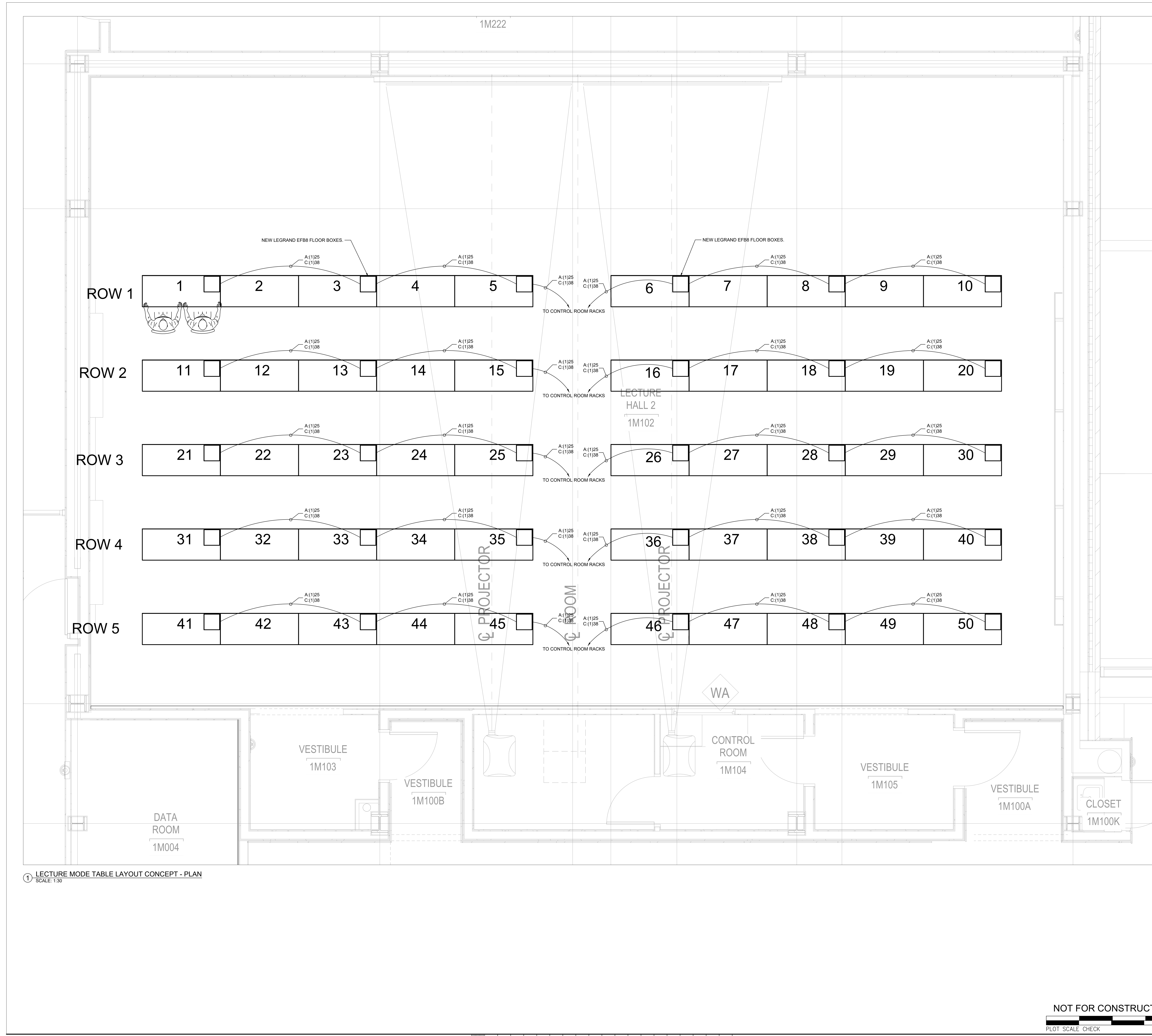
PROJECT NO. 22405
DRAWN BY RL
DATE 2023-09-08
SHEET NO. AV-211C

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100mm

PLOT SCALE CHECK





① LECTURE MODE TABLE LAYOUT CONCEPT - PLAN
SCALE: 1:30

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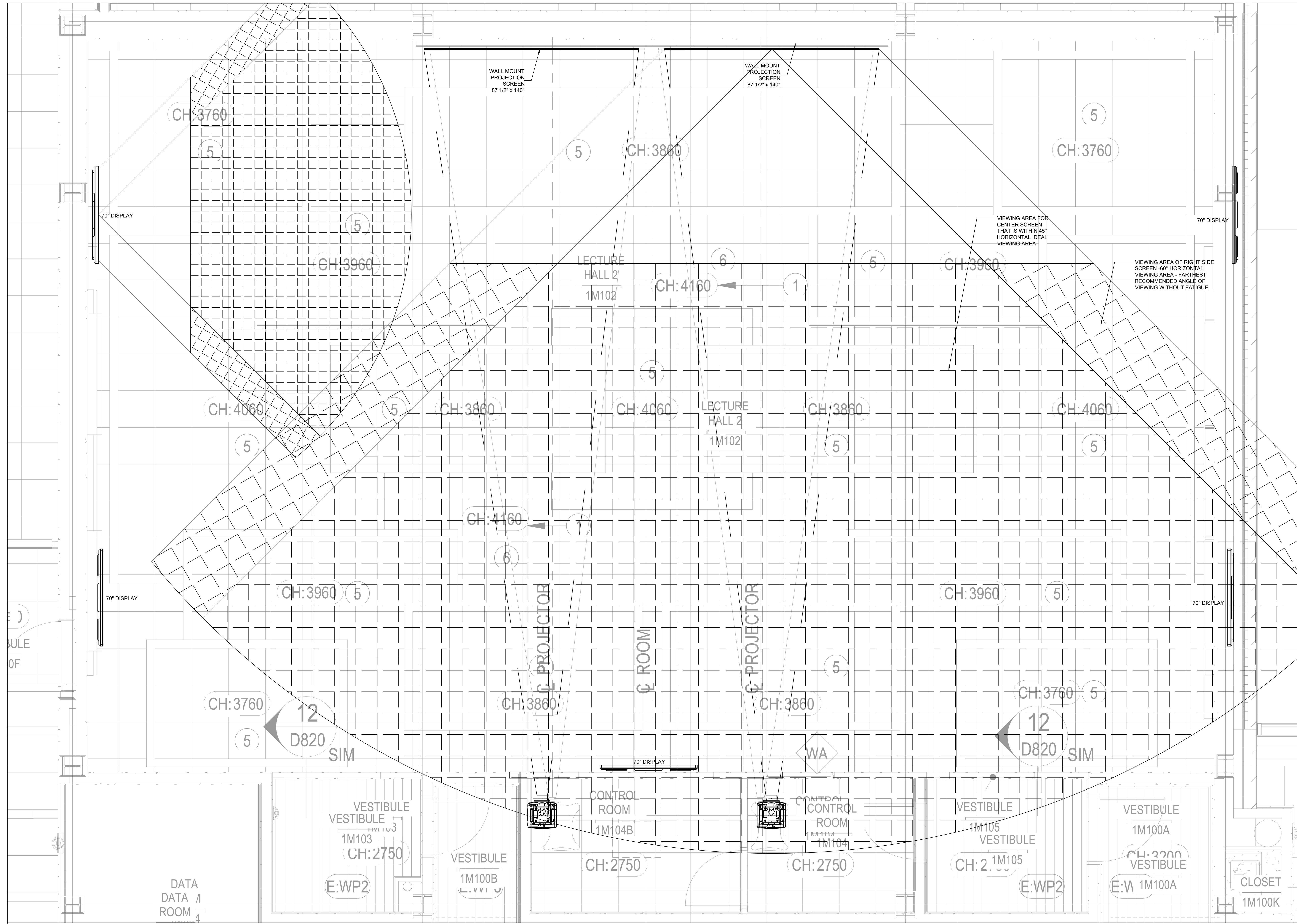
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PROJECT TITLE
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Centre for Human Genetics
Christ Chalmers Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
CNS

