



FACILITIES MANAGEMENT

OPEN CALL FOR BIDS

FOR

**IIC-516-19: Bruneau
Centre, Heating Levels 1
and Level 2**

Request for Open Call Number: **TFM-044-25** Issued:

October 10, 2025

Submission Deadline: **Thursday, November 6, 2025
@ 3:00PM NST**

REQUEST FOR OPEN CALL FOR BIDS INFORMATION SHEET

Request for Open Call			
Title:	IIC-516-19: Bruneau Centre, Heating Level 1 & Level 2		
Open Call #:	TFM-044-25	Issue Date:	October 10, 2025
Non-Mandatory Site Visit:	Location: Bruneau Centre for Research and Innovation (first level), IIC-1C01 Atrium @ 11:00am		October 22, 2025
Questions Deadline:	Eight (8) days prior to closing time, at 3:00pm (NST).	Closing Date & Time:	Thursday November 6, 2025 @ 3:00 pm NST
		Bid Submission Format:	opencalls@mun.ca
		Opening Date, Time & Location:	Thursday, November 6, 2025 @ 3:30 pm NST Via Conference line: 1-416-915-6530 (toll free) Access Code: 2772 067 6983 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: <u>BID SUBMISSION: TFM-044-25 – Bruneau Centre, Heating level 1 & Level 2</u>			
Inquiries and Communication			

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-044-25 Bruneau Centre, Heating level 1 & Level 2** in subject line. Emails not containing this requirement information in the subject line will NOT receive a response.

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.



Department of Facilities Management
Memorial University of Newfoundland
St. John's, Newfoundland



MUN BRUNEAU CENTER
HEATING UPGRADES
MECHANICAL PROJECT SPECIFICATION
MUN FILE: EN-TFM-044-25

Issued for Tender
October 9, 2025

PROVINCE OF NEWFOUNDLAND	
 PROFESSIONAL ENGINEERS AND GEOSCIENTISTS NEWFOUNDLAND & LABRADOR	PERMIT HOLDER This Permit Allows
CORE ENGINEERING INC.	
MIRC: 03823	
To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by PEGNL <u>D0209</u> which is valid for the year <u>2025</u> .	

Prepared by:

CORE 
ENGINEERING INC.
57 Pippy Place
ST. John's, NL, Canada A1B 4H8
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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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END OF SECTION

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/Revision of Bids

Bidders shall 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. Previous submissions shall be cancelled and the bid submission with the most recent date and time shall be considered the final bid.

Bidders shall revise **APPENDIX C- Pricing form** only by submitting an updated **Pricing Form** prior to submission deadline. The revised **Pricing Form** shall replace the **Pricing Form** received with the original bid submission.

PLEASE NOTE: **APPENDIX C – Pricing Form** is the only section of the bid that can be revised independently. All other amendments/revisions shall require completing a new bid submission.

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

Time is of the essence and delivery schedule(s) are legally binding. Memorial University reserves the right to assess penalties or cancel awards to Bidders who fail to meet the stated delivery or completion dates. 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	\$133,800	\$133,800	\$334,400	\$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.

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.

3.20 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).

3.21 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.

3.22 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*.

3.23 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.

3.24 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.ni.ca/guidance/documents>.

3.25 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.

3.26 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 Surety

6.2.1 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 per 6.2.2 below.

The terms of the bid security will be invoked and the amount retained by the Owner if: the Tenderer fails to enter into a formal agreement, where one is specified, when notified of the award of the Contract within the tender validity period; or fails to provide the required Performance Bond and Labour and Materials Payment Bond within the time specified

6.2.2 Public Work's Surety

Within seven (7) days of the issuance of the letter of acceptance, the preferred Bidder shall obtain and deliver to the Owner a Performance Bond in the amount of 50 percent of the bid price (HST Excluded) which guarantees the successful and complete performance of the Work. The Performance Bond is required as a condition of bid award. In lieu of a Performance Bond an approved certified cheque in the amount of 10 percent of the bid price may, at their option, be accepted for retention by the Owner until the successful completion of the Contract. The certified cheque will be retained until satisfactory completion of the Work including the warranty period after which it will be returned to the Contractor. Performance Bond or other such security will not be required for a contract value of \$100,000 or less. No Work is to be undertaken while the above performance security remains outstanding.

Within seven (7) days of issuance of the letter of acceptance, the preferred Bidder shall obtain and deliver to the Owner a Labour and Materials Payment Bond in the amount of 50 percent of the bid price (HST Excluded). The Labour and Materials Payment Bond is required as a condition of the bid award. In lieu of a Labour and Materials Payment Bond, an approved certified cheque in the amount 10 percent of the bid price may, at their option, be accepted for retention by the Owner until successful completion of the Contract. The certified cheque will be retained until substantial completion of the Work as defined by the Mechanics Lien Act and upon receipt of an acceptable statutory declaration form stating that all labour and material obligations due and payable under the Work have been discharged, after which it will then be returned to the Contractor. Labour and Materials

Payment Bond or other such security will not be required for a contract value of \$100,000 or less. No Work is to be undertaken while the above labour and materials security remains outstanding.

No interest will be paid to the preferred Bidder for any certified cheques on deposit during the period of retention.

The cost of all bid, performance and labour and materials security shall be included in the bid price

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 date 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.

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
PROPOSER ACKNOWLEDGES
HAVING READ, UNDERSTOOD AND
AGREED TO THE TERMS AND
CONDITIONS OF THIS DOCUMENT**

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:

The scope of work for Price A, Price B and Price C is outlined in the contract documents - see specification section 01 11 00 Summary of Works. The Owner reserves the right to delete any or all parts of this tender and award individual and/or combined parts.		
	Contract Bid (HST Excluded)	
Price A: Subtotal		HST EXCLUDED
Price B: Sum of Allowances (Section 01 21 00)	\$50,000.00	HST EXCLUDED
Price C: Total: [\$(A+B)]		HST EXCLUDED

I/We agree to commence work within two (2) weeks after the acceptance of my/our Bid and complete the work in _____ 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:

TFM-044-25: Bruneau Centre,
Heating Levels 1 and Level 2.
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 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.

[illegible]



DEPARTMENT OF FACILITIES MANAGEMENT

GENERAL CONDITIONS

AND

AGREEMENT BETWEEN OWNER AND CONTRACTOR

FOR

THE STIPULATED PRICE CONTRACT

**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 (inclusive 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 (inclusive 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 included) 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 included) 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.

PROCUREMENT AND CONTRACTING DOCUMENTS GROUP

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- M-1.1 LEVEL 1 FLOOR PLAN - NEW HYDRONIC PIPING LAYOUT
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- M-5.1 MECHANICAL DETAILS, SCHEDULES & LEGEND

END OF SECTION

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.
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 - 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

Project Identification: IIC-516-19 MUN Bruneau Centre Heating Upgrades

- 1. Project Location: Bruneau Centre

- B. Owner: Memorial University of Newfoundland
 - 1. Owner's Representative: Department of Facilities Management, Tel. 709-853-7012
- C. The Work consists of the following:
 - 1. The Work includes supply, installation and testing of reheat hydronic heating coils, piping and ductwork and controls modifications. The Contractor shall include all cutting, patching, ceiling removal and replacement, and provision of access required to perform the Work.

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 1 phase.
- B. Before commencing Work of each phase, submit a schedule showing the sequence, commencement and completion dates, and move-out and -in dates of Owner's personnel for all phases of the Work.

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-Furnished Products:
 - 1. No Owner-furnished products.

1.9 USE OF PREMISES

- A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.
- B. 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. Owner Occupancy: Allow for Owner occupancy of Project site and use by the public.
 - 2. 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.
- C. 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. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day 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.

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 15 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 WORK.
 - 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 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.

1.22 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.

1.23 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.

1.24 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.

1.25 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.

1.26 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.

1.27 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.

1.28 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.

1.29 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.

1.30 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.

1.31 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.**

1.32 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.

1.33 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 CASH ALLOWANCES

- .1 Include in Contract Price, cash allowances as stated herein:
 - Cash allowance to cover costs for \$50,000.
- .2 Expend each allowance as directed by Owner.
- .3 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing Work.
- .4 Each cash allowance will be adjusted to actual cost as defined hereunder and contract price will be amended accordingly by written order.
- .5 Contract Price will be adjusted by written order to provide for an excess or deficit to each cash allowance.
- .6 Progress payments for work and material authorized under cash allowances will be made in accordance with contract terms of payment.
- .7 The Contract Price and not cash allowance, includes contractor's overhead and profit in connection with such cash allowance.
- .8 Progress payments on accounts of work authorized under cash allowances shall be included in monthly certificate for payment.
- .9 Schedule shall be prepared jointly by Owner and Contractor to show when items called for under cash allowances must be authorized by Owner for ordering purposes so that progress of work will not be delayed.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

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 for substitutions.
- .2 Types of items you will not find described in this Section:
 - .1 Products selected under an allowance.
 - .2 Requirements for submitting comparable product submittals for products by listed manufacturers.
 - .3 Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- .1 Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - .1 Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - .2 Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- .1 Substitution Requests: Submit three 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:
 - .1 Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - .2 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.
 - .3 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.
 - .4 Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - .5 Samples, where applicable or requested.
 - .6 Certificates and qualification data, where applicable or requested.
 - .7 List of similar installations for completed projects with project names and addresses and names and addresses of Owner's Representatives and owners.
 - .8 Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - .9 Research reports evidencing compliance with building code in effect for Project.

- .10 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.
 - .11 Cost information, including a proposal of change, if any, in the Contract Sum.
 - .12 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.
 - .13 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 10 working days of receipt of a request for substitution. Owner's Representative will notify Contractor of acceptance or rejection of proposed substitution within 15 working days of receipt of request, or 10 working days after receipt of additional information or documentation, whichever is later.
- .1 Forms of Acceptance: Change Order, Construction Change Directive, or Owner's Representative's Supplemental Instructions for minor changes in the Work.
- 1.5 QUALITY ASSURANCE
- .1 Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.
- 1.6 PROCEDURES
- .1 Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- .1 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:
 - .1 Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - .2 Substitution request is fully documented and properly submitted.
 - .3 Requested substitution will not adversely affect Contractor's construction schedule.
 - .4 Requested substitution has received necessary approvals of authorities having jurisdiction.
 - .5 Requested substitution is compatible with other portions of the Work.
 - .6 Requested substitution has been coordinated with other portions of the Work.
 - .7 Requested substitution provides specified warranty.
 - .8 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.
- .2 Substitutions for Convenience: Owner's Representative will consider requests for substitution if received within 15 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:
 - .1 Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Owner's Representative for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - .2 Requested substitution does not require extensive revisions to the Contract Documents.
 - .3 Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - .4 Substitution request is fully documented and properly submitted.
 - .5 Requested substitution will not adversely affect Contractor's construction schedule.
 - .6 Requested substitution has received necessary approvals of authorities having jurisdiction.
 - .7 Requested substitution is compatible with other portions of the Work.
 - .8 Requested substitution has been coordinated with other portions of the Work.
 - .9 Requested substitution provides specified warranty.
 - .10 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.

PART 3 - EXECUTION (Not Used)

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 for handling and processing Contract modifications.
- .2 Types of items you will not find described in this Section:
 - .1 Administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- .1 Owner's Representative will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 CONTENPLATED CHANGE ORDERS

- .1 Owner-Initiated Contemplated Change Order: Owner's Representative will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - .1 Proposal Requests issued by Owner's Representative are not instructions either to stop work in progress or to execute the proposed change.
 - .2 Within time specified in Proposal Request or 10 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - .1 Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - .2 Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
 - .3 Include costs of labour and supervision directly attributable to the change.
 - .4 Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - .5 Quotation Form: Use forms acceptable to Owner's Representative.
- .2 Contractor-Initiated Contemplated Change Order: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Owner's Representative.
 - .1 Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - .2 Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - .3 Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
 - .4 Include costs of labour and supervision directly attributable to the change.
 - .5 Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- .6 Comply with requirements in Division 01 Section *Substitution Procedures* if the proposed change requires substitution of one product or system for product or system specified.
- .7 Proposal Request Form: Use form acceptable to Owner's Representative.

1.5 ADMINISTRATIVE CHANGE ORDERS

- .1 Allowance Adjustment: Refer to Division 01 Section *Allowances* for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- .2 Unit Price Adjustment: Refer to Division 01 Section *Unit Prices* for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.

1.6 CHANGE ORDER PROCEDURES

- .1 On Owner's approval of a Proposal Request, Owner's Representative will issue a Change Order for signatures of Owner and Contractor.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- .1 Construction Change Directive: Owner's Representative may issue a Construction Change Directive as may be permitted in the Contract. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - .1 Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- .2 Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - .1 After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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 necessary to prepare and process Applications for Payment.
- .2 Types of items you will not find described in this Section:
 - .1 Procedural requirements governing the handling and processing of allowances.
 - .2 Administrative procedures for handling changes to the contract.
 - .3 Administrative requirements governing the preparation and submittal of the contractor's construction schedule.
 - .4 Administrative requirements governing the preparation and submittal of the submittal schedule.
 - .5 Administrative requirements governing submittal of cost breakdown information required for leed documentation.

1.3 DEFINITIONS

- .1 Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- .1 Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - .1 Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - .1 Application for Payment forms with continuation sheets.
 - .2 Submittal schedule.
 - .3 Items required to be indicated as separate activities in Contractor's construction schedule.
 - .2 Submit the schedule of values to Owner's Representative at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- .2 Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - .1 Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - .1 Related Specification Section or Division.
 - .2 Description of the Work.
 - .3 Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - .2 Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.