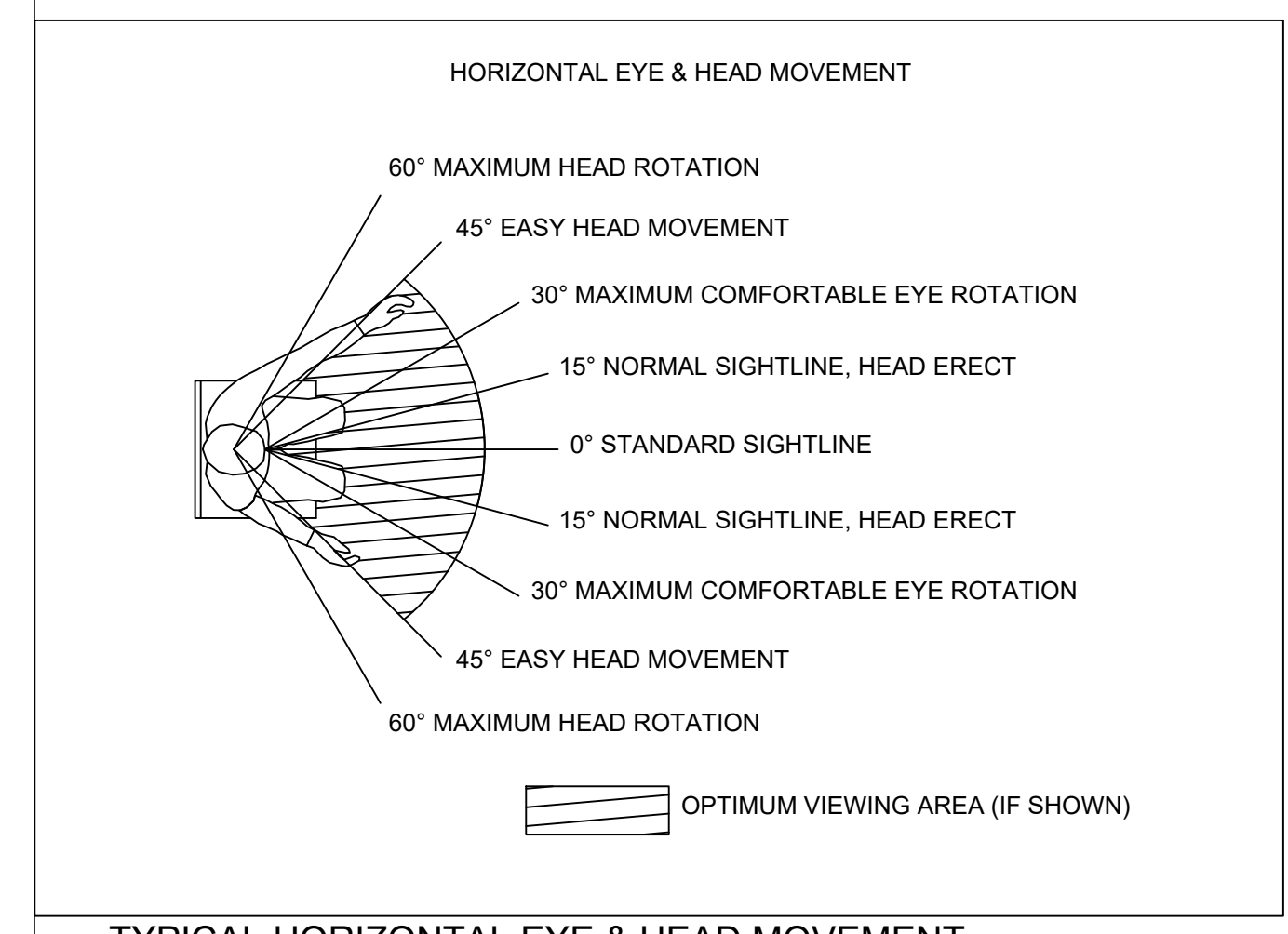
SHEET TITLE
**LEVEL 1 LECTURE HALL 1M102
TABLE LOCATIONS - PLAN**

PROJECT NO.	2205
DRAWN BY	RL
DATE	2023-09-08
SHEET NO.	AV-211D

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PLOT SCALE CHECK



1 LECTURE HALL 2 SIGHTLINE STUDY - PLAN
SCALE: 1:25



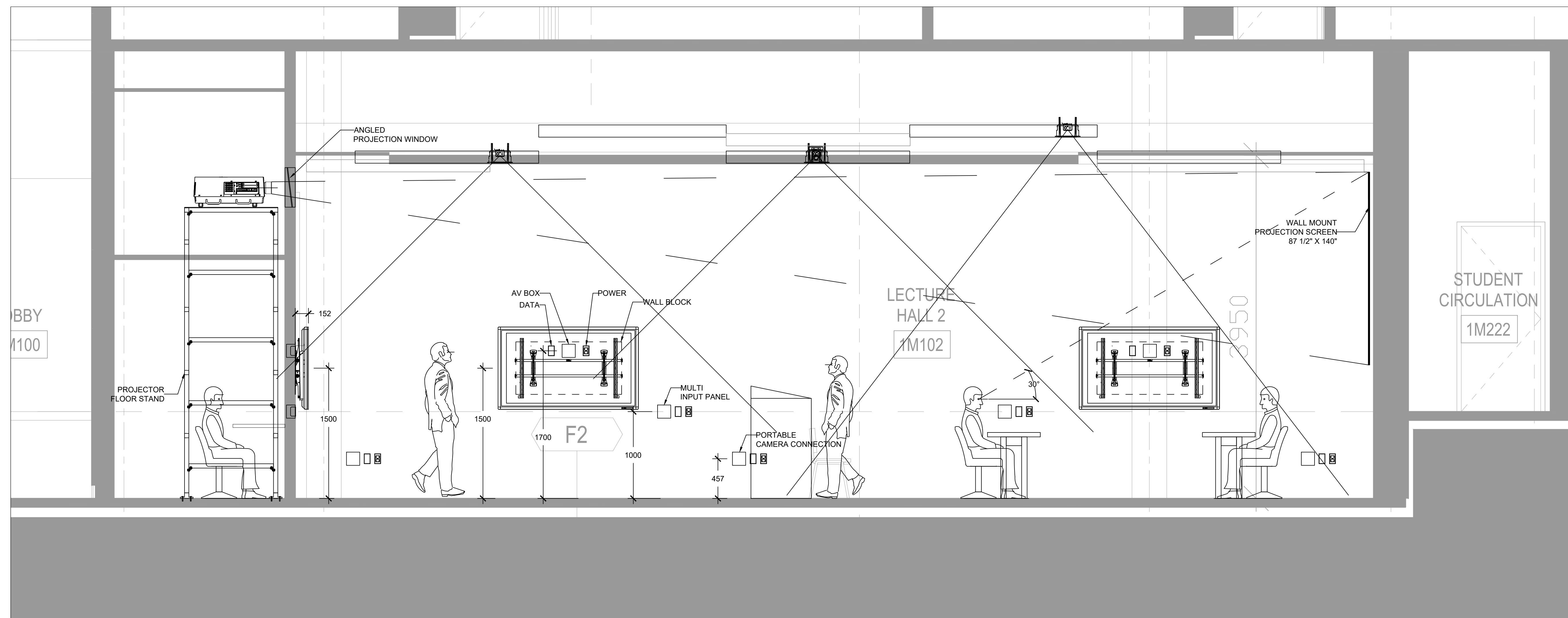
2 TYPICAL HORIZONTAL EYE & HEAD MOVEMENT
SCALE: NTS

GENERAL NOTES
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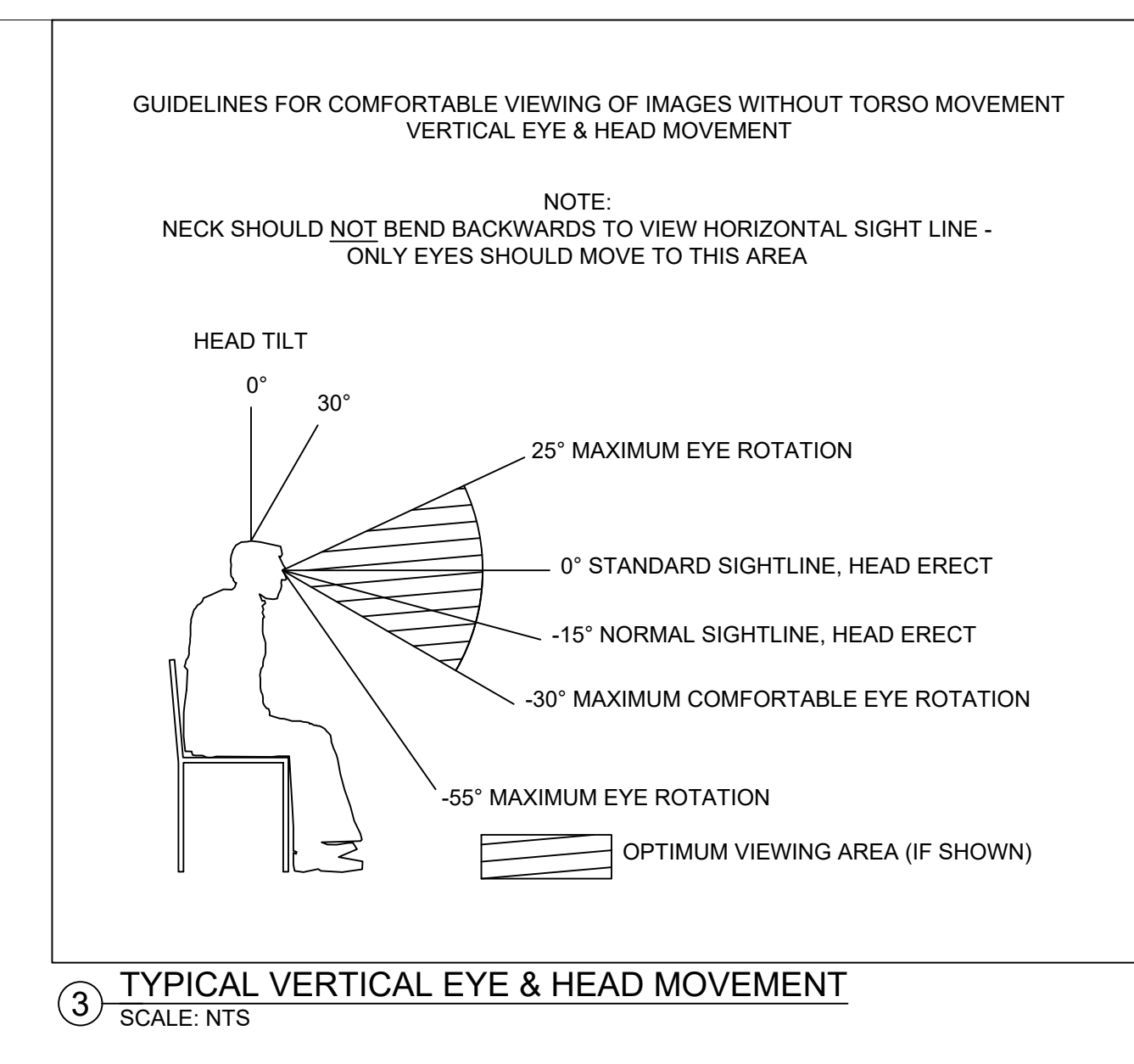
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PROJECT TITLE		
Faculty of Medicine Expansion and the Centre for Human Genetics <small>Chief Consultant, Memorial University of Newfoundland St. John's, Newfoundland and Labrador CPS</small>		
SHEET TITLE		
LEVEL 1 LECTURE HALL 2 CONCEPT SIGHTLINE STUDY		
PROJECT NO.	2205	
DRAWN BY	RL	
DATE	2023-09-08	
SHEET NO.	AV-211E	