- .1 Include separate line items under principal subcontracts for sustainability documentation for LEED certification, if applicable, and other project closeout requirements in an amount totalling not less than five percent of the Contract Sum and subcontract amount.
- .3 Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- .4 Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - .1 Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
- .5 Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
- .6 Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - .1 Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- .7 Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- .1 Each Application for Payment shall be consistent with previous applications and payments as certified by Owner's Representative and paid for by Owner.
 - .1 Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- .2 Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- .3 Application for Payment Forms: Use forms acceptable to Owner's Representative and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.
- .4 Application Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf of Contractor. Owner's Representative will return incomplete applications without action.
 - .1 Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - .2 Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - .3 Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - .4 Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- .5 Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - .1 Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - .2 Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - .3 Provide summary documentation for stored materials indicating the following:
 - .1 Materials previously stored and included in previous Applications for Payment.
 - .2 Work completed for this Application utilizing previously stored materials.

- .3 Additional materials stored with this Application.
 - .4 Total materials remaining stored, including materials with this Application.
- .6 Transmittal: Submit two signed original copies of each Application for Payment to Owner's Representative by a method ensuring receipt within 24 hours. Provide current Letter of Good Standing from Work Place Health and Safety authority.
 - .1 Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- .7 Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - .1 List of subcontractors.
 - .2 Schedule of values.
 - .3 Contractor's construction schedule (preliminary if not final).
 - .4 Products list (preliminary if not final).
 - .5 Schedule of unit prices.
 - .6 Submittal schedule (preliminary if not final).
 - .7 List of Contractor's staff assignments.
 - .8 List of Contractor's principal consultants.
 - .9 Copies of building permits.
 - .10 Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - .11 Initial progress report.
 - .12 Report of preconstruction conference.
- .8 Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - .1 Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
- .9 Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - .1 Evidence of completion of Project closeout requirements.
 - .2 Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - .3 Updated final statement, accounting for final changes to the Contract Sum.
 - .4 Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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 provisions for coordinating construction operations on Project including, but not limited to, the following:
 - .1 General project coordination procedures.
 - .2 Administrative and supervisory personnel.
 - .3 Coordination drawings.
 - .4 Requests for Information (RFIs).
 - .5 Project Web Site.
 - .6 Project meetings.
- .2 Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- .3 Types of items you will not find described in this Section:
 - .1 Description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
 - .2 Preparing and submitting Contractor's construction schedule.
 - .3 Procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - .4 Coordinating closeout of the Contract.
 - .5 Coordinating the Work with Owner's commissioning authority.

1.3 DEFINITIONS

- .1 RFI: Request from Owner, Owner's Representative, or Contractor seeking information from each other during construction.

1.4 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.
 - .1 Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - .2 Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - .3 Make adequate provisions to accommodate items scheduled for later installation.
- .2 Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - .1 Preparation of Contractor's construction schedule.

- .2 Preparation of the schedule of values.
- .3 Installation and removal of temporary facilities and controls.
- .4 Delivery and processing of submittals.
- .5 Progress meetings.
- .6 Preinstallation conferences.
- .7 Project closeout activities.
- .8 Startup and adjustment of systems.
- .9 Project closeout activities.

- .3 Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - .1 Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- .1 Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - .1 Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - .1 Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - .2 Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - .3 Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - .4 Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - .5 Indicate required installation sequences.
 - .6 Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Owner's Representative indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- .2 Coordination Drawing Organization: Organize coordination drawings as follows:
 - .1 Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 - .2 Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 - .3 Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
 - .4 Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 - .5 Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 - .6 Mechanical and Plumbing Work: Show the following:

- .1 Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
- .2 Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
- .3 Fire-rated enclosures around ductwork.
- .7 Electrical Work: Show the following:
 - .1 Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
 - .2 Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - .3 Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - .4 Location of pull boxes and junction boxes, dimensioned from column center lines.
- .8 Fire Protection System: Show the following:
 - .1 Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
- .9 Review: Owner's Representative will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Owner's Representative determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Owner's Representative will so inform the Contractor, who shall make changes as directed and resubmit.
- .10 Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section *Submittal Procedures*.

1.6 KEY PERSONNEL

- .1 Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - .1 Post copies of list in project meeting rooms, in any temporary field office, and by any and all temporary telephones. Keep list current at all times.

1.7 REQUESTS FOR INFORMATION (RFIs)

- .1 General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - .1 Owner's Representative will return RFIs submitted to Owner's Representative by other entities controlled by Contractor with no response.
 - .2 Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- .2 Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - .1 Project name.
 - .2 Project number.
 - .3 Date.
 - .4 Name of Contractor.
 - .5 Name of Owner's Representative.
 - .6 RFI number, numbered sequentially.
 - .7 RFI subject.
 - .8 Specification Section number and title and related paragraphs, as appropriate.
 - .9 Drawing number and detail references, as appropriate.
 - .10 Field dimensions and conditions, as appropriate.

- .11 Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - .12 Contractor's signature.
 - .13 Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - .1 Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
 - .3 RFI Forms: Contractor's form acceptable to the Owner's Representative.
 - .4 Owner's Representative's Action: Owner's Representative will review each RFI, determine action required, and respond. Allow seven working days for Owner's Representative's response for each RFI. RFIs received by Owner's Representative after 1:00 p.m. will be considered as received the following working day.
 - .1 The following RFIs will be returned without action:
 - .1 Requests for approval of submittals.
 - .2 Requests for approval of substitutions.
 - .3 Requests for coordination information already indicated in the Contract Documents.
 - .4 Requests for adjustments in the Contract Time or the Contract Sum.
 - .5 Requests for interpretation of Owner's Representative's actions on submittals.
 - .6 Incomplete RFIs or inaccurately prepared RFIs.
 - .2 Owner's Representative's action may include a request for additional information, in which case Owner's Representative's time for response will date from time of receipt of additional information.
 - .3 Owner's Representative's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section *Contract Modification Procedures*.
 - .1 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.
 - .5 On receipt of Owner's Representative's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Owner's Representative within seven days if Contractor disagrees with response.
- 1.8 PROJECT MEETINGS
- .1 General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - .1 Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Owner's Representative of scheduled meeting dates and times.
 - .2 Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - .3 Minutes: Entity responsible for conducting meeting will 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.
 - .2 Preconstruction Conference: Owner's Representative will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Owner's Representative, but no later than 15 days after execution of the Agreement.
 - .1 Conduct the conference to review responsibilities and personnel assignments.
 - .2 Attendees: Authorized representatives of Owner, Owner's Commissioning Authority if applicable, Owner's Representative, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - .3 Agenda: Discuss items of significance that could affect progress, including the following:
 - .1 Tentative construction schedule.

- .2 Phasing.
- .3 Critical work sequencing and long-lead items.
- .4 Designation of key personnel and their duties.
- .5 Lines of communications.
- .6 Procedures for processing field decisions and Change Orders.
- .7 Procedures for RFIs.
- .8 Procedures for testing and inspecting.
- .9 Procedures for processing Applications for Payment.
- .10 Distribution of the Contract Documents.
- .11 Submittal procedures.
- .12 Sustainable design requirements.
- .13 Preparation of record documents.
- .14 Use of the premises and existing building.
- .15 Work restrictions.
- .16 Working hours.
- .17 Owner's occupancy requirements.
- .18 Responsibility for temporary facilities and controls.
- .19 Procedures for moisture and mold control.
- .20 Procedures for disruptions and shutdowns.
- .21 Construction waste management and recycling.
- .22 Parking availability.
- .23 Office, work, and storage areas.
- .24 Equipment deliveries and priorities.
- .25 First aid.
- .26 Security.
- .27 Progress cleaning.
- .4 Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- .3 Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - .1 Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner's Representative, and Owner's Commissioning Authority if applicable, of scheduled meeting dates.
 - .2 Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - .1 Contract Documents.
 - .2 Options.
 - .3 Related RFIs.
 - .4 Related Change Orders.
 - .5 Purchases.
 - .6 Deliveries.
 - .7 Submittals.
 - .8 Review of mockups.
 - .9 Possible conflicts.
 - .10 Compatibility problems.
 - .11 Time schedules.
 - .12 Weather limitations.
 - .13 Manufacturer's written recommendations.
 - .14 Warranty requirements.
 - .15 Compatibility of materials.

- .16 Acceptability of substrates.
- .17 Temporary facilities and controls.
- .18 Space and access limitations.
- .19 Regulations of authorities having jurisdiction.
- .20 Testing and inspecting requirements.
- .21 Installation procedures.
- .22 Coordination with other work.
- .23 Required performance results.
- .24 Protection of adjacent work.
- .25 Protection of construction and personnel.
- .3 Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- .4 Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
- .5 Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- .4 Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner and Owner's Representative, but no later than thirty days prior to the scheduled date of Substantial Completion.
 - .1 Conduct the conference to review requirements and responsibilities related to Project closeout.
 - .2 Attendees: Authorized representatives of Owner, Owner's Commissioning Authority if applicable, Owner's Representative, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - .3 Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - .1 Preparation of record documents.
 - .2 Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - .3 Submittal of written warranties.
 - .4 Requirements for preparing sustainable design documentation.
 - .5 Requirements for preparing operations and maintenance data.
 - .6 Requirements for demonstration and training.
 - .7 Preparation of Contractor's punch list.
 - .8 Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - .9 Submittal procedures.
 - .10 Coordination of separate contracts.
 - .11 Owner's partial occupancy requirements.
 - .12 Installation of Owner's furniture, fixtures, and equipment.
 - .13 Responsibility for removing temporary facilities and controls.
 - .4 Minutes: Entity conducting meeting will record and distribute meeting minutes.
- .5 Progress Meetings: Conduct progress meetings at monthly intervals.
 - .1 Coordinate dates of meetings with preparation of payment requests.
 - .2 Attendees: In addition to representatives of Owner, Owner's Commissioning Authority if applicable and Owner's Representative, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - .3 Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- .1 Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - .1 Review schedule for next period.
- .2 Review present and future needs of each entity present, including the following:
 - .1 Interface requirements.
 - .2 Sequence of operations.
 - .3 Status of submittals.
 - .4 Deliveries.
 - .5 Off-site fabrication.
 - .6 Access.
 - .7 Site utilization.
 - .8 Temporary facilities and controls.
 - .9 Progress cleaning.
 - .10 Quality and work standards.
 - .11 Status of correction of deficient items.
 - .12 Field observations.
 - .13 Status of RFIs.
 - .14 Status of proposal requests.
 - .15 Pending changes.
 - .16 Status of Change Orders.
 - .17 Pending claims and disputes.
 - .18 Documentation of information for payment requests.
- .4 Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - .1 Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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 for documenting the progress of construction during performance of the Work, including the following:
 - .1 Start-up construction schedule.
 - .2 Contractor's construction schedule.
 - .3 Daily construction reports.
 - .4 Material location reports.
 - .5 Field condition reports.
 - .6 Special reports.
- .2 Types of items you will not find described in this Section:
 - .1 Procedures for submitting schedules and reports.
 - .2 Requirements for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

- .1 Format for Submittals: Submit required submittals in the following format:
 - .1 Three paper copies, one pdf and one editable copy.
- .2 Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- .3 Daily Construction Reports: Submit at weekly intervals.
- .4 Field Condition Reports: Submit at time of discovery of differing conditions.
- .5 Special Reports: Submit at time of unusual event.

1.4 COORDINATION

- .1 Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - .1 Secure time commitments for performing critical elements of the Work from entities involved.
 - .2 Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- .1 Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

- .1 Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
 - .2 Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - .1 Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Owner's Representative.
 - .2 Procurement Activities: Include procurement process activities for any long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - .3 Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section *Submittal Procedures* in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - .4 Start-up and Testing Time: Include not less than 10 days for start-up and testing.
 - .5 Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Owner's Representative's administrative procedures necessary for certification of Substantial Completion.
 - .6 Punch List and Final Completion: Include not more than 30 days for punch list and final completion.
 - .3 Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - .1 Phasing: Arrange list of activities on schedule by phase.
 - .2 Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - .3 Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section *Summary*. Delivery dates indicated stipulate the earliest possible delivery date.
 - .4 Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section *Summary*. Delivery dates indicated stipulate the earliest possible delivery date.
 - .5 Work Stages: Indicate important stages of construction for each major portion of the Work
 - .4 Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, Construction Start Date, Substantial Completion, and final completion.
- 2.2 START-UP CONSTRUCTION SCHEDULE
- .1 Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule within seven days of date established for commencement of the Work.
 - .2 Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)
- .1 Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the start-up construction schedule and additional information received since the start of Project.
 - .2 Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - .1 For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 REPORTS

- .1 Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - .1 List of subcontractors at Project site.
 - .2 List of separate contractors at Project site.
 - .3 Approximate count of personnel at Project site.
 - .4 Equipment at Project site.
 - .5 Material deliveries.
 - .6 High and low temperatures and general weather conditions, including presence of rain or snow.
 - .7 Accidents.
 - .8 Meetings and significant decisions.
 - .9 Unusual events (refer to special reports).
 - .10 Stoppages, delays, shortages, and losses.
 - .11 Meter readings and similar recordings.
 - .12 Emergency procedures.
 - .13 Orders and requests of authorities having jurisdiction.
 - .14 Change Orders received and implemented.
 - .15 Construction Change Directives received and implemented.
 - .16 Services connected and disconnected.
 - .17 Equipment or system tests and startups.
 - .18 Partial completions and occupancies.
 - .19 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 Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- .1 General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- .2 Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- .1 Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting.
 - .1 Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - .2 Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - .3 As the Work progresses, indicate final completion percentage for each activity.