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1 LECTURE HALL 2 SIGHTLINE STUDY - SECTION
SCALE: 1:25



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SHEET TITLE
**LEVEL 1 LECTURE HALL 2
CONCEPT SIGHTLINE STUDY**

PROJECT NO. 22408
DRAWN BY RL
DATE 2023-09-08
SHEET NO. AV-211F

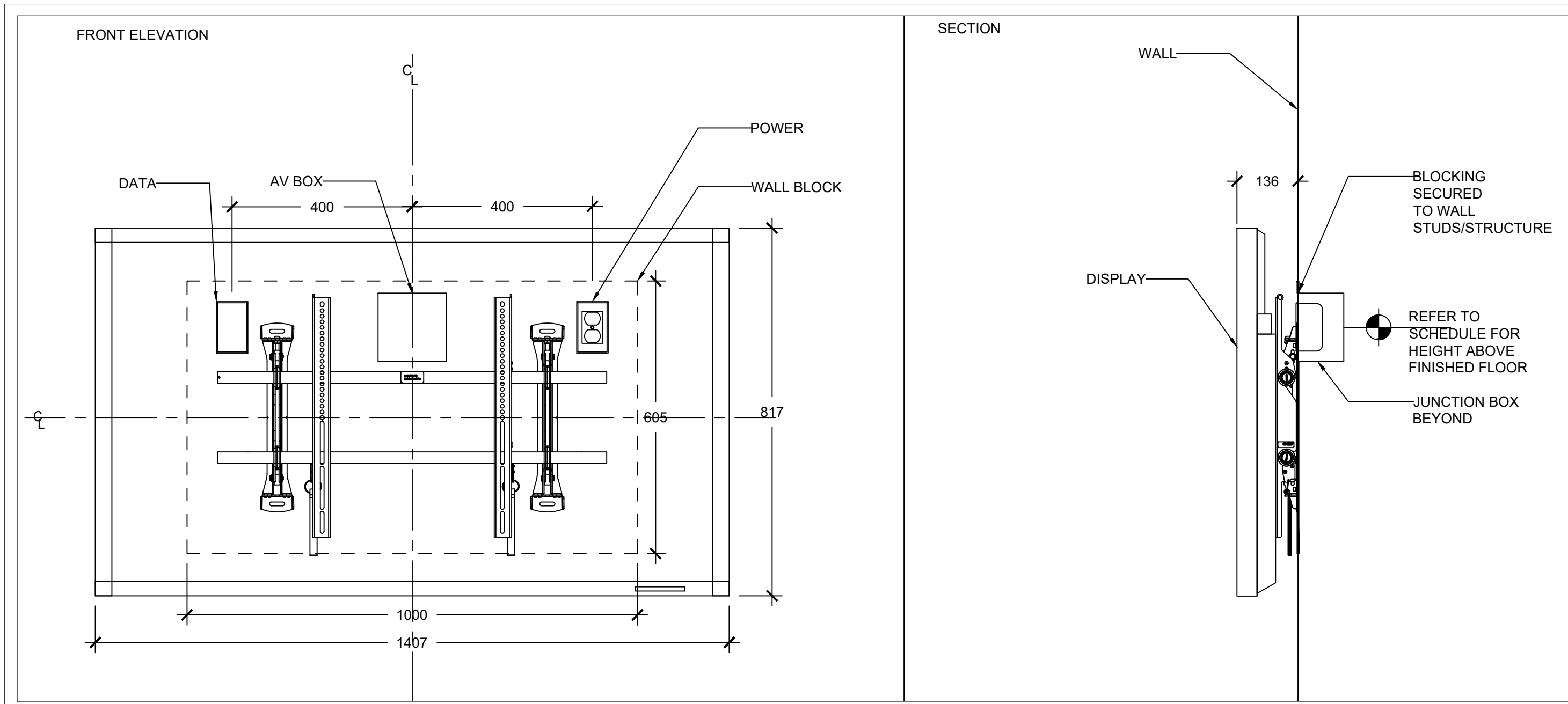


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SCALE: 1:25

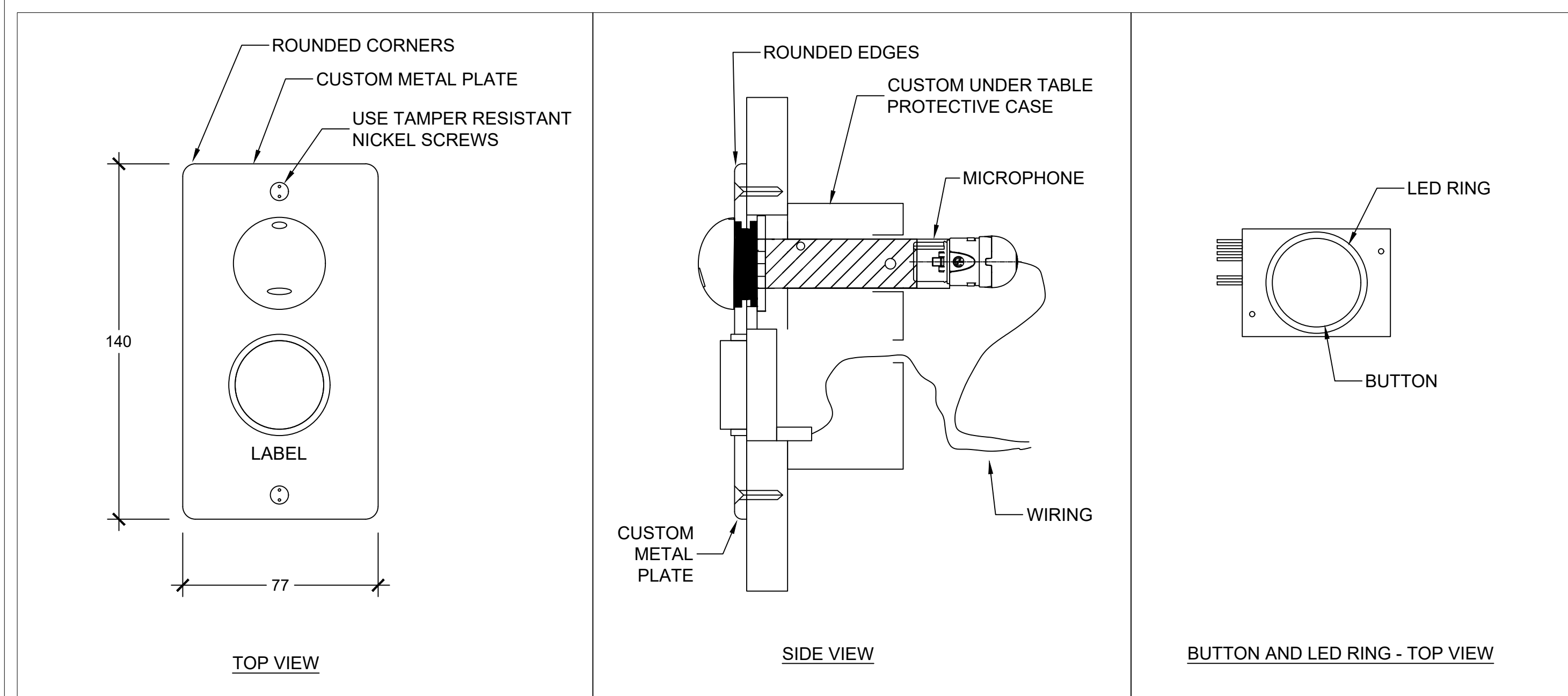
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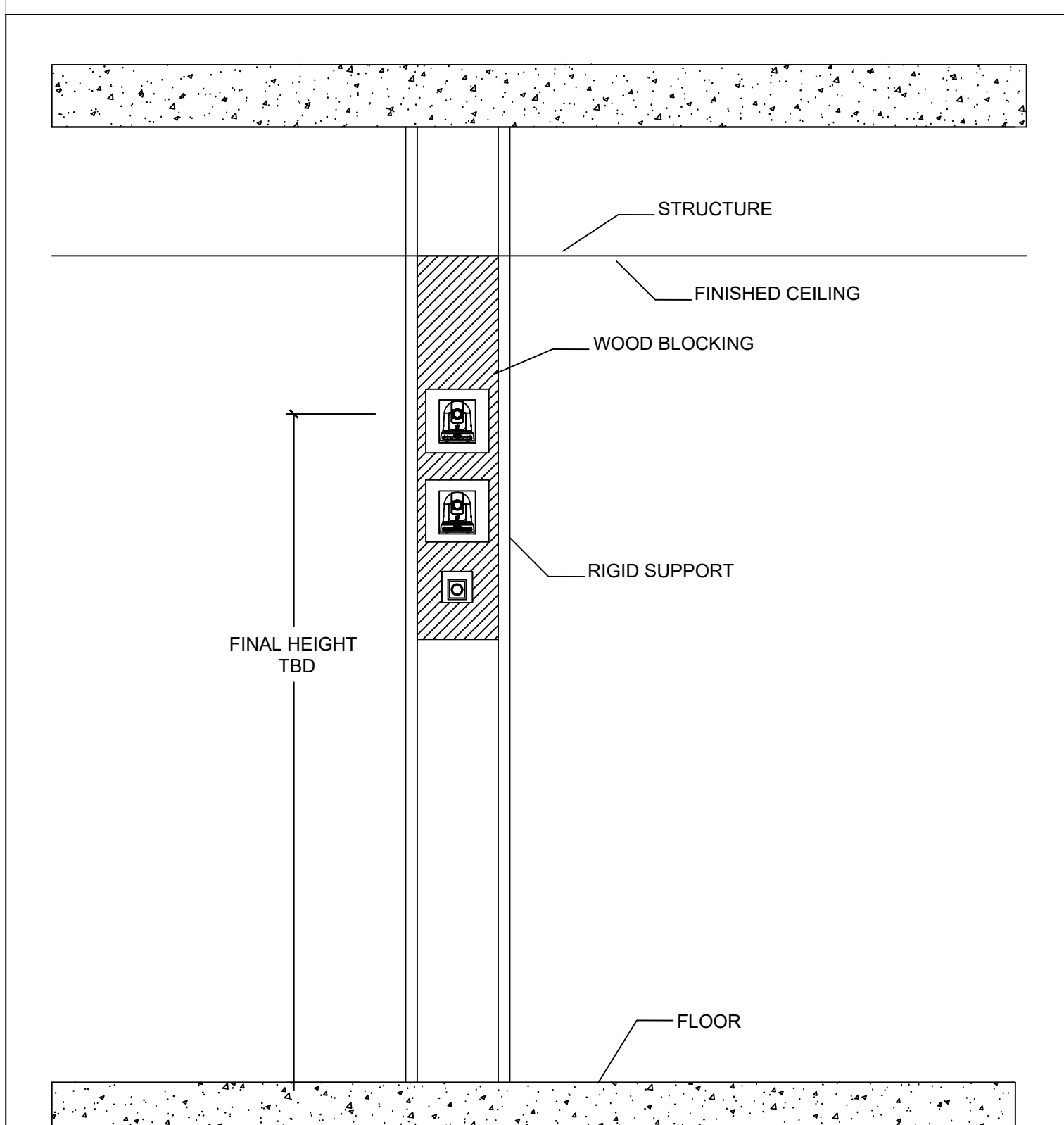
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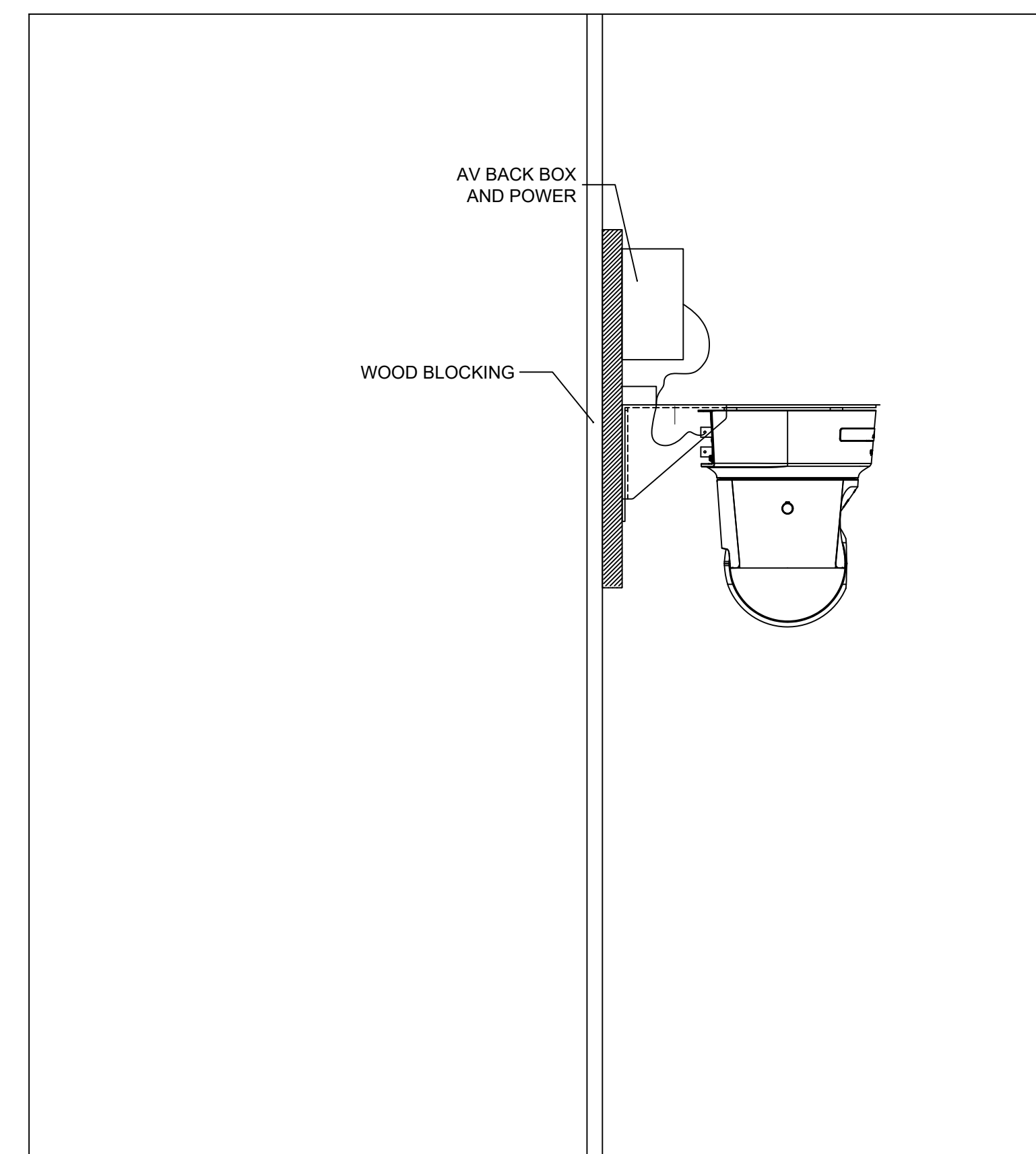
1 TYPICAL WALL MOUNT DISPLAY INSTALLATION DETAIL
SCALE: NTS



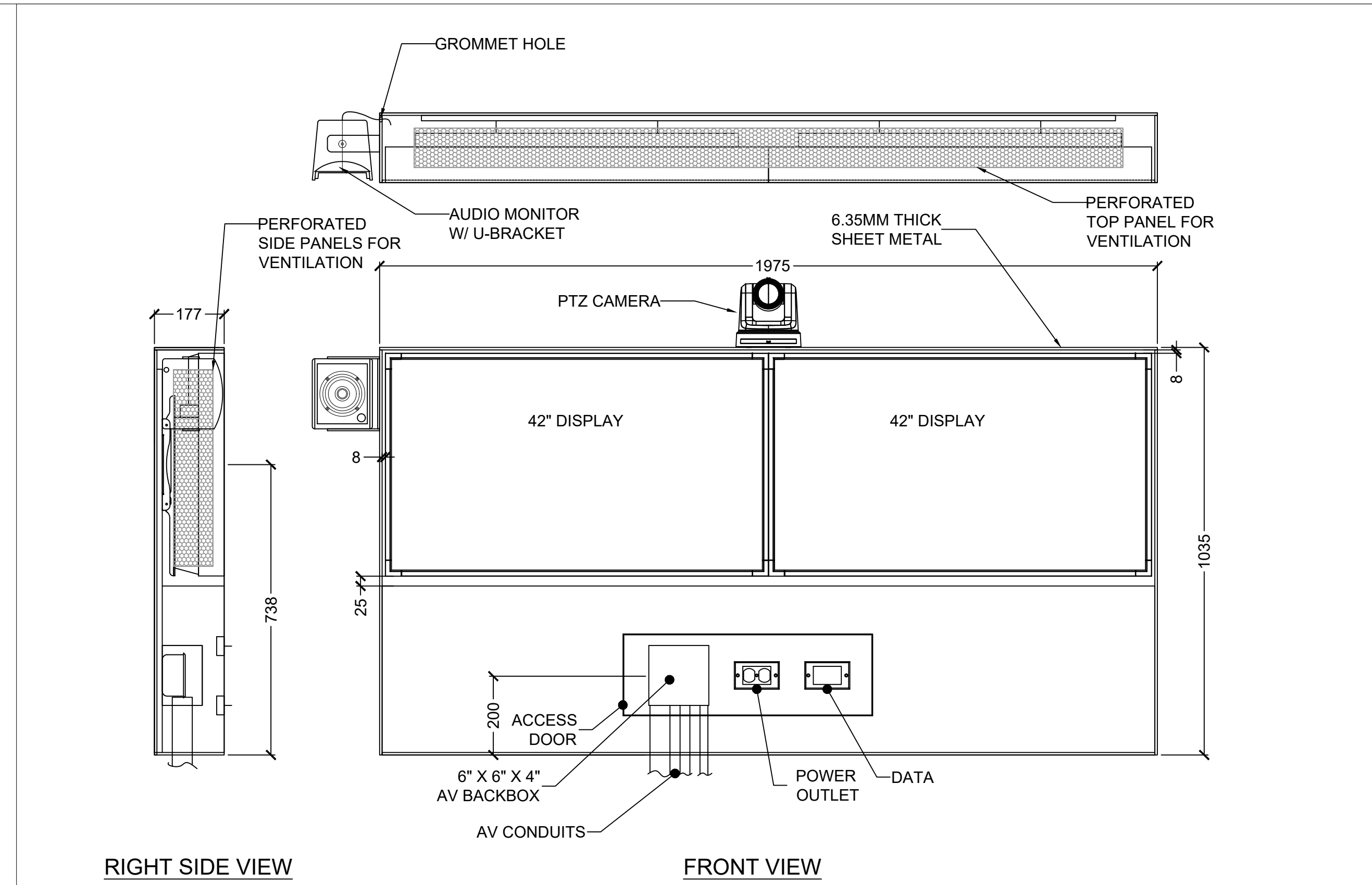
2 STUDENT DESK MICROPHONE, LED RING AND BUTTON - CONCEPT
SCALE: NTS



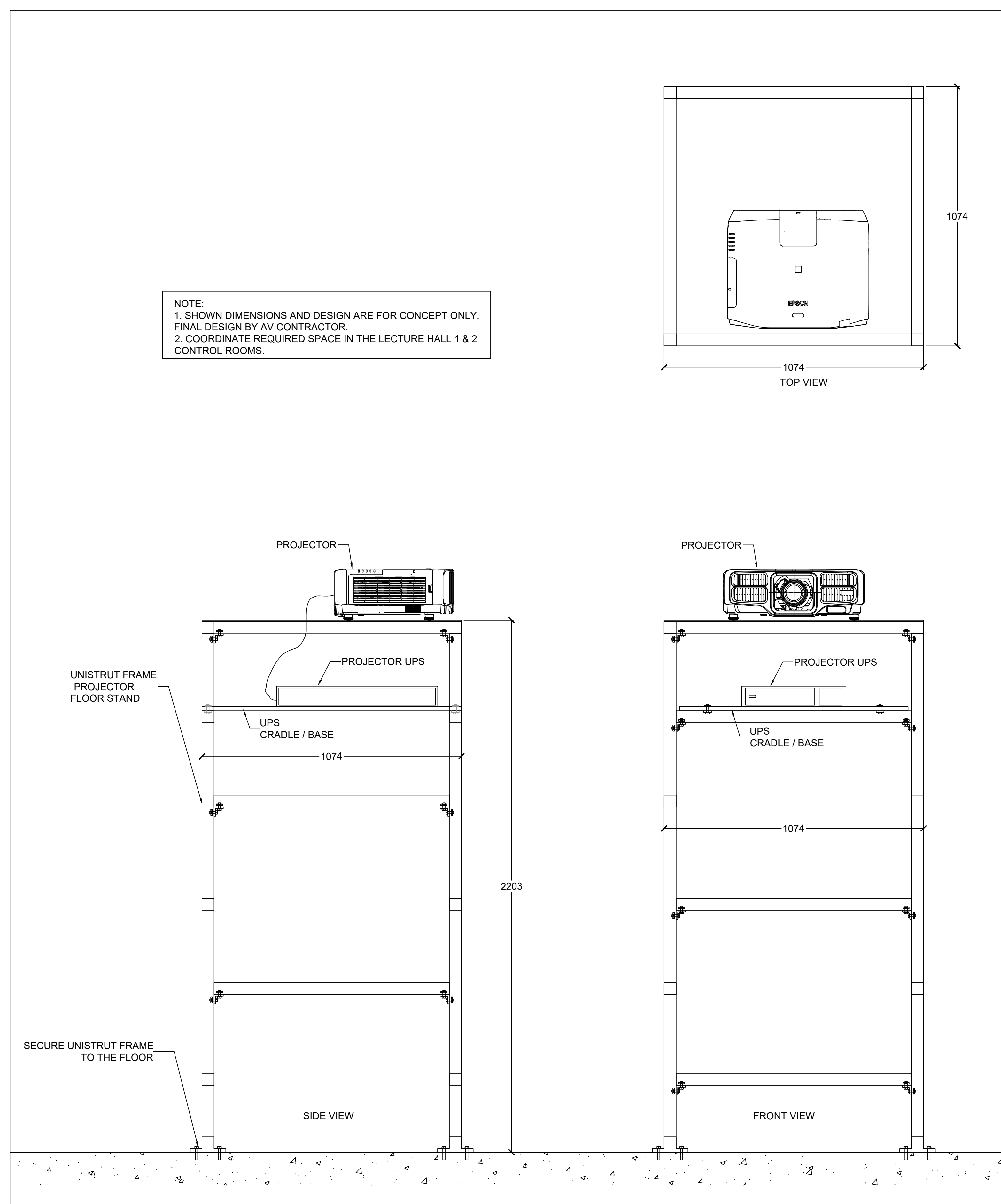
3 CONCEPT FRONT WALL PTZ CAMERA STRUCTURE DETAILS
SCALE: NTS