- .2 Distribution: Distribute copies of approved schedule to Owner's Representative Owner, inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - .1 Post copies in Project meeting rooms and temporary field offices.
 - .2 When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

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 for the following:
 - .1 Preconstruction photographs.
 - .2 Periodic construction photographs.
- .2 Types of items you will not find described in this Section:
 - .1 Final completion construction photographs.
 - .2 Preconstruction video recordings.
 - .3 Periodic construction video recordings.
 - .4 Web-based construction photographic documentation.
 - .5 Procedures for unit prices for extra photographs.
 - .6 Procedures for submitting photographic documentation.
 - .7 Procedures for submitting photographic documentation as project record documents at project closeout.
 - .8 Submitting video recordings of demonstration of equipment and training of owner's personnel.
 - .9 Photographic documentation before building demolition operations commence.
 - .10 Photographic documentation before selective demolition operations commence.
 - .11 Photographic documentation before site clearing operations commence.

1.3 SUBMITTALS

- .1 Digital Photographs: Submit image files within three days of taking photographs.
 - .1 Identification: Provide the following information with submission:
 - .1 Name of Project.
 - .2 Name of Contractor.
 - .3 Date photograph was taken.
 - .4 Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1.4 USAGE RIGHTS

- .1 Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- .1 Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 6 megapixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- .1 General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
- .2 Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - .1 Date and Time: Include date and time in file name for each image.
 - .2 Field Office Images: Maintain one set of images accessible in any field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Owner's Representative.
- .3 Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Owner's Representative.
 - .1 Take not less than 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - .2 Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- .4 Periodic Construction Photographs: Take not less than 20 photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- .5 Owner's Representative-Directed Construction Photographs: From time to time, Owner's Representative will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

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 Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- .2 Related Sections:
 - .1 Division 01 Section *Payment Procedures* for submitting Applications for Payment and the schedule of values.
 - .2 Division 01 Section *Construction Progress Documentation* for submitting schedules and reports, including Contractor's construction schedule.
 - .3 Division 01 Section *Operation and Maintenance Data* for submitting operation and maintenance manuals.
 - .4 Division 01 Section *Project Record Documents* for submitting record Drawings, record Specifications, and record Product Data.
 - .5 Division 01 Section *Demonstration and Training* for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- .1 Action Submittals: Written and graphic information and physical samples that require Owner's Representative's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- .2 Informational Submittals: Written and graphic information and physical samples that do not require Owner's Representative's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.
- .3 File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- .4 Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- .1 Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Owner's Representative and additional time for handling and reviewing submittals required by those corrections.
 - .1 Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

- .2 Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
- .3 Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - .1 Submit revised submittal schedule to reflect changes in current status and timing for submittals.
- .4 Format: Arrange the following information in a tabular format:
 - .1 Scheduled date for first submittal.
 - .2 Specification Section number and title.
 - .3 Submittal category: Action, informational.
 - .4 Name of subcontractor.
 - .5 Description of the Work covered.
 - .6 Scheduled date for Owner's Representative's final release or approval.
 - .7 Scheduled dates for installation.
 - .8 Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- .1 Owner's Representative's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Owner's Representative for Contractor's use in preparing submittals.
 - .1 Owner's Representative will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - .1 Owner's Representative makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - .2 Digital Drawing Software Program: The Contract Drawings are available in Autodesk AutoCAD 2014 format.
 - .3 Only the following plot files will be furnished for each appropriate discipline:
 - .1 Floor plans.
- .2 Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - .1 Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - .2 Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - .3 Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
- .3 Processing Time: 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.
 - .1 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.
 - .2 Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - .3 Resubmittal Review: Allow 15 days for review of each resubmittal.
 - .4 Sequential Review: Where sequential review of submittals by Owner's Representative's consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.
- .4 Identification and Information: Place a permanent label or title block on each submittal item for identification.
 - .1 Indicate name of firm or entity that prepared each submittal on label or title block.
 - .2 Include the following information for processing and recording action taken:

- .1 Project name.
 - .2 Date.
 - .3 Name of Owner's Representative.
 - .4 Name of Contractor.
 - .5 Name of subcontractor.
 - .6 Name of supplier.
 - .7 Name of manufacturer.
 - .8 Submittal number or other unique identifier, including revision identifier.
 - .1 Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
 - .9 Number and title of appropriate Specification Section.
 - .10 Drawing number and detail references, as appropriate.
 - .11 Location(s) where product is to be installed, as appropriate.
 - .12 Other necessary identification.
- .5 Options: Identify options requiring selection by the Owner's Representative.
- .6 Deviations: Identify deviations from the Contract Documents on submittals.
- .7 Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Owner's Representative will discard submittals received from sources other than Contractor.
- .1 Transmittal Form: Provide locations on form for the following information:
 - .1 Project name.
 - .2 Date.
 - .3 Category and type of submittal.
 - .4 Submittal purpose and description.
 - .5 Specification Section number and title.
 - .6 Indication of full or partial submittal.
 - .7 Remarks.
 - .8 Signature of transmitter.
 - .2 On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Owner's Representative on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- .8 Resubmittals: Make resubmittal in same form and number of copies as initial submittal.
- .1 Note date and content of previous submittal.
 - .2 Note date and content of revision in label or title block and clearly indicate extent of revision.
 - .3 Resubmit submittals until they are marked with approval notation from Owner's Representative's action stamp.
- .9 Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- .10 Use for Construction: Use only final submittals that are marked with approval notation from Owner's Representative's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- .1 General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - .1 Submittals in General; Submit PDF's of each submittal, unless otherwise indicated.
 - .2 Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section *Closeout Procedures*.
 - .3 Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section *Quality Requirements*.
- .2 Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - .1 If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - .2 Mark each copy of each submittal to show which products and options are applicable.
 - .3 Include the following information, as applicable:
 - .1 Manufacturer's catalog cuts.
 - .2 Manufacturer's product specifications.
 - .3 Statement of compliance with specified referenced standards.
 - .4 Testing by recognized testing agency.
 - .5 Application of testing agency labels and seals.
 - .6 Notation of coordination requirements.
 - .7 Availability and delivery time information.
 - .4 For equipment, include the following in addition to the above, as applicable:
 - .1 Wiring diagrams showing factory-installed wiring.
 - .2 Printed performance curves.
 - .3 Operational range diagrams.
 - .4 Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - .5 Submit Product Data before or concurrent with Samples.
- .3 Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - .1 Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - .1 Identification of products.
 - .2 Schedules.
 - .3 Compliance with specified standards.
 - .4 Notation of coordination requirements.
 - .5 Notation of dimensions established by field measurement.
 - .6 Relationship and attachment to adjoining construction clearly indicated.
 - .7 Seal and signature of professional engineer if specified.
 - .2 Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings whenever possible on sheets not larger than 11 x17".
 - .1 .
- .4 Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section *Construction Progress Documentation*.
- .5 Application for Payment: Comply with requirements specified in Division 01 Section *Payment Procedures*.

- .6 Schedule of Values: Comply with requirements specified in Division 01 Section *Payment Procedures*.
 - .7 Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - .1 Name, address, and telephone number of entity performing subcontract or supplying products.
 - .2 Number and title of related Specification Section(s) covered by subcontract.
 - .3 Drawing number and detail references, as appropriate, covered by subcontract.
 - .8 Sustainability Submittals: Comply with requirements specified in Division 01 Section *Sustainable Design Requirements*.
 - .9 Coordination Drawings: Comply with requirements specified in Division 01 Section *Project Management and Coordination*.
 - .10 Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section *Quality Requirements*.
 - .11 Maintenance Data: Comply with requirements specified in Division 01 Section *Operation and Maintenance Data*.
- 2.2 DELEGATED-DESIGN SERVICES
- .1 Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - .1 If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Owner's Representative.
 - .2 Provide submittals and certificates sealed with by a professional identified by the Section who is licensed to practice in the project's jurisdiction; signifying compliance with the performance and design criteria in the Contract Documents. Indicate list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- .1 Action and Informational Submittals: 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 .
- .2 Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section *Closeout Procedures*.
- .3 Approval Stamp: 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.

3.2 OWNER'S REPRESENTATIVE'S ACTION

- .1 General: Owner's Representative will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- .2 Action Submittals: 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.
- .3 Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

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:
 - 1. Health and safety requirements for projects located in Newfoundland and Labrador.

1.3 REFERENCES

- A. Code and standards referenced in this section refer to the latest edition thereof.
- B. Canadian Standards Association (CSA)
 - 1. CSA S269.1 Falsework for Construction Purposes.
 - 2. CAN/CSA-Z259.1 Safety Belts and Lanyards.
 - 3. CAN/CSA-Z259.10 Full body Harnesses.
 - 4. CAN/CSA-Z259.11 Shock Absorbers for Personal Fall Arrest Systems.
 - 5. CAN/CSA-Z259.2, Fall Arresting Devices, Personnel Lowering Devices and Lifelines.
 - 6. FCC No. 301 Standard for Construction Operations.
 - 7. CSA Z275.2 Occupational Safety Code for Diving Operations.
 - 8. CSA Z275.4 Competency Standard for Divers Operations.
- C. FCC No. 302 Standard for Welding and Cutting.
- D. Transportation of Dangerous Goods Act Regulations.
- E. Newfoundland Occupational Health and Safety Act, Amended
- F. Consolidated Newfoundland and Regulations 1149 WMIS Regulations Under the Occupational Health and Safety Act
- G. Consolidated Newfoundland and Regulations 1165 Occupational Health and Safety Regulations under the Occupational Health and Safety Act.
- H. Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- I. National Building Code of Canada.

1.4 SUBMITTALS

- A. At least 10 (ten) working days prior to commencing any site work: submit to Owner's Representative copies of:
 - 1. A complete Site Specific Hazard Assessment and Safety Program Table of Contents.
 - 2. **Including requirements as outlined by the Department of Environmental Health & Safety, See APPENDIX A.**
- B. Acceptance of the Project Health and Safety Hazard Assessment and Management Plan and other submitted documents by the Owner's Representative shall only be viewed as acknowledgement that the contractor has submitted the required documentation under this specification section.
- C. Owner's Representative makes no representation and provides no warranty for the accuracy, completeness and legislative compliance of the Project Health and Safety Hazard Management Plan and other submitted documents by this acceptance.
- D. Responsibility for errors and omissions in the Project Health and Safety Hazard Assessment and Management Plan and other submitted documents is not relieved by acceptance by Owner's Representative.

1.5 OCCUPATIONAL HEALTH AND SAFETY (PROJECT HEALTH AND SAFETY HAZARD ASSESSMENT AND MANAGEMENT PLANS)

- A. Conduct operations in accordance with latest edition of the Newfoundland Occupational Health and Safety (OH&S) Act and Regulations.
- B. Prepare a detailed Project Health and Safety Hazard Assessment and Management Plan for the Owner. Assessment shall identify, evaluate and control job specific hazards and the necessary control measures to be implemented for managing hazards.
- C. Provide a copy of the Project Health and Safety Hazard Assessment and Management Plan upon request to Occupational Health and Safety Branch, Department of Labour, Province of Newfoundland and Labrador and the Owner.
- D. The written Health and Safety Hazard Assessment and Management Plan shall incorporate the following:
 - 1. A site-specific health and safety plan, refer to clause 1.6 Site-Specific Health and Safety Hazard Assessment and Management Plan of this section for requirements.
 - 2. An organizational structure which shall establish the specific chain of command and specify the overall responsibilities of contractor's employees at the work site.
 - 3. A comprehensive work plan which shall:
 - a. define work tasks and objectives of site activities/operations and the logistics and resources required to reach these tasks and objectives
 - b. establish personnel requirements for implementing the plan, and
 - c. establish site specific training and notification requirements and schedules.
 - 4. A personal protected equipment (PPE) Program which shall detail PPE:
 - a. Selection criteria based on site hazards.
 - b. Use, maintenance, inspection and storage requirements and procedures.
 - c. Decontamination and disposal procedures.

- d. Inspection procedures prior to during and after use, and other appropriate medical considerations.
 - e. Limitations during temperature extremes, heat stress and other appropriate medical consideration.
- 5. An emergency response procedure, refer to Clause 1.7 Supervision and Emergency Response Procedure of this section for requirements.
- 6. A hazard communication program for informing workers, visitors and individuals outside of the work area as required.
- 7. A diving program which shall contain standard operating procedures to be followed in the diving operation.
- 8. A health and safety training program.
- 9. General safety rules.
- E. Periodically review and modify as required each component of the Project Health and Safety Hazard Assessment and Management Plan when a new hazard is identified during completion of work and when an error or omission is identified in any part of the Project Health and Safety Hazard Assessment and Management Plan.
- F. Implement all requirements of the Project Health and Safety Hazard Assessment and Management Plan.
 - 1. Ensure that every person entering the project site is informed of requirements under the Project Health and Safety Hazard Assessment and Management Plan.
 - 2. Take all necessary measures to immediately implement any engineering controls, administrative controls, personal protective equipment required or termination of work procedures to ensure compliance with the Project Health and Safety Hazard Assessment and Management Plan.

1.6 SITE SPECIFIC HEALTH AND SAFETY PLAN

- A. Prepare a detailed site Specific Project Health and Safety Plan which shall:
 - 1. Contain certain hazard assessment results.
 - 2. Identify engineering and administrative demonstrative controls (work-practices and procedures) to be implemented for managing identified and potential hazards, and comply with applicable federal and provincial legislation and more stringent requirements that have been specified in these specifications.
- B. Review for completeness the hazard assessment results immediately prior to commencing work, when a new hazard is identified during completion of work and when an error or omission is identified.
 - 1. Be solely responsible for investigating, evaluation and managing any report of actual or potential hazards.
 - 2. Retain copies of all completed hazard assessments at the project site and make available to the Owner's Representative immediately upon request.