4 CONCEPT PTZ CAMERA - REAR OF ROOM
SCALE: NTS



5 TIERED LECTURE HALL DUAL 42\"/>



6 PROJECTOR FLOOR STAND CONCEPT DETAIL
SCALE: NTS

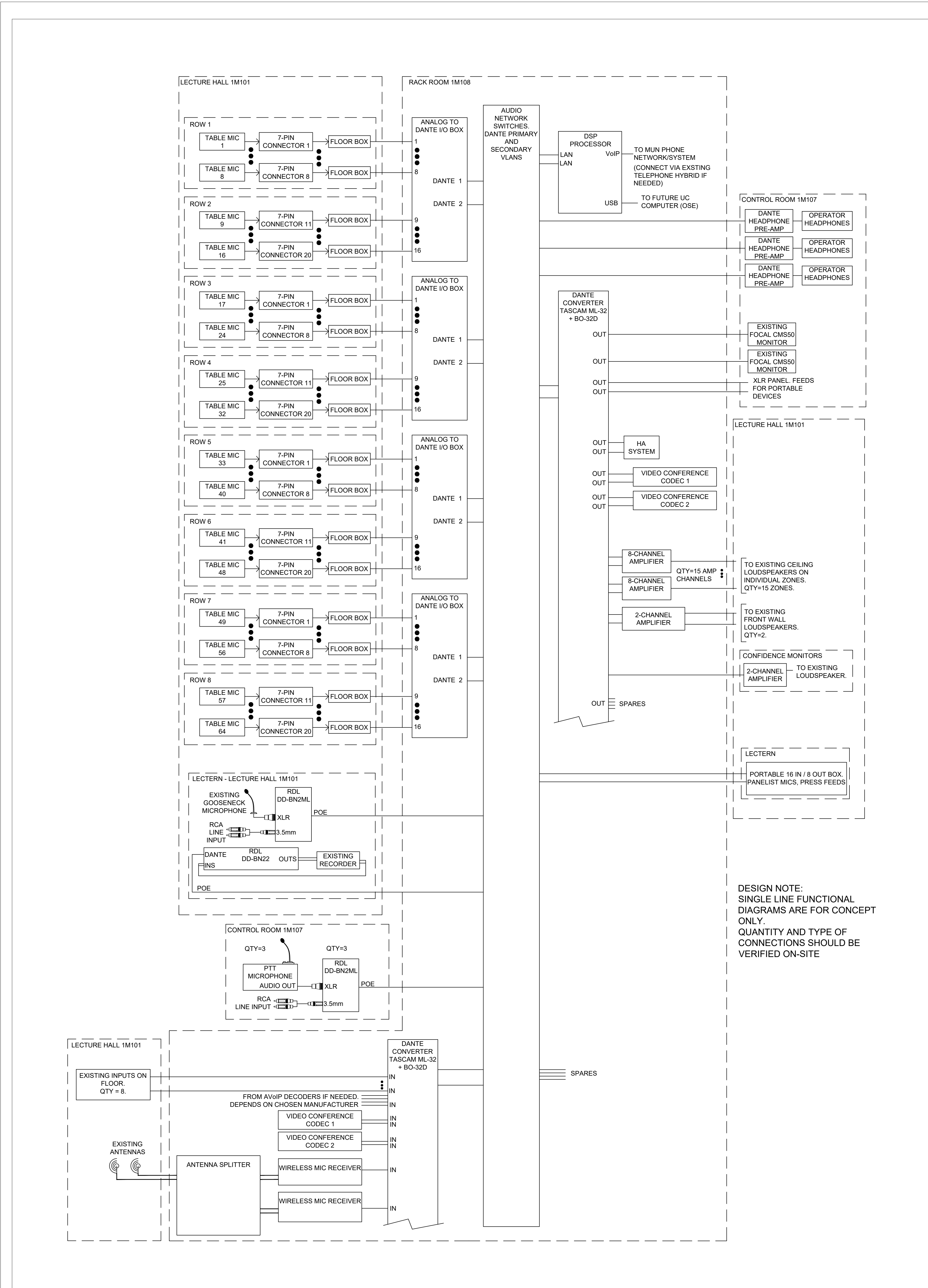
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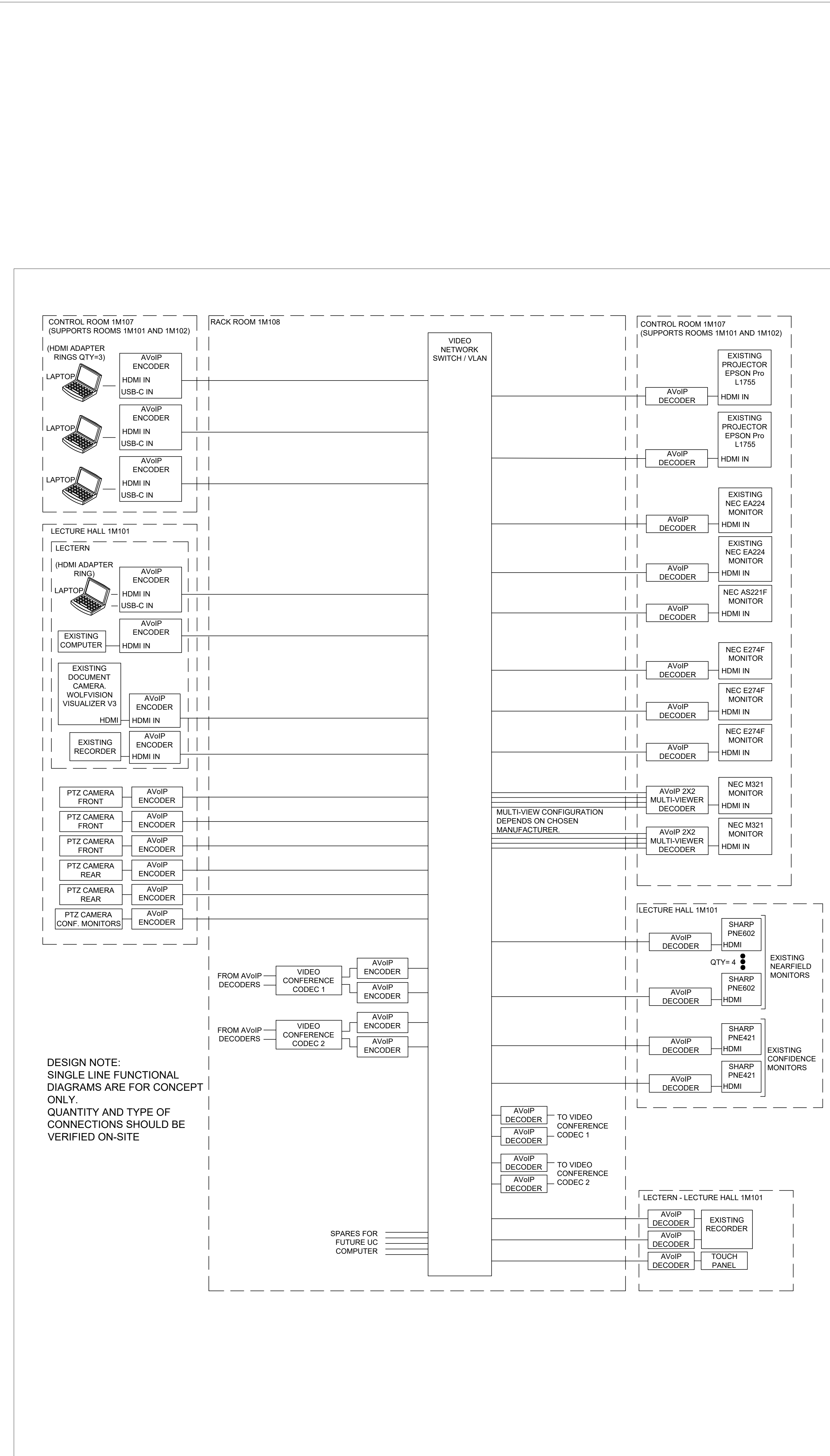
NOTE:
1. SHOWN DIMENSIONS AND DESIGN ARE FOR CONCEPT ONLY. FINAL DESIGN BY AV CONTRACTOR.
2. COORDINATE REQUIRED SPACE IN THE LECTURE HALL 1 & 2 CONTROL ROOMS.

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CLIENT		
MEMORIAL UNIVERSITY <small>Department of Facilities Management</small>		
PROJECT TITLE Faculty of Medicine Expansion and the Centre for Human Genetics <small>Chief Consultant, Memorial University of Newfoundland St. John's, Newfoundland and Labrador CPS</small>		
SHEET TITLE INSTALLATION DETAILS		
PROJECT NO.	2205	
DRAWN BY	Author	
DATE	2023-10-06	
SHEET NO.	AV-400	



① TIERED LECTURE HALL 1M101 WITH CONTROL ROOM - AV SYSTEMS - CONCEPT FUNCTIONAL DIAGRAM - AUDIO
SCALE: N.T.S.



② TIERED LECTURE HALL 1M101 WITH CONTROL ROOM - AV SYSTEMS - CONCEPT FUNCTIONAL DIAGRAM - VIDEO
SCALE: N.T.S.