1.7 SUPERVISION AND EMERGENCY RESCUE PROCEDURE

- A. Carry out work under the direct supervision of competent persons responsible for safety by ensuring the work complies with the appropriate section of OH&S Act and Regulations
- B. Assign a sufficient number of supervisory personnel to the work site.

- C. Provide a suitable means of communications for workers required to work alone.
- D. Develop an emergency rescue plan for the job site and ensure that supervisors and workers are trained in the emergency rescue plan.
- E. The emergency response plan shall address, as a minimum:
 - 1. Pre-emergency planning.
 - 2. Personnel roles, lines of authority and communication.
 - 3. Emergency recognition and prevention.
 - 4. Safe distances and places of refuge.
 - 5. Site security and control
 - 6. Evacuation routes and procedures
 - 7. Decontamination procedures which are not covered by the site specific safety and health plan.
 - 8. Emergency medical treatment and first aid.
 - 9. Emergency alarm, notification and response procedures including procedures for reporting incidents to local, provincial and federal government departments.
 - 10. PPE and emergency equipment.
 - 11. Procedures for handling emergency incidents.
 - 12. Site specific emergency response training requirements and schedules.
 - 13. For diving operation, include procedures for:
 - a. Managing deteriorating environmental conditions.
 - b. Managing unexpected weather or sea-state condition.
 - c. Evacuation of diver(s) under pressures greater than atmospheric pressure.
 - d. In-water emergency transfers.
 - e. Managing failing of equipment below the surface that impairs the ability of a diver to complete a dive.
 - f. Managing failure of any major component of diving plant or equipment.
 - g. Emergency signalling between divers involved in the diving program and between the diver(s) and the attendants using umbilical, tethers or other suitable methods.
 - h. Mobilizing stand-by divers.
 - i. Mobilizing crafts, stand-by boats and any other devices to be used for rescue.
 - j. Contacting evacuation, rescue, treatment facilities and medical services that will be used in the diving program.
 - k. Operation of emergency power and lighting facilities.
- F. The emergency response procedures shall be rehearsed regularly as part of the overall training program.
- G. Provide adequate first aid facilities for the jobsite and ensure that a minimum number of workers are trained in first aid in accordance with the First Aid Regulations.

1.8 CONTRACTORS SAFETY OFFICER

- A. The contractor's Safety Officer will be solely responsible for the implementation and monitoring of the Project Health and Safety Hazard Assessment and Management Plan, and will have the authority to implement health and safety changes as directed by the Owner's Representative. The Safety Officer shall have as a minimum:
 - 1. Completed training in hazardous occurrence management and response/protocols.
 - 2. Completed training in the use, maintenance of fall protection systems.

3. Completed training in the design and construction of scaffolding.
4. Completed training in confined space entry protocols and techniques.
5. Completed training in First Aid.
6. Have working knowledge of occupational safety and health regulations.
7. Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
8. Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
9. Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.9 HEALTH AND SAFETY COMMITTEE

- A. Establish an Occupational Health and Safety Committee where ten or more workers are employed on the job site as per the OH&S Act and Regulations. Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- C. Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.10 RESPONSIBILITY

- A. Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- B. Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.11 UNFORESEEN HAZARDS

- A. Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction. Advise Owner's Representative verbally and in writing.

1.12 INSTRUCTION AND TRAINING

- A. Workers shall not participate in or supervise any activity on the work site until they have been trained to a level required by this job function and responsibility. Training shall as a minimum thoroughly cover the following:
 1. Federal and Provincial Health and Safety Legislation requirements including roles and responsibilities of workers and person(s) responsible for implementing, monitoring and enforcing health and safety requirements.
 2. Safety and health hazards associated with working on a contaminated site including recognition of symptoms and signs which might indicate over exposure to hazards.
 3. Limitations, use, maintenance and disinfection-decontamination of personal protective equipment associated with completing work.

4. Limitations, use, maintenance and care of engineering controls and equipment.
 5. Limitations and use of emergency notifications and response equipment including emergency response protocol.
 6. Work practices and procedures to minimize the risk of an accident and hazardous occurrence from exposure to a hazard.
- B. Provide and maintain training of workers, as required, by Federal and Provincial legislation.
- C. Provide copies of all safety training certificates, upon request, to Owner's Representative for review, and to be maintained on the worker when they enter the work site.
- D. Authorized visitors shall not access the work site until they have been:
1. Notified of the names of persons responsible for implementing, monitoring and enforcing the Health and Safety Hazard Assessment and Management Plan.
 2. Briefed on safety and health hazards present on the site.
 3. Instructed in the proper use and limitations of personal protective equipment.
 4. Briefed as the emergency response protocol including notification and evacuation process.
 5. Informed of practices and procedures to minimize risks from hazards and applicable to activities performed by visitors.

1.13 CONSTRUCTION SAFETY MEASURES

- A. Observe construction safety measures of National Building Code, latest edition, Provincial Government, OH&S Act and Regulations, Workplace Health and Safety and Compensation Commission and Municipal Authority provided that in any case of conflict or discrepancy more stringent requirements shall apply.
- B. Administer the project in a manner that will ensure, at all times, full compliance with Federal and Provincial Acts, regulations and applicable safety codes and the site Health and Safety Hazard Assessment and Management Plan.
- C. Provide Owner's Representative with copies of all orders, directions and any other documentation, issued by the Provincial Department of Government Services, Occupational Health and Safety branch immediately after receipt.

1.14 POSTING OF DOCUMENTS

- A. Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province and authority having jurisdiction, and in consultation with Owner's Representative.

1.15 HEALTH AND SAFETY MONITORING

- A. Periodic inspections of the contractor's work may be carried out by the Owner's Representative to maintain compliance with the Health and Safety Program. Inspections will include visual inspections as well as testing and sampling as required.
- B. The contractor shall be responsible for any and all costs associated with delays as a result of contractor's failure to comply with the requirements outlined in this section.

1.16 CORRECTION OF NON-COMPLIANCE

- A. Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Owner's Representative.
- B. Provide Owner's Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- C. Owner's Representative may stop work if non-compliance of health and safety regulations is not corrected.

1.17 WHMIS

- A. Ensure that all controlled products are in accordance with the Workplace Hazardous Materials Information System (WHMIS) Regulations and Chemical Substances of the OH&S Act and Regulations regarding use, handling, labelling, storage, and disposal of hazardous materials.
- B. Deliver copies of relevant (Material) Safety Data Sheets (SDS) to job site and the Owner's Representative. The SDS must be acceptable to Labour Canada and Health and Welfare Canada for all controlled products that will be used in the performance of this work.
- C. Train workers required to use or work in close proximity to controlled products as per OH&S Act and Regulations.
- D. Label controlled products at jobsite as per OH&S and Regulations.
- E. Provide appropriate emergency facilities as specified in the SDS where workers might be exposed to contact with chemicals, e.g. eye-wash facilities, emergency shower.
 - 1. Workers to be trained in use of such emergency equipment.
- F. Contractor shall provide appropriate personal protective equipment as specified in the SDS where workers are required to use controlled products.
 - 1. Properly fit workers for personal protective equipment
 - 2. Train workers in care, use and maintenance of personal protective equipment.
- G. No controlled products are to be brought on-site without prior approved SDS.
- H. The SDS are to remain on site at all times.

1.18 OVERLOADING

- A. Ensure no part of work or associated equipment is subjected to loading that will endanger its safety or will cause permanent deformation.

1.19 FALSEWORK

- A. Design and construct falsework in accordance with CSA S269.1.

1.20 SCAFFOLDING

- A. Design, erect and maintain scaffolding in accordance with CSA S269.2 and Sections 91-97 of the OH&S Act and Regulations.
- B. Ensure that fall-restraint or fall-arrest devices are used by all workers working at elevations greater than 3.05 metres above grade or floor level in accordance with CSA Z259.

1.21 PERSONAL PROTECTIVE EQUIPMENT

- A. Ensure workers on the jobsite use personal protective equipment appropriate to the hazards identified in the Hazard Assessment and Management Plan and those workers are trained in the proper care, use, and maintenance of such equipment.
- B. PPE selections shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, task-specific conditions, duration and hazards and potential hazards identified on site.
- C. Provide workers and visitors to the site with proper respiratory protection equipment.
 - 1. No work shall be performed in an area where an airborne contaminant exceeds one half ($\frac{1}{2}$) the IDLH concentration.
 - 2. Respiratory protection shall be provided in accordance with the requirements of the Occupational Health and Safety Branch, Department of Labour of the Province of Newfoundland and Labrador and these specifications.
 - 3. Establish, implement and maintain a respirator inspection and maintenance program.
 - 4. Copies of all respirator owners' maintenance manuals shall be kept at all times at the contractor's site office.
- D. Provide and maintain a supply of dermal protection equipment to allow visitors and all workers proper dermal protection.
 - 1. Dermal protection shall be sufficient to act as a protective barrier between the skin and an airborne contaminant or hazardous material. Dermal protection shall also be provided for all physical hazards.
 - 2. Dermal protection equipment shall not be used after exceeding 75% of the break through time. The break through time shall be based on the contaminant which requires the least amount of time to break through the protective equipment
 - 3. Copies of all dermal protection user specifications, owners and maintenance manuals shall be kept at all times at the contractor's site office.
 - 4. Establish, implement and maintain air inspection program to ensure proper dermal protection in accordance with CSA, NIOSH, U.S. EPA and manufacturer's requirements.
- E. Provide all workers and up to two (2) visitors to the site with proper hearing protection. Workers and visitors shall not be exposed to noise levels greater than 85 dB (A) over an eight hour shift without proper hearing protection.
- F. Provide all workers and up to two (2) visitors to the site with CSA approved eye protection sufficient to act as a protective barrier between the eye and airborne contaminants, hazardous materials and physical hazard.
- G. Provide workers and up to two (2) visitors to the site with CSA approved hard hats.

1.22 EXCAVATION SAFETY

- A. Protect excavations more than 1.25 metres deep against cave-ins or wall collapse by side wall sloping to the appropriate angle of repose, an engineered shoring/sheathing system or an approved trench box.
 - 1. Provide a ladder which can extend from the bottom of the excavation to at least 0.91 metres above the top of the excavation.
- B. Ensure that all excavations less than 1.25 metres deep are effectively protected when hazardous ground movement may be expected.
- C. Design trench boxes, certified by a registered Professional Engineer, and fabricated by a reputable manufacturer. Provide the manufacturer's Depth Certificate Statement permanently affixed. Use trench boxes in strict accordance with manufacturer's instructions and depth certification data.
- D. For excavations deeper than six (6) metres, provide a certificate from a registered Professional Engineer stating that the protection methods proposed have been properly designed in accordance with accepted engineering practice. The engineer's certificate shall verify that the trench boxes, if used, are properly designed and constructed to suit the depth and soil conditions.
 - 1. Ensure that the superintendent and every crew chief, foreperson and lead hand engaged in trenching operations or working in trenches have in his/her possession a copy of the Department of Labour's "Trench Excavation Safety Guide".

1.23 CONFINED SPACE WORK

- A. Comply with requirements of Canada Occupational Safety and Health Regulations, Part XI and Consolidated Regulations Newfoundland and Labrador (CRNL) OH&S 1165/96.
- B. Provide approved air monitoring equipment where workers are working in confined spaces and ensure any test equipment to be used is calibrated, in good working order and used by trained persons.
- C. Develop a confined space entry program specific to the nature of work performed and in accordance with OH&S Act and Regulations and ensure supervisors and workers are trained in the confined space entry program.
 - 1. Ensure that personal protective equipment and emergency rescue equipment appropriate to the nature of the work being performed is provided and used.
- D. Provide and maintain training of workers, as required by the Federal and Provincial Legislation.
- E. Provide Owner's Representative with a copy of an "Entry Permit" for each entry into the confined space to ensure compliance with Federal and Provincial Legislation.

1.24 HAZARDOUS MATERIALS

- A. Should material resembling hazardous materials (asbestos/mould) be encountered during the execution of work and notify Owner's Representative. Do not proceed until written instructions have been received from Owner's Representative.

- B. Unless otherwise noted, for hazardous materials abatement and repair, employ the services of a recognized Environmental Consultant to provide all air monitoring and testing services for regulatory requirements.

1.25 HEAVY EQUIPMENT

- A. Ensure mobile equipment used on jobsite is of the type specified in OH&S Act and Regulations fitted with a Roll Over Protective (ROP) Structure.
- B. Provide certificate of training in Power Line Hazards for operators of heavy equipment.
- C. Obtain written clearance from the power utility where equipment is used in close proximity to (within 5.5 metres) overhead or underground power lines.
- D. Equip cranes with:
 - 1. A mechanism which will effectively prevent the hook assembly from running into the top boom pulley.
 - 2. A legible load chart.
 - 3. A maintenance log book.

1.26 WORK STOPPAGE

- A. Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations of Work.

PART 2 - PRODUCTS (NOT APPLICABLE)

EXECUTION (NOT APPLICABLE)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 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.

1.3 FIRES

- .1 Fires and burning of rubbish on site not permitted.

1.4 HAZARDOUS MATERIAL HANDLING

- .1 Store and handle hazardous materials in accordance with applicable federal and provincial laws, regulations, codes and guidelines. Store in location that will prevent spillage into the environment
- .2 Label containers to WHMIS requirements and keep MSDS data sheets on site for all hazardous materials.
- .3 Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when storage began.
- .4 Store and handle flammable and combustible materials in accordance with National Fire Code.
- .5 Transport hazardous materials in accordance with federal Transportation of Dangerous Goods Regulations and applicable Provincial regulations.

1.5 DISPOSAL OF WASTES

- .1 Dispose of hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.

1.6 POLLUTION CONTROL

- .1 Control emissions from equipment and plant to local authorities emission requirements.
- .2 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
- .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads and around entire construction site.
- .4 Have appropriate emergency spill response equipment and rapid clean-up kit on site located adjacent to hazardous materials storage area. Provide personal protective equipment required for clean-up.

- .5 Report, spills of petroleum and other hazardous materials as well as accidents having potential of polluting the environment to Federal and Provincial Department of the Environment.
- .6 Notify Owner's Representative and submit a written spill report to Owner's Representative within 24 hours of occurrence.

END OF SECTION 01 35 43

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 for quality assurance and quality control.
- .2 Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - .1 Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - .2 Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - .3 Requirements for Contractor to provide quality-assurance and -control services required by Owner's Representative, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- .3 Types of items you will not find described in this Section:
 - .1 Allowances for testing and inspecting allowances.
 - .2 Developing a schedule of required tests and inspections.
 - .3 Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- .1 Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- .2 Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Owner's Representative.
- .3 Mock-ups: Full size physical assemblies that are constructed on-site. Mock-ups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mock-ups are not Samples. Unless otherwise indicated, approved mock-ups establish the standard by which the Work will be judged.
- .4 Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- .5 Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

- .6 Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- .7 Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- .8 Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- .9 Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - .1 Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- .10 Experienced: When used with an entity or individual, *experienced* means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- .1 Referenced Standards: 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 conflicting 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.

1.5 SUBMITTALS

- .1 Shop Drawings: For laboratory mock-ups, provide plans, sections, and elevations, indicating materials and size of mock-up construction.
 - .1 Indicate manufacturer and model number of individual components.
 - .2 Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 SUBMITTALS

- .1 Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- .2 Contractor's Quality-Control Manager Qualifications: For supervisory personnel.
- .3 Testing Agency Qualifications: For testing agencies specified in *Quality Assurance* Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- .4 Schedule of Tests and Inspections: Prepare in tabular form and include the following:

- .1 Specification Section number and title.
- .2 Entity responsible for performing tests and inspections.
- .3 Description of test and inspection.
- .4 Identification of applicable standards.
- .5 Identification of test and inspection methods.
- .6 Number of tests and inspections required.
- .7 Time schedule or time span for tests and inspections.
- .8 Requirements for obtaining samples.
- .9 Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- .1 Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Owner's Representative. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- .2 Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - .1 Project quality-control manager may also serve as Project superintendent .
- .3 Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- .4 Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:
 - .1 Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - .2 Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority, if applicable.
- .5 Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mock-ups.
- .6 Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Owner's Representative has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- .1 Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - .1 Date of issue.
 - .2 Project title and number.
 - .3 Name, address, and telephone number of testing agency.
 - .4 Dates and locations of samples and tests or inspections.
 - .5 Names of individuals making tests and inspections.
 - .6 Description of the Work and test and inspection method.

- .7 Identification of product and Specification Section.
 - .8 Complete test or inspection data.
 - .9 Test and inspection results and an interpretation of test results.
 - .10 Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - .11 Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - .12 Name and signature of laboratory inspector.
 - .13 Recommendations on retesting and reinspecting.
- .2 Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
- .1 Name, address, and telephone number of technical representative making report.
 - .2 Statement on condition of substrates and their acceptability for installation of product.
 - .3 Statement that products at Project site comply with requirements.
 - .4 Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - .5 Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - .6 Statement whether conditions, products, and installation will affect warranty.
 - .7 Other required items indicated in individual Specification Sections.
- .3 Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
- .1 Name, address, and telephone number of factory-authorized service representative making report.
 - .2 Statement that equipment complies with requirements.
 - .3 Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - .4 Statement whether conditions, products, and installation will affect warranty.
 - .5 Other required items indicated in individual Specification Sections.
- .4 Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- 1.9 QUALITY ASSURANCE
- .1 General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- .2 Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- .3 Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- .4 Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

- .5 Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- .6 Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - .1 Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- .7 Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- .8 Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- .9 Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- .10 Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - .1 Contractor responsibilities include the following:
 - .1 Provide test specimens representative of proposed products and construction.
 - .2 Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - .3 Provide sizes and configurations of test assemblies, mock-ups, and laboratory mock-ups to adequately demonstrate capability of products to comply with performance requirements.
 - .4 Build site-assembled test assemblies and mock-ups using installers who will perform same tasks for Project.
 - .5 Build laboratory mock-ups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - .6 When testing is complete, remove test specimens, assemblies, mock-ups; do not reuse products on Project.
 - .2 Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Owner's Representative, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- .11 Mock-ups: Before installing portions of the Work requiring mock-ups, build mock-ups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - .1 Build mock-ups in location and of size indicated or, if not indicated, as directed by Owner's Representative.
 - .2 Notify Owner's Representative seven days in advance of dates and times when mock-ups will be constructed.
 - .3 Employ supervisory personnel who will oversee mock-up construction. Employ workers that will be employed during the construction at the Project.
 - .4 Demonstrate the proposed range of aesthetic effects and workmanship.
 - .5 Obtain Owner's Representative's approval of mock-ups before starting work, fabrication, or construction.
 - .1 Allow seven days for initial review and each re-review of each mock-up.

- .6 Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed Work.
- .7 Demolish and remove mock-ups when directed, unless otherwise indicated.

1.10 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.
 - .1 Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - .2 Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders; or made directly by the Owner.
 - .3 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 Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - .1 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.
 - .2 Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - .1 Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - .3 Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - .4 Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in triplicate, of each quality-control service.
 - .5 Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - .6 Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- .3 Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section *Submittal Procedures*.
- .4 Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- .5 Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- .6 Testing Agency Responsibilities: Cooperate with Owner's Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - .1 Notify Owner's Representative and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - .2 Determine the location from which test samples will be taken and in which in-situ tests are conducted.

- .3 Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
- .4 Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
- .5 Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
- .6 Do not perform any duties of Contractor.
- .7 Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - .1 Access to the Work.
 - .2 Incidental labor and facilities necessary to facilitate tests and inspections.
 - .3 Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - .4 Facilities for storage and field curing of test samples.
 - .5 Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - .6 Security and protection for samples and for testing and inspecting equipment at Project site.
- .8 Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - .1 Schedule times for tests, inspections, obtaining samples, and similar activities.
- .9 Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .
 - .1 Distribution: Distribute schedule to Owner, Owner's Representative, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- .1 Prepare a record of tests and inspections. Include the following:
 - .1 Date test or inspection was conducted.
 - .2 Description of the Work tested or inspected.
 - .3 Date test or inspection results were transmitted to Owner's Representative.
 - .4 Identification of testing agency or special inspector conducting test or inspection.
- .2 Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Owner's Representative's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- .1 General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - .1 Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining

areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section *Execution*.

- .2 Protect construction exposed by or for quality-control service activities.
- .3 Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Types of items described in this Section:
 - 1. References and Codes.

1.3 REFERENCES AND CODES

- A. Perform Work in accordance with National Building Code of Canada (NBCC) 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.

1.4 NATIONAL PARKS ACT

- A. For projects located within boundaries of a National Park, perform Work in accordance with National Parks Act.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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 DEFINITIONS

- .1 General: Basic Contract definitions are included in the Conditions of the Contract.
- .2 *Approved*: When used to convey Owner's Representative's action on Contractor's submittals, applications, and requests, *approved* is limited to Owner's Representative's duties and responsibilities as stated in the Conditions of the Contract.
- .3 *Directed*: A command or instruction by Owner's Representative. Other terms including *requested*, *authorized*, *selected*, *required*, and *permitted* have the same meaning as *directed*.
- .4 *Indicated*: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including *shown*, *noted*, *scheduled*, and *specified* have the same meaning as *indicated*.
- .5 *Regulations*: Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- .6 *Furnish*: Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- .7 *Install*: Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- .8 *Provide*: Furnish and install, complete and ready for the intended use.
- .9 *Project Site*: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- .1 Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- .2 Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- .3 Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - .1 Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- .1 Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- .1 AA - Aluminium Association, 900 19th Street N.W., Washington, D.C., U.S.A. 20006 URL <http://www.aluminum.org>
 - .2 AASHTO - American Association of State Highway and Transportation Officials, 444 N Capitol Street N.W., Suite 249, Washington, D.C., U.S.A. 20001 URL <http://www.aashto.org>
 - .3 ACEC Association of Consulting Engineers of Canada, 130 Albert Street, Ottawa, ON. K1P 5G4 URL <http://www.acec.ca>
 - .4 AHA - American Hardboard Association, 1210W Northwest Hwy., Palatine, Illinois, U.S.A. 60067 URL : <http://www.ahat.com>
 - .5 AITC - American Institute of Timber Construction, 7012 S. Revere Parkway, Suite 140, Englewood, Colorado, U.S.A. 80112 URL <http://www.aitc-glulam.org>
 - .6 AMCA - Air Movement and Control Association Inc., 30 West University Drive, Arlington Heights, Illinois, U.S.A. 60004-1893 URL <http://www.amca.org>
 - .7 ANSI - American National Standards Institute, 11 West 42nd Street, New York, New York, U.S.A. 10036 URL <http://www.ansi.org>
 - .8 APA - The Engineered Wood Association, P.O. Box 11700, Tacoma, Washington, U.S.A. 98411-0700 URL <http://www.apawood.org>
 - .9 API - American Petroleum Institute, 1220 L St. Northwest, Washington, D.C., U.S.A. 20005-4070 URL <http://www.api.org>
 - .10 ARI - Air Conditioning and Refrigeration Institute, 4301 North Fairfax Drive, Suite 425, Arlington, Virginia, U.S.A. 22203 URL <http://www.ari.org>
 - .11 ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, Georgia, U.S.A. 30329 URL <http://www.ashrae.org>
 - .12 ASME - American Society of Mechanical Engineers, United Engineering Centre, Three Park Avenue, New York, New York, U.S.A. 10016-5990 URL <http://www.asme.org>
 - .13 ASPT Association for Asphalt Paving Technologists, 400 Selby Avenue, Suite 1, St. Paul, MN 55102 U.S.A. URL <http://www.asphalt.org>
 - .14 ASTM - American Society for Testing and Materials, 100 Barr Harbor Drive West, Conshohocken, Pennsylvania 19428-2959 URL <http://www.astm.org>
 - .15 AWCI - Association of the Wall and Ceiling Industries International, 803 West Broad Street, Suite 600, Falls Church, VA, U.S.A. 22046 URL <http://www.awci.org>
 - .16 AWMAC - Architectural Woodwork Manufacturers Association of Canada, 516 4 Street West, High River, Alberta T1V 1B6 URL <http://www.awmac.com>
 - .17 AWWA - American Wire Producer's Association, 6232 Roudsby, Alexandria, VA U.S.A. 22315-5285 URL <http://www.awpa.org>
 - .18 AWWA - American Wood Preservers' Association, P.O. Box 5690, Grandbury Texas, U.S.A. 76049-0690 URL <http://www.awap.com>
 - .19 AWS - American Welding Society, 550 N.W. LeJeune Road, Miami, Florida U.S.A. 33126 URL <http://www.amweld.org>
 - .20 AWWA - American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado, U.S.A. 80235 URL <http://www.awwa.org>
 - .21 CCA Canadian Construction Association, 75 Albert St., Suite 400 Ottawa, Ontario, K1P 5E7 URL <http://www.cca-acc.com>
 - .22 CCDC Canadian Construction Documents Committee, Refer to ACEC, CCA, CSC or RAIC
 - .23 CITC Canadian Institute of Timber Construction, 200 Cooper Street, Ottawa, Ontario K2P 0G1
 - .24 CFFM - Canadian Forces Fire Marshal, 101 Colonel By Drive, 8NT MGen George R. Pearkes Bldg., Ottawa, Ontario K1A 0K2