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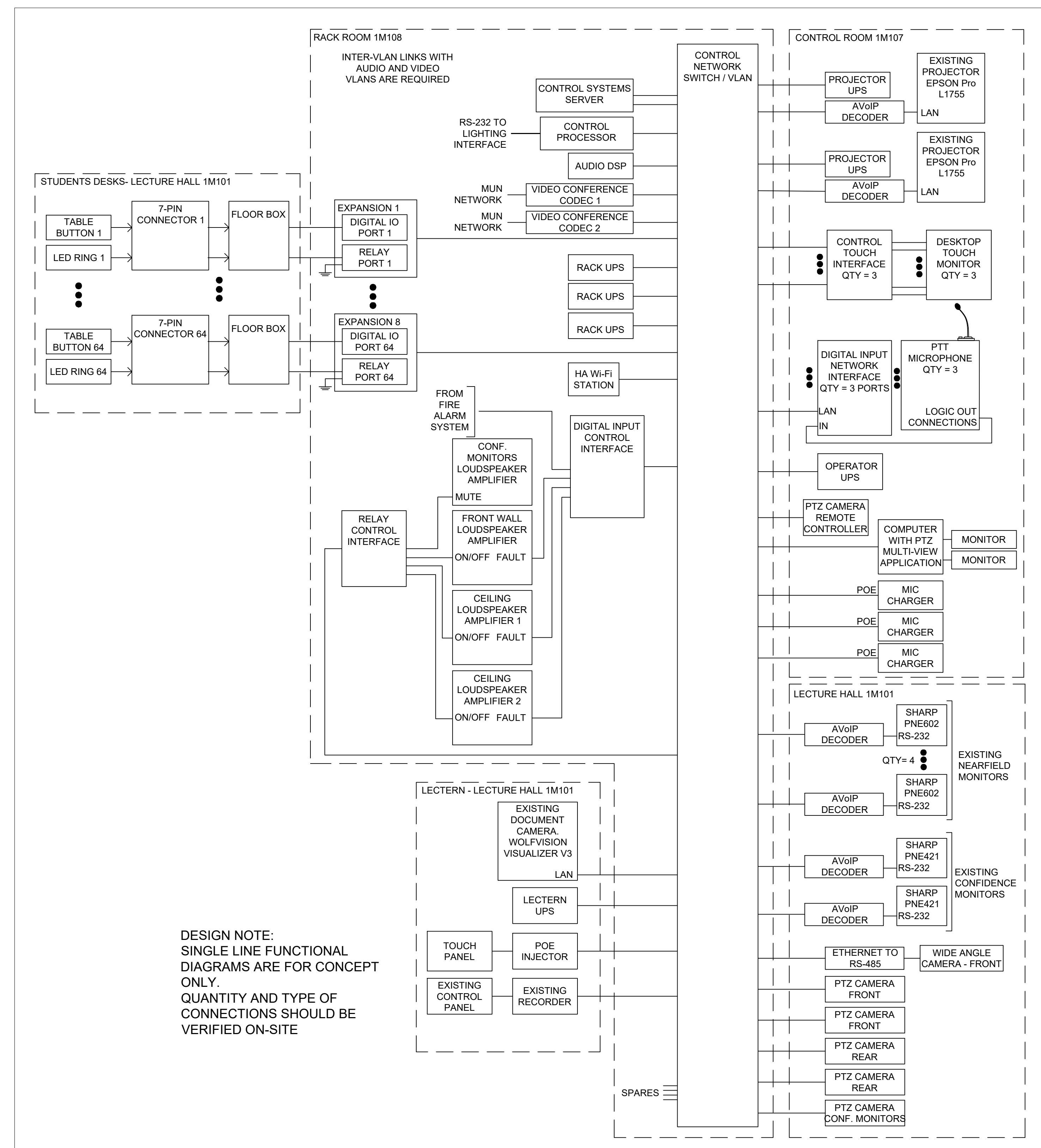
PROJECT TITLE
Faculty of Medicine Expansion and the
Centre for Human Genetics
Crest Ossington, Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
CPLS