- .25 CGA - Canadian Gas Association, 20 Eglinton Avenue West, Suite 1305, Toronto, Ontario M4R 1K8 URL <http://www.cga.ca>
- .26 CGSB - Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, Quebec K1A 1G6 URL <http://w3.pwgsc.gc.ca/cgsb>
- .27 CISC - Canadian Institute of Steel Construction, 201 Consumers Road, Suite 300, Willowdale, Ontario M2J 4G8 URL <http://www.buildingweb.com/CISC>
- .28 CLA - Canadian Lumbermen's Association, 27 Goulburn Avenue, Ottawa, Ontario, K1N 8C7 URL <http://www.cla.ca.ca>
- .29 CNLA - Canadian Nursery Landscape Association, RR #4, Stn. Main, 7856 Fifth Street, Milton, Ontario. L9T 2X8 URL <http://www.canadanursery.com>
- .30 CRCA - Canadian Roofing Contractors Association, 155 Queen Street, Suite 130C, Ottawa, Ontario K1P 6L1 URL <http://www.roofingcanada.com>
- .31 CSA - Canadian Standards Association International, 178 Rexdale Blvd., Toronto, Ontario M9W 1R3 URL <http://www.csa-international.org>
- .32 CSC - Construction Specifications Canada, 100 Lombard Street, Suite 200, Toronto, Ontario M5C 1M3 URL <http://www.csc-dcc.ca>
- .33 CSDFMA - Canadian Steel Door and Frame Manufacturing Association One Yonge Street, Suite 1400, Toronto, Ontario M5E 1J9
- .34 CSPI - Corrugated Steel Pipe Institute, 201 Consumers Road, Suite 306, Willowdale, Ontario M2J 4G8
- .35 CSSBI - Canadian Sheet Steel Building Institute, 652 Bishop St. N., Unit 2A, Cambridge, Ontario N3H 4V6 URL <http://www.cssbi.ca>
- .36 CUFCA Canadian Urethane Foam Contractor's Association
- .37 CWC - Canadian Wood Council, 1400 Blair Place, Suite 210, Ottawa, Ontario K1J 9B8 URL <http://www.cwc.ca>
- .38 EC - Environment Canada, Conservation and Protection, Ottawa, Ontario KIA 0H3 URL <http://www.ec.gc.ca>
- .39 EEMAC - Electrical and Electronic Manufacturers' Association of Canada, 5800 Explorer Drive, Suite 200, Mississauga, Ontario L4W 5K9 URL <http://www.electrofed.ca>
- .40 EIMA EIFS Industry Manufacturer's Association, 3000 Corporate Center Drive, Suite 270, Morrow, Georgia U.S.A. 30260 URL <http://www.eifsfacts.com>
- .41 FCC - Fire Commissioner of Canada, Place du Portage, Phase II, 165 rue Hotel de Ville, Hull Quebec K1A 0J2 URL <http://www.hrdc-drhc.gc.ca>
- .42 IEEE - Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York U.S.A. 10017 URL <http://www.ieee.org>
- .43 MPI - The Master Painters Institute, 4090 Graveley Street, Burnaby, BC V5C 3T6 URL <http://www.paintinfo.com>
- .44 MSS - Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street, N.E., Vienna, Virginia U.S.A.22180
- .45 NAAMM - National Association of Architectural Metal Manufacturers, 8 South Michigan Avenue, Suite 1000, Chicago, Illinois U.S.A. 60603 URL <http://www.naamm.org>
- .46 NABA - National Air Barrier Association, 400-283 Bannatyne Avenue, Winnipeg, Manitoba R3B 3B2
- .47 NEMA - National Electrical Manufacturers Association, 1300 N. 17th Street, Suite 1847, Rosslyn, Virginia 22209 URL <http://www.nema.org>
- .48 NFPA - National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101Quincy, Massachusetts, U.S.A. 02269-9101 URL <http://www.nfpa.org>
- .49 NFSA - National Fire Sprinkler Association, 40 Jon Barrett Road, P.O. Box 1000, Patterson, New York, U.S.A. 12563 URL <http://www.nfsa.org>
- .50 NHLA - National Hardwood Lumber Association, P.O. Box 34518, Memphis, Tennessee, U.S.A 38184-0518 URL <http://www.natlhardwood.org>
- .51 NLGA - National Lumber Grades Authority, 406 First Capital Place, New Westminster, B.C. V3M 6G2
- .52 NRC - National Research Council, Montreal Road, Ottawa, Ontario K1A 0S2 URL <http://www.nrc.gc.ca>

- .53 NSPE National Society of Professional Engineers, 1420 King Street, Alexandria, VA U.S.A. 22314-2794 URL <http://www.nspe.org>
 - .54 PCI - Prestressed Concrete Institute, 209 W. Jackson Blvd., Suite 500, Chicago, Illinois, U.S.A. 60606 URL <http://www.pci.org>
 - .55 PEI - Porcelain Enamel Institute, P.O. Box 158541, 4004 Hillsboro Pike, Suite 224-B Nashville, TN, U.S.A. 37215 URL <http://www.porecelainenamel.com>
 - .56 QPL - Qualification Program List, c/o Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, Quebec K1A 1G6 URL <http://www.pwgsc.gc.ca/cgsb>
 - .57 RAIC Royal Architectural Institute of Canada, 55 Murray Street, Suite 330, Ottawa, Ontario, K1N 5M3 URL <http://www.raic.org>
 - .58 SCC - Standards Council of Canada, 200 Albert Street, Suite 2000, Ottawa, Ontario K1P 6N7 URL <http://www.scc.ca>
 - .59 SSPC - The Society for Protective Coatings, 40 24th Street, Pittsburgh, Pennsylvania 15222-4656 URL <http://www.sspc.org>
 - .60 TPI - Truss Plate Institute, 583 D'Onofrio Drive, Suite 200, Madison, WI, U.S.A. 53719 URL <http://www.tpinst.org>
 - .61 TTMAC - Terrazzo, Tile and Marble Association of Canada, 30 Capston Gate, Unit 5 Concord, Ontario L4K 3E8 URL <http://www.ttmac.com>
 - .62 UL - Underwriters' Laboratories, 333 Pfingsten Road, Northbrook, Illinois, U.S.A. 60062 URL <http://www.ul.com>
 - .63 ULC - Underwriters' Laboratories of Canada, 7 Crouse Road, Toronto, Ontario M1R 3A9 URL <http://www.ulc.ca>
- .2 Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- .1 NBCC – National Building Code of Canada
 - .2 NFCC – National Fire Code of Canada
 - .3 NFPA 101 - National Fire protection Association Life Safety Code
- .3 Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- .1 PWGSC – Public Works and Government Services Canada
 - .2 DND – Department of National Defence.
- .4 Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- .1 -
- .5 Provincial Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
- .1 -

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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 Requirements for temporary utilities, support facilities, and security and protection facilities.
- .2 Types of items you will not find described in this Section:
 - .1 Work restrictions and limitations on utility interruptions.
 - .2 Disposal of ground water at project site.
 - .3 Construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 USE CHARGES

- .1 General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's Representative, occupants of Project, testing agencies, and authorities having jurisdiction.
- .2 Sewer Service: If Contractor provides his own sewer hock-up, pay usage by all entities for construction operations.
- .3 Water Service: If Contractor provides his own water service hock-up, pay use charges for water used by all entities for construction operations.
- .4 Electric Power Service: If Contractor provides his own electric power service hock-up, pay electric power service use charges for electricity used by all entities for construction operations.
- .5 Water and Sewer Service from Existing System: If the Owner has an existing waters system available to use, it is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- .6 Electric Power Service from Existing System: If the Owner has an existing electric power system available to use, it is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 SUBMITTALS

- .1 Site Plan: For projects requiring onsite trailers and temporary utility hook-ups, show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- .2 Erosion- and Sedimentation-Control Plan: Show compliance with requirements of authorities having jurisdiction.
- .3 Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.

- .1 Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - .4 Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative as required to describe the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - .1 Locations of dust-control partitions at each phase of the work.
 - .2 HVAC system isolation schematic drawing.
 - .3 Location of proposed air filtration system discharge.
 - .4 Other dust-control measures.
 - .5 Waste management plan.
- 1.5 QUALITY ASSURANCE
- .1 Electric Service: Comply with requirements of local utility company and authorities having jurisdiction and regulations for temporary electric service. Install service to comply with National Electrical Code of Canada.
 - .2 Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
 - .3 Accessible Temporary Egress: For Work on existing buildings that current has wheel chair access, maintain access.
- 1.6 PROJECT CONDITIONS
- .1 Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Chain-Link Fencing: Minimum 50 mm , 3.8 mm thick, galvanized steel, chain-link fabric fencing; minimum 1.8 m high with galvanized steel pipe posts; minimum 60 mm OD line posts and 73 mm OD corner and pull posts.
- .2 Portable Chain-Link Fencing: Minimum 50 mm , 3.8 mm thick, galvanized steel, chain-link fabric fencing; minimum 1.8 m high with galvanized steel pipe posts; minimum 60 mm OD line posts and 73 mm OD corner and pull posts, with 42 mm OD top and bottom rails. Provide concrete bases for supporting posts.
- .3 Wood Enclosure Fence: Plywood, 2.4 m high, framed with four 50-by-100 mm rails, wood posts spaced not more than 2.4 m apart.
- .4 Polyethylene Sheet: Reinforced, fire-resistive sheet, 0.25 mm minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- .5 Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 914 by 1624 mm.
- .6 Insulation: Unfaced mineral-fibre blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- .1 Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- .2 Common-Use Field Office; for all projects involving the construction of new buildings and when required by the Contractor, provide common-use Field Office of sufficient size to accommodate needs of construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - .1 Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - .2 Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 1.2-m- square tack and marker boards.
 - .3 Drinking water.
 - .4 Heating equipment necessary to maintain indoor temperature of 20 to 22 deg C.
 - .5 Lighting fixtures capable of maintaining average illumination of 215 lx at desk height.
- .3 Storage and Fabrication Sheds: for all projects involving the construction of new buildings and when required by the Contractor provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - .1 Store combustible materials apart from building.

2.3 EQUIPMENT

- .1 Fire Extinguishers: Portable, ULC rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- .2 HVAC Equipment: for all projects involving the construction of new buildings and when required by the Contractor, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control, unless Owner authorizes use of permanent HVAC system.
 - .1 Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - .2 Heating Units: Listed and labelled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - .3 Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section *Closeout Procedures*.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- .1 Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - .1 Locate facilities to limit site disturbance as specified in Division 01 Section *Summary*.
- .2 Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- .1 General: Install temporary service or connect to existing service.

- .1 Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- .2 Sewers and Drainage:
 - .1 For work on existing buildings equipped with sufficient sewers and drainage to meet the Owner's needs and the needs for construction, connect to Owner's existing sewers as required.
 - .2 For all other projects: Provide service of size and capacity needed for construction to remove effluent lawfully.
- .3 Water Service: Install water distribution piping in sizes and pressures adequate for construction.
 - .1 For work on existing buildings equipped with an water service to meet the Owner's needs and the needs for construction, connect to Owner's existing water service as required.
 - .2 For all other projects: Provide water service of size and pressures adequate for construction.
- .4 Sanitary Facilities:
 - .1 For work on existing buildings with adequate sanitary facilities to meet the Owner's need and the needs for construction, Use of Owner's existing sanitary facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner.
 - .2 For all other projects: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- .5 Heating: Provide temporary heating 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 Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - .1 Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
 - .1 Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - .2 Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - .2 Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 - .3 Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- .7 Ventilation and Humidity Control: Provide temporary ventilation 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.
 - .1 Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- .8 Electric Power Service: Provide electric power distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - .1 For work on existing buildings equipped with an adequate electric service to meet the Owner's needs and the needs for construction, connect to Owner's existing electric power service and maintain equipment in a condition acceptable to Owner.
 - .2 For all other projects: Provide electric power service of sufficient size, capacity, and power characteristics required for construction operations.

- .1 Install electric power service overhead, unless otherwise indicated.

- .9 Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - .1 Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION

- .1 General: Comply with the following:
 - .1 Provide construction for temporary offices, shops, and sheds located within construction area or within 9 m of building lines.
 - .2 Maintain support facilities until Owner's Representative schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- .2 Temporary Roads and Paved Areas: For construction projects located on sites not currently provided with road access, construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits.
 - .1 Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
- .3 Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - .1 Protect existing site improvements to remain including curbs, pavement, and utilities.
 - .2 Maintain access for fire-fighting equipment and access to fire hydrants.
- .4 Parking: Owner does not provide parking for construction personnel. Provide temporary parking areas for construction personnel as needed.
- .5 Dewatering Facilities and Drains: For projects involving site work or interior excavations comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - .1 Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 - .2 Remove snow and ice as required to minimize accumulations.
- .6 Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - .1 Identification Signs - New buildings, exterior building renovations, and building expansions: Provide 1200 x 2400 mm professionally painted plywood site sign to design provided by Owner's Representative, unless otherwise indicated.
 - .2 Identification Signs - Interior Renovations: Provide 300 x 600 mm professionally painted plastic site sign to design provided by Owner's Representative at each entrance into work area, unless otherwise indicated.
 - .3 Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - .4 Maintain and touch-up signs so they are legible at all times.
- .7 Waste Disposal Facilities: Comply with requirements specified in Division 01 Section *Construction Waste Management and Disposal*.
- .8 Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel as needed.
 - .1 Truck cranes and similar devices used for hoisting materials are considered *tools and equipment* and not temporary facilities.

- .9 Temporary Use of New Elevators: For projects involving the installation of new elevators, refer to Division 14 Sections for temporary use of new elevators.
 - .10 Existing Elevators: For projects within existing buildings having elevators, the use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
 - .1 Do not load elevators beyond their rated weight capacity.
 - .2 Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
 - .11 Temporary Stairs: For multi-level building projects where construction of permanent stairs is included in the scope of work, provide temporary stairs where ladders are not adequate, until permanent stairs are available, .
 - .12 Use of Existing Stairs: For projects where the use of existing stairs is desirable, use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - .1 Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
 - .13 Requirements for Temporary Use of Any New Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
- 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION
- .1 Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - .1 Comply with work restrictions specified in Division 01 Section *Summary*.
 - .2 Temporary Erosion and Sedimentation Control: For projects involving site work, provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of \ authorities having jurisdiction and what is indicated on drawings, whichever is more stringent.
 - .1 Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - .2 Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - .3 Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
 - .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
 - .3 Stormwater Control: For projects involving site work, comply with requirements of authorities having jurisdiction. Provide barriers in and around any excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

- .4 Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- .5 Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
 - .1 Provide only if required.
- .6 Site Enclosure Fence: for projects involving the construction of new buildings or foundations or when required by the either authorities having jurisdiction or the Contractor, and before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - .1 Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - .2 Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
 - .3 Construct fence using plywood cladding, unless otherwise indicated.
- .7 Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- .8 Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- .9 Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as may be required by authorities having jurisdiction.
- .10 Covered Walkway: Where the Owner or members of the public must walk immediately adjacent to or through the construction work site and in other locations specifically indicated or required by authorities having jurisdiction erect protective covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 - .1 Construct covered walkways using scaffold or shoring framing.
 - .2 Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - .3 Paint and maintain appearance of walkway for duration of the Work.
- .11 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.
 - .1 Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- .12 Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
 - .1 In only locations specifically indicated construct dustproof partitions with gypsum wallboard with joints taped on occupied side.
 - .2 In all other locations construct dustproof partitions with one layer of 0.15 mm polyethylene sheet. Overlap and tape full length of joints.

- .3 Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - .4 Protect air-handling equipment.
 - .5 Provide walk-off mats at each entrance through temporary partition.
- .13 Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
- .1 Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - .2 Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
- 3.5 MOISTURE AND MOLD CONTROL
- .1 Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
 - .2 Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - .1 Protect porous materials from water damage.
 - .2 Protect stored and installed material from flowing or standing water.
 - .3 Keep porous and organic materials from coming into prolonged contact with concrete.
 - .4 Remove standing water from decks.
 - .5 Keep deck openings covered or dammed.
 - .3 Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - .1 Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - .2 Keep interior spaces reasonably clean and protected from water damage.
 - .3 Periodically collect and remove waste containing cellulose or other organic matter.
 - .4 Discard or replace water-damaged material.
 - .5 Do not install material that is wet.
 - .6 Discard, replace or clean stored or installed material that begins to grow mold.
 - .7 Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
 - .4 Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - .1 Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - .2 Use permanent HVAC system to control humidity.
 - .3 Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - .1 Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - .2 Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.
- 3.6 OPERATION, TERMINATION, AND REMOVAL

- .1 Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- .2 Maintenance: Maintain facilities in good operating condition until removal.
 - .1 Maintain operation of temporary enclosures, heating, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- .3 Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- .4 Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - .1 Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - .2 Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - .3 At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section *Closeout Procedures*.

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 for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- .2 Types of items you will not find described in this Section:
 - .1 Products selected under an allowance.
 - .2 Procedures for requests for substitutions.
 - .3 Applicable industry standards for products specified.

1.3 DEFINITIONS

- .1 Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term *product* includes the terms *material*, *equipment*, *system*, and terms of similar intent.
 - .1 Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - .2 New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - .3 Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- .2 Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words *basis-of-design product*, including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 SUBMITTALS

- .1 Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - .1 Include data to indicate compliance with the requirements specified in *Comparable Products* Article.
 - .2 Owner's Representative's Action: If necessary, Owner's Representative will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Owner's Representative will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - .1 Form of Approval: As specified in Division 01 Section *Submittal Procedures*.

- .2 Use product specified if Owner's Representative does not issue a decision on use of a comparable product request within time allocated.

- .2 Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section *Submittal Procedures*. Show compliance with requirements.

1.5 QUALITY ASSURANCE

- .1 Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- .2 Delivery and Handling:
 - .1 Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - .2 Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - .3 Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - .4 Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- .3 Storage:
 - .1 Store products to allow for inspection and measurement of quantity or counting of units.
 - .2 Store materials in a manner that will not endanger Project structure.
 - .3 Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
 - .4 Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - .5 Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - .6 Protect stored products from damage and liquids from freezing.
 - .7 Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 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.
 - .1 Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - .2 Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- .2 Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - .1 Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

- .2 Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
- .3 Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
- .3 Submittal Time: Comply with requirements in Division 01 Section *Closeout Procedures*.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- .1 General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - .1 Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - .2 Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - .3 Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - .4 Where products are accompanied by the term *as selected*, Owner's Representative will make selection.
 - .5 Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - .6 Or Equal: For products specified by name and accompanied by the term *or equal*, or *or approved equal*, or *or approved*, comply with requirements in *Comparable Products* Article to obtain approval for use of an unnamed product.
- .2 Product Selection Procedures:
 - .1 Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - .2 Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - .3 Products:
 - .1 Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience may be considered at the sole discretion of the Owner's Representative.
 - .2 Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in *Comparable Products* Article for consideration of an unnamed product.
 - .4 Manufacturers:
 - .1 Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience may be considered at the sole discretion of the Owner's Representative.
 - .2 Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in *Comparable Products* Article for consideration of an unnamed manufacturer's product.

- .5 Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in *Comparable Products* Article for consideration of an unnamed product by one of the other named manufacturers.
- .3 Visual Matching Specification: Where Specifications require *match Owner's Representative's sample*, provide a product that complies with requirements and matches Owner's Representative's sample. Owner's Representative's decision will be final on whether a proposed product matches.
 - .1 If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section *Substitution Procedures* for proposal of product.
- .4 Visual Selection Specification: Where Specifications include the phrase *as selected by Owner's Representative from manufacturer's full range* or similar phrase, select a product that complies with requirements. Owner's Representative will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- .1 Conditions for Consideration: Owner's Representative will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Owner's Representative may return requests without action, except to record noncompliance with these requirements:
 - .1 Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - .2 Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - .3 Evidence that proposed product provides specified warranty.
 - .4 List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - .5 Samples, if requested.

PART 3 - EXECUTION (Not Used)

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 General administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - .1 Construction layout.
 - .2 Field engineering and surveying.
 - .3 Installation of the Work.
 - .4 Cutting and patching.
 - .5 Coordination of Owner-installed products.
 - .6 Progress cleaning.
 - .7 Starting and adjusting.
 - .8 Protection of installed construction.
 - .9 Correction of the Work.
 - .2 Types of items you will not find described in this Section:
 - .1 Procedures for submitting surveys.
 - .2 Procedures for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - .3 Demolition and removal of selected portions of the building.
 - .4 Patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- .1 Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- .2 Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 QUALITY ASSURANCE

- .1 Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - .1 Structural Elements: When cutting and patching structural elements, notify Owner's Representative of locations and details of cutting and await directions from the Owner's Representative before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - .2 Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - .3 Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

- .4 Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owner's Representative's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
 - .2 Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
 - .3 Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.
- 1.5 WARRANTY
- .1 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 In-Place Materials: 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.
 - .1 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - .1 Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - .2 Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- .2 Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - .1 Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - .2 Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - .3 Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - .4 Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- .1 Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- .2 Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- .3 Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- .4 Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Owner's Representative according to requirements in Division 01 Section *Project Management and Coordination*.

3.3 CONSTRUCTION LAYOUT

- .1 Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Owner's Representative promptly.
- .2 General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - .1 Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - .2 Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - .3 Inform installers of lines and levels to which they must comply.
 - .4 Check the location, level and plumb, of every major element as the Work progresses.
 - .5 Notify Owner's Representative when deviations from required lines and levels exceed allowable tolerances.
 - .6 Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- .3 Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- .4 Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- .5 Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Owner's Representative.

3.4 FIELD ENGINEERING

- .1 If Work involves any site work then provide field engineering services described and as required.
- .2 Identification: Owner will identify existing benchmarks, control points, and property corners.

- .3 Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - .1 Do not change or relocate existing benchmarks or control points without prior written approval of Owner's Representative. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Owner's Representative before proceeding.
 - .2 Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- .4 Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - .1 Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - .2 Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - .3 Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- .1 General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - .1 Make vertical work plumb and make horizontal work level.
 - .2 Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - .3 Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - .4 Maintain minimum headroom clearance of 2440 mm in occupied spaces and 2300 mm in unoccupied spaces, unless otherwise indicated.
- .2 Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- .3 Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- .4 Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- .5 Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- .6 Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- .7 Attachment: 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.
 - .1 Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner's Representative.
 - .2 Allow for building movement, including thermal expansion and contraction.
 - .3 Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- .8 Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

- .9 Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- .1 Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

- .1 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 Temporary Support: Provide temporary support of work to be cut.

- .3 Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- .4 Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."

- .5 Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

- .6 Cutting: 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.

- .1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - .2 Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - .3 Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - .4 Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - .5 Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - .6 Proceed with patching after construction operations requiring cutting are complete.

- .7 Patching: 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.

- .1 Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - .2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - .1 Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - .2 Restore damaged pipe covering to its original condition.
 - .3 Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture,

and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- .1 Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- .4 Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- .5 Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
- .8 Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- .1 Site Access: Provide access to Project site for Owner's construction personnel.
- .2 Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - .1 Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - .2 Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- .1 General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - .1 Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - .2 Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 27 deg C.
 - .3 Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - .1 Utilize containers intended for holding waste materials of type to be stored.
 - .4 Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- .2 Site: Maintain Project site free of waste materials and debris.
- .3 Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - .1 Remove liquid spills promptly.
 - .2 Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- .4 Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- .5 Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

- .6 Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- .7 Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section *Construction Waste Management and Disposal*.
- .8 During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- .9 Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- .10 Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- .1 Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section *General Commissioning Requirements*.
- .2 Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- .3 Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- .4 Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- .5 Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section *Quality Requirements*.

3.10 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 Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

- .1 Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - .1 Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- .2 Restore permanent facilities used during construction to their specified condition.
- .3 Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

- .4 Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- .5 Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL

- .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
- .2 Store volatile waste in covered metal containers and remove from premises at end of each working day.
- .3 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

1.2 RELATED SECTION

- .1 Section 01 77 00 - Closeout Procedures.

1.3 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Remove waste materials and debris from site at the end of each working day. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.4 FINAL CLEANING

- .1 Refer to General Conditions.
- .2 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .4 When the Work is Totally Performed, remove surplus products, tools, construction machinery and equipment. Remove waste products and debris other than that caused by the Owner or other Contractors.
- .5 Remove waste materials from the site at regularly scheduled times or dispose of as directed by the Engineer/Architect. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Leave the work broom clean before the inspection process commences.
- .8 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .9 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fittings, walls, floors and ceilings.
- .10 Clean lighting reflectors, lenses, and other lighting surfaces.
- .11 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .12 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .13 Inspect finishes, fittings and equipment and ensure specified workmanship and operation.
- .14 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .15 Remove dirt and other disfiguration from exterior surfaces.
- .16 Clean and sweep roofs.
- .17 Sweep and wash clean paved areas.
- .18 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- .19 Remove snow and ice from access to building.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- .1 Types of items described in this Section:
 - .1 Requirement to carry out work placing maximum emphasis on the areas of:
 - .1 Waste reduction;
 - .2 Diversion of waste from landfill; and
 - .3 Material Recycling.
- .2 Types of items you will not find described in this Section:
 - .1 Environment Procedures.

1.2 WASTE MANAGEMENT PLAN

- .1 Prior to commencement of work, prepare waste Management Workplan.
- .2 Workplan to include:
 - .1 Waste audit.
 - .2 Waste reduction practices.
 - .3 Material source separation process.
 - .4 Procedures for sending recyclables to recycling facilities.
 - .5 Procedures for sending non-salvageable items and waste to approved waste processing facility or landfill site.
 - .6 Training and supervising workforce on waste management at site.
- .3 Workplan to incorporate waste management requirements specified herein and in other sections of the Specifications.
- .4 Develop Workplan in collaboration with all subcontractors to ensure all waste management issues and opportunities are addressed.
- .5 Implement and manage all aspects of Waste Management Workplan for duration of work.
- .6 Revise Plan as work progresses addressing new opportunities for diversion of waste from landfill.

1.3 WASTE AUDIT

- .1 At project start-up, conduct waste audit of:
 - .1 Site conditions identifying salvageable and non-salvageable items and waste resulting from demolition and removal work.
 - .2 Projected waste resulting from product packaging and from material leftover after installation work.
- .2 Develop written list. Record type, composition, and quantity of various salvageable items and waste anticipated reasons for waste generation and operational factors which contribute to waste.

1.4 WASTE REDUCTION

- .1 Based on waste audit, develop waste reduction program.

- .2 Structure program to prioritize actions, with waste reduction as first priority, followed by salvage and recycling effort, then disposal as solid waste.
 - .3 Identify materials and equipment to be:
 - .1 Protected and turned over to Owner's Representative when indicated.
 - .2 Salvaged for resale by Contractor.
 - .3 Sent to recycling facility.
 - .4 Sent to waste processing/landfill site for their recycling effort
 - .5 Disposed of in approved landfill site.
 - .4 Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:
 - .1 Use of a central cutting area to allow for easy access to off-cuts;
 - .2 Use of off-cuts for blocking and bridging elsewhere.
 - .3 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 work whenever possible avoiding unnecessary waste.
 - .5 Develop other strategies and innovative procedures to reduce waste such as minimizing the extent of packaging used for delivery of materials to site etc...
- 1.5 MATERIAL SOURCE SEPARATION PROCESS
- .1 Develop and implement material source separation process at commencement of work as part of mobilization and waste management at site.
 - .2 Provide on-site facilities to collect, handle and store anticipated quantities of reusable, salvageable, and recyclable materials.
 - .1 Use suitable containers for individual collection of items based on intended purpose.
 - .2 Locate to facilitate deposit but without hindering daily operations of existing building tenants.
 - .3 Clearly mark containers and stockpiles as to purpose and use.
 - .3 Perform demolition and removal of existing building components and equipment following a systematic deconstruction process.
 - .1 Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
 - .1 Reinstallation into the work where indicated.
 - .2 Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
 - .3 Sending as many items as possible to locally available recycling facility.
 - .4 Segregating remaining waste and debris into various individual waste categories for disposal in a *non-mixed state* as recommended by waste processing/landfill sites.
 - .4 Isolate product packaging and delivery containers from general waste stream. Send to recycling facility or return to supplier/manufacturer.
 - .5 Send leftover material resulting from installation work for recycling whenever possible.

- .6 Establish methods whereby hazardous and toxic waste materials, and their containers, encountered or used in the course work are properly isolated, stored on site and disposed in accordance with applicable laws and regulations from authorities having jurisdiction.

- .7 Isolate and store existing materials and equipment identified for re-incorporation into the Work. Protect against damage.

1.6 WORKER TRAINING AND SUPERVISION

- .1 Provide adequate training to workforce, through meetings and demonstrations, to emphasize purpose and worker responsibilities in carrying out the Waste Management Plan.
- .2 Waste Management Coordinator: designate full-time person on site, experienced in waste management and having knowledge of the purpose and content of Waste Management Plan to:
 - .1 Oversee and supervise waste management during work.
 - .2 Provide instructions and directions to all workers and subcontractors on waste reduction, source separation and disposal practices.
- .3 Post a copy of Plan in a prominent location on site for review by workers.

1.7 CERTIFICATION OF MATERIAL DIVERSION

- .1 Submit to Owner's Representative, copies of certified weigh bills from authorized waste processing sites and sale receipts from recycling/reuse facilities confirming receipt of building materials and quantity of waste diverted from landfill.
- .2 Submit data at pre-determined project milestones as determined by Owner's Representative.
- .3 Compare actual quantities diverted from landfill with projections made during waste audit.

1.8 DISPOSAL REQUIREMENTS

- .1 Burying or burning of rubbish and waste materials is prohibited.
- .2 Disposal of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers is prohibited.
- .3 Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.
- .4 Contact the authority having jurisdiction prior to commencement of work, to determine what, if any, demolition and construction waste materials have been banned from disposal in landfills and at transfer stations. Take appropriate action to isolate such banned materials at site of work and dispose in strict accordance with provincial and municipal regulations.
- .5 Transport waste intended for landfill in separated condition, following rules and recommendations of Landfill Operator in support of their effort to divert, recycle and reduce amount of solid waste placed in landfill.
- .6 Collect, bundle and transport salvaged materials to be recycled in separated categories and condition as directed by recycling facility. Ship materials only to approved recycling facilities.

- .7 Sale of salvaged items by Contractor to other parties not permitted on site.

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 for contract closeout, including, but not limited to, the following:
 - .1 Substantial Completion procedures.
 - .2 Final completion procedures.
 - .3 Warranties.
 - .4 Final cleaning.
- .2 Types of items you will not find described in this Section:
 - .1 Submitting final completion construction photographic documentation.
 - .2 Progress cleaning of project site.
 - .3 Operation and maintenance manual requirements.
 - .4 Submitting record drawings, record specifications, and record product data.
 - .5 Requirements for instructing owner's personnel.
 - .6 Divisions 02 through 49 sections for specific closeout and special cleaning requirements for the work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- .1 Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.
 - .1 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.
 - .2 Advise Owner of pending insurance changeover requirements.
 - .3 Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - .4 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.
 - .5 Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - .6 Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - .7 Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - .8 Complete startup testing of systems.
 - .9 Submit test/adjust/balance records.
 - .10 Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - .11 Advise Owner of changeover in heat and other utilities.
 - .12 Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - .13 Complete final cleaning requirements, including touchup painting.
 - .14 Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- .15 Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 - .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.
 - .1 Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - .2 Results of completed inspection will form the basis of requirements for final completion.
- 1.4 FINAL COMPLETION
 - .1 Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
 - .1 Submit a final Application for Payment according to Division 01 Section *Payment Procedures*.
 - .2 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.
 - .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.
 - .1 Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- 1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)
 - .1 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:
 - .1 Project name.
 - .2 Date.
 - .3 Name of Owner's Representative.
 - .4 Name of Contractor.
 - .5 Page number.
 - .4 Submit list of incomplete items in the following format:
 - .1 Three paper copies of product schedule or list, unless otherwise indicated.
- 1.6 WARRANTIES
 - .1 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.
 - .2 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.
- .3 Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - .1 Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- .1 General: Perform 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 Complete the following cleaning operations, as applicable to the project, before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - .1 Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - .2 Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - .3 Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - .4 Remove tools, construction equipment, machinery, and surplus material from Project site.
 - .5 Remove snow and ice to provide safe access to building.
 - .6 Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - .7 Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - .8 Sweep concrete floors broom clean in unoccupied spaces.
 - .9 Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - .10 Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - .11 Remove labels that are not permanent.

- .12 Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - .1 Do not paint over *ULC* and other required labels and identification, including mechanical and electrical nameplates.
 - .13 Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - .14 Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - .15 Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - .16 Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - .17 Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - .1 Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning upon request.
 - .18 Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - .19 Leave Project clean and ready for occupancy.
 - .20 If final cleaning is not to a standard acceptable to the owner, the owner, with prior notice to the contractor, may opt to have owners cleaning staff perform final cleaning at a cost to the contractor. Full owner burden rates will apply.
- .3 Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests if pest problems are suspected by the Owner's Representative. Prepare a report.
- .4 Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section *Construction Waste Management and Disposal*.

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 for preparing operation and maintenance manuals, including the following:
 - .1 Operation and maintenance documentation directory.
 - .2 Operation manuals for systems, subsystems, and equipment.
 - .3 Product maintenance manuals.
 - .4 Systems and equipment maintenance manuals.
- .2 Types of items you will not find described in this Section:
 - .1 Emergency manuals.
 - .2 Procedures for submitting copies of submittals for operation and maintenance manuals.
 - .3 Requirements for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

- .1 System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- .2 Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- .1 Manual Content: 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.
- .2 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.
 - .1 Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
 - .2 Enable inserted reviewer comments on draft submittals.
 - .2 One paper copy. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Owner's Representative will return one copy.
- .3 Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Owner's Representative will comment on whether general scope and content of manual are acceptable.
- .4 Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Owner's Representative will return copy with comments.

- .1 Correct or modify each manual to comply with Owner's Representative's comments. Submit copies of each corrected manual within 15 days of receipt of Owner's Representative's comments and prior to commencing demonstration and training.
- .5 Close-out submittal procedures are to be in conjunction with Memorial University's Stipulated Price Contract General Conditions.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- .1 Organization: Include a section in the directory for each of the following:
 - .1 List of documents.
 - .2 List of systems.
 - .3 List of equipment.
 - .4 Table of contents.
- .2 List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- .3 List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- .4 Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- .5 Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, *Preparation of Operating and Maintenance Documentation for Building Systems*.

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- .1 Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - .1 Title page.
 - .2 Table of contents.
 - .3 Manual contents.
- .2 Title Page: Include the following information:
 - .1 Subject matter included in manual.
 - .2 Name and address of Project.
 - .3 Name and address of Owner.
 - .4 Date of submittal.
 - .5 Name and contact information for Contractor.
 - .6 Name and contact information for Owner's Representative.
 - .7 Name and contact information for Commissioning Agent.
 - .8 Names and contact information for major consultants to the Owner's Representative that designed the systems contained in the manuals.
 - .9 Cross-reference to related systems in other operation and maintenance manuals.

- .3 Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - .1 If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- .4 Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- .5 Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - .1 Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - .2 File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.
- .6 Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
 - .1 Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 215-by-280 mm paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - .1 If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - .2 Identify each binder on front and spine, with printed title *OPERATION AND MAINTENANCE MANUAL*, Project title or name, subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 - .2 Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - .3 Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 - .4 Supplementary Text: Prepared on 215-by-280 mm white bond paper.
 - .5 Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - .1 If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - .2 If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

- .1 Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - .1 System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - .2 Performance and design criteria if Contractor is delegated design responsibility.
 - .3 Operating standards.
 - .4 Operating procedures.

- .5 Operating logs.
 - .6 Wiring diagrams.
 - .7 Control diagrams.
 - .8 Piped system diagrams.
 - .9 Precautions against improper use.
 - .10 License requirements including inspection and renewal dates.
- .2 Descriptions: Include the following:
- .1 Product name and model number. Use designations for products indicated on Contract Documents.
 - .2 Manufacturer's name.
 - .3 Equipment identification with serial number of each component.
 - .4 Equipment function.
 - .5 Operating characteristics.
 - .6 Limiting conditions.
 - .7 Performance curves.
 - .8 Engineering data and tests.
 - .9 Complete nomenclature and number of replacement parts.
- .3 Operating Procedures: Include the following, as applicable:
- .1 Startup procedures.
 - .2 Equipment or system break-in procedures.
 - .3 Routine and normal operating instructions.
 - .4 Regulation and control procedures.
 - .5 Instructions on stopping.
 - .6 Normal shutdown instructions.
 - .7 Seasonal and weekend operating instructions.
 - .8 Required sequences for electric or electronic systems.
 - .9 Special operating instructions and procedures.
- .4 Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- .5 Piped Systems: Diagram piping as installed, and identify colour-coding where required for identification.
- 2.4 PRODUCT MAINTENANCE MANUALS
- .1 Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- .2 Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- .3 Product Information: Include the following, as applicable:
- .1 Product name and model number.
 - .2 Manufacturer's name.
 - .3 Colour, pattern, and texture.
 - .4 Material and chemical composition.
 - .5 Reordering information for specially manufactured products.
- .4 Maintenance Procedures: Include manufacturer's written recommendations and the following:

- .1 Inspection procedures.
- .2 Types of cleaning agents to be used and methods of cleaning.
- .3 List of cleaning agents and methods of cleaning detrimental to product.
- .4 Schedule for routine cleaning and maintenance.
- .5 Repair instructions.

.5 Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

.6 Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

- .1 Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

.1 Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

.2 Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

.3 Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

- .1 Standard maintenance instructions and bulletins.
- .2 Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
- .3 Identification and nomenclature of parts and components.
- .4 List of items recommended to be stocked as spare parts.

.4 Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

- .1 Test and inspection instructions.
- .2 Troubleshooting guide.
- .3 Precautions against improper maintenance.
- .4 Disassembly; component removal, repair, and replacement; and reassembly instructions.
- .5 Aligning, adjusting, and checking instructions.
- .6 Demonstration and training video recording, if available.

.5 Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

- .1 Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
- .2 Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

.6 Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- .7 Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- .8 Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - .1 Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- .1 Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- .2 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.
 - .1 Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - .2 Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- .3 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.
 - .1 Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- .4 Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - .1 Do not use original project record documents as part of operation and maintenance manuals.
 - .2 Comply with requirements of newly prepared record Drawings in Division 01 Section *Project Record Documents*.
- .5 Comply with Division 01 Section *Closeout Procedures* for schedule for submitting operation and maintenance documentation.

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 for project record documents, including the following:
 - .1 Record Drawings.
- .2 Types of items you will not find described in this Section:
 - .1 Record specifications.
 - .2 Record product data.
 - .3 Miscellaneous record submittals.
 - .4 Final property survey.
 - .5 General closeout procedures.
 - .6 Operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- .1 Record Drawings: Comply with the following:
 - .1 Number of Copies: Submit two set(s) of marked-up record prints.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- .1 Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.
 - .1 Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - .1 Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - .2 Accurately record information in an acceptable drawing technique.
 - .3 Record data as soon as possible after obtaining it.
 - .4 Record and check the markup before enclosing concealed installations.
 - .5 Cross-reference record prints to corresponding archive photographic documentation.
 - .2 Content: Types of items requiring marking include, but are not limited to, the following:
 - .1 Dimensional changes to Drawings.
 - .2 Revisions to details shown on Drawings.
 - .3 Depths of foundations below first floor.
 - .4 Locations and depths of underground utilities.
 - .5 Revisions to routing of piping and conduits.
 - .6 Revisions to electrical circuitry.
 - .7 Actual equipment locations.
 - .8 Duct size and routing.
 - .9 Locations of concealed internal utilities.

- .10 Changes made by Change Order or Construction Change Directive.
 - .11 Changes made following Owner's Representative's written orders.
 - .12 Details not on the original Contract Drawings.
 - .13 Field records for variable and concealed conditions.
 - .14 Record information on the Work that is shown only schematically.
 - .3 Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
 - .4 Mark record sets with erasable, red-coloured pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - .5 Mark important additional information that was either shown schematically or omitted from original Drawings.
 - .6 Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- .2 Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- .1 Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Owner's Representative's reference during normal working hours.

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 for instructing Owner's personnel, including the following:
 - .1 Demonstration of operation of systems, subsystems, and equipment.
 - .2 Training in operation and maintenance of systems, subsystems, and equipment.
- .2 Types of items you will not find described in this Section:
 - .1 Demonstration and training video recordings.
 - .2 Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- .1 Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
- .2 Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

- .1 Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section *Quality Requirements*, experienced in operation and maintenance procedures and training.
- .2 Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section *Project Management and Coordination*. Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - .1 Inspect and discuss locations and other facilities required for instruction.
 - .2 Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - .3 Review required content of instruction.
 - .4 For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- .1 Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- .2 Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

- .3 Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Owner's Representative.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- .1 Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- .2 Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - .1 Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - .1 System, subsystem, and equipment descriptions.
 - .2 Performance and design criteria if Contractor is delegated design responsibility.
 - .3 Operating standards.
 - .4 Regulatory requirements.
 - .5 Equipment function.
 - .6 Operating characteristics.
 - .7 Limiting conditions.
 - .8 Performance curves.
 - .2 Documentation: Review the following items in detail:
 - .1 Emergency manuals.
 - .2 Operations manuals.
 - .3 Maintenance manuals.
 - .4 Project record documents.
 - .5 Identification systems.
 - .6 Warranties and bonds.
 - .7 Maintenance service agreements and similar continuing commitments.
 - .3 Emergencies: Include the following, as applicable:
 - .1 Instructions on meaning of warnings, trouble indications, and error messages.
 - .2 Instructions on stopping.
 - .3 Shutdown instructions for each type of emergency.
 - .4 Operating instructions for conditions outside of normal operating limits.
 - .5 Sequences for electric or electronic systems.
 - .6 Special operating instructions and procedures.
 - .4 Operations: Include the following, as applicable:
 - .1 Startup procedures.
 - .2 Equipment or system break-in procedures