SHEET TITLE
**AV SYSTEMS - CONCEPT
FUNCTIONAL DIAGRAMS**

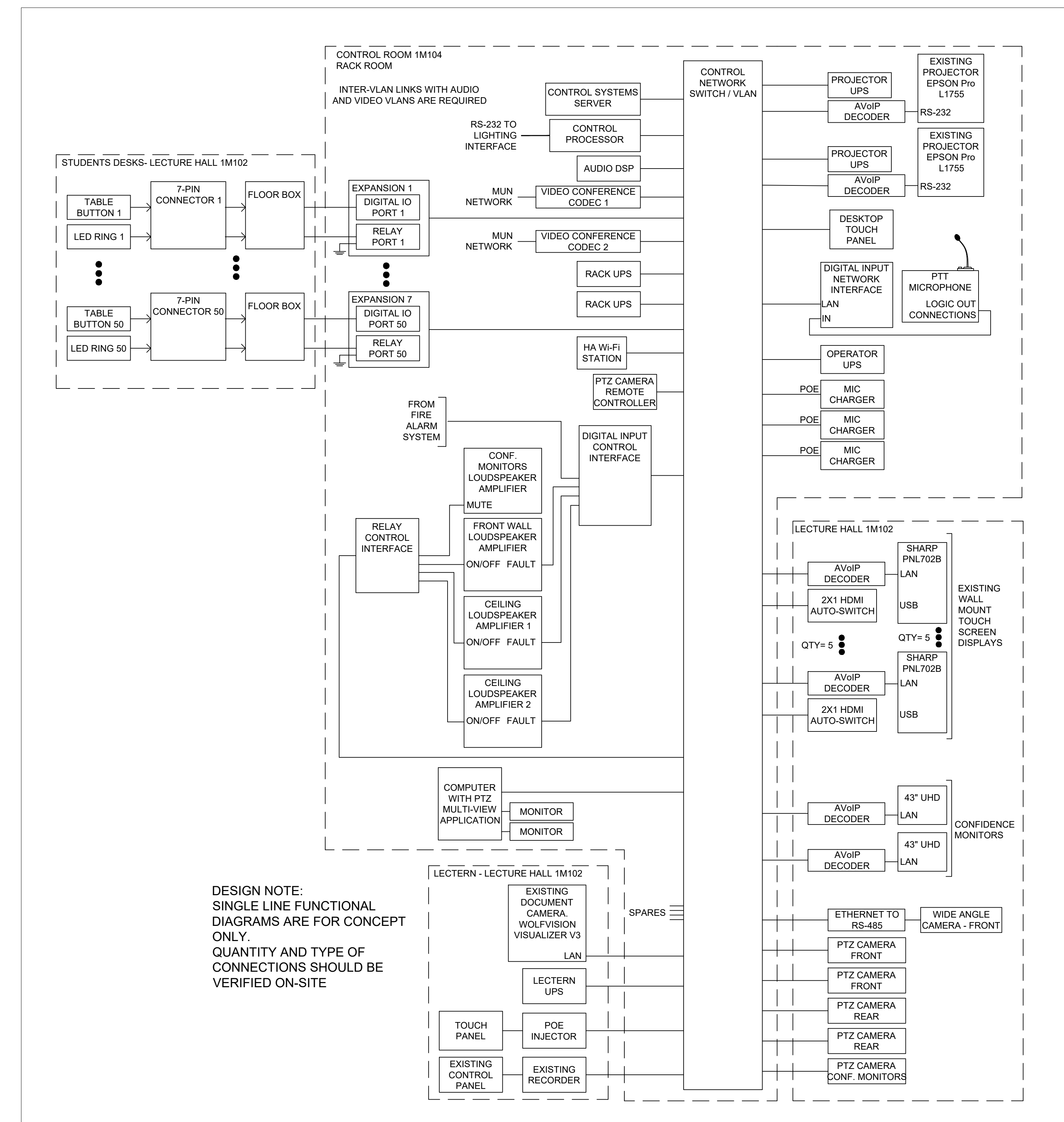
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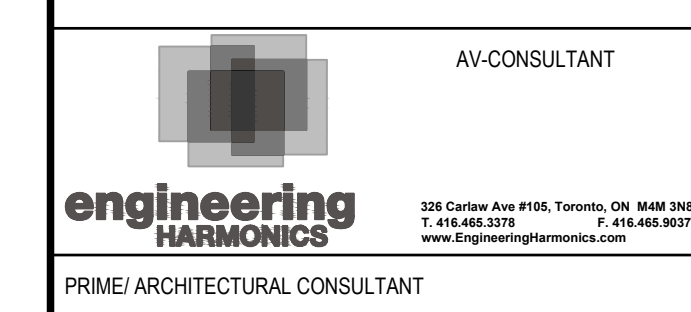
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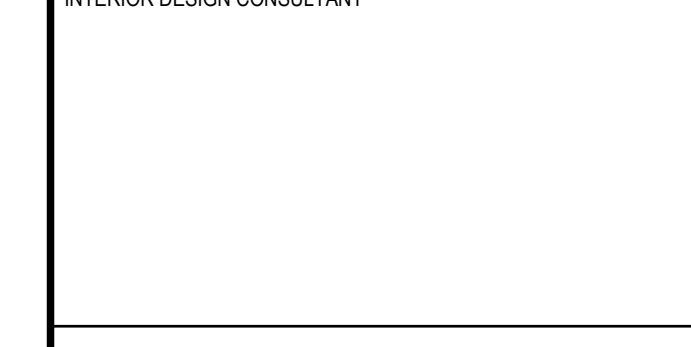
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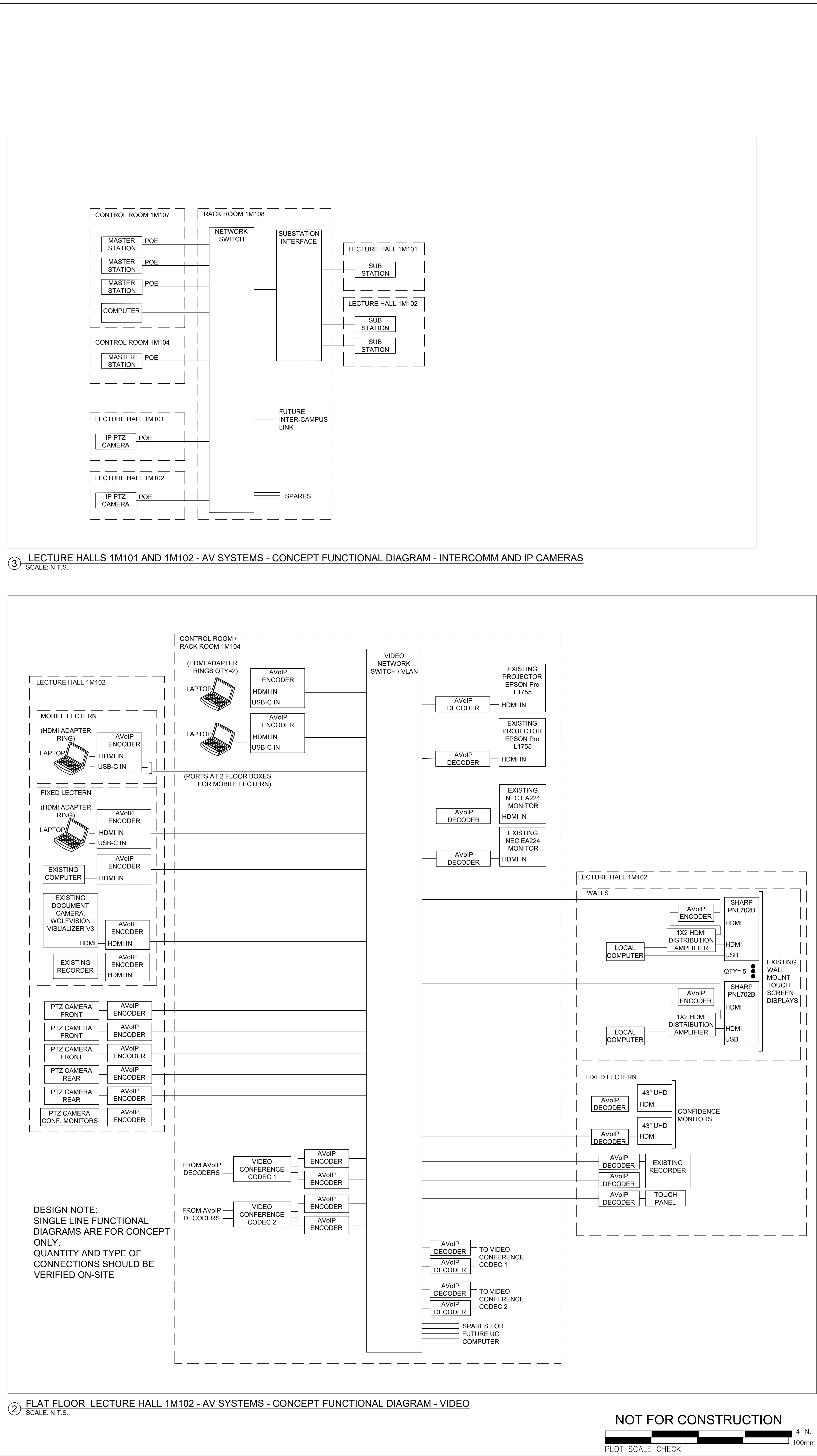
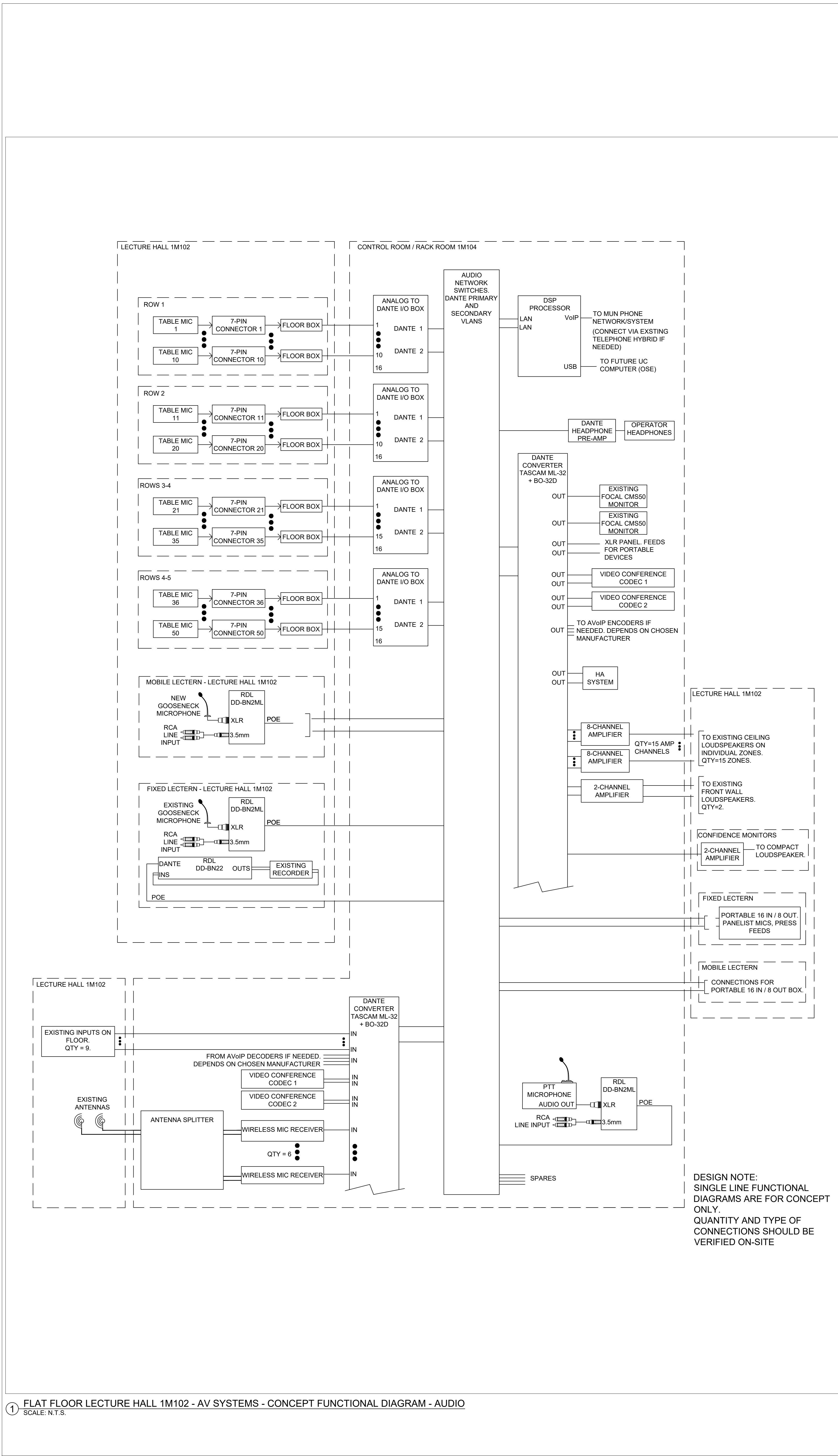


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PROJECT TITLE
Faculty of Medicine Expansion and the
Centre for Human Genetics
Queen's University
St. John's, Newfoundland and Labrador
CPS

PROJECT NO.	2205
DRAWN BY	Author
DATE	2023-09-08
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AV CONSULTANT
**engineering
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INTERIOR DESIGN CONSULTANT

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**MEMORIAL
UNIVERSITY**
Department of Facilities Management

PROJECT TITLE
**Faculty of Medicine Expansion and the
Centre for Human Genetics**
Crest Crescent, Memorial University of Newfoundland
St. John's, Newfoundland and Labrador
A1B3X9

SHEET TITLE
**AV SYSTEMS - CONCEPT
FUNCTIONAL DIAGRAMS**

DRAWN BY	2265
DATE	2023-09-08
SHEET NO.	AV-602

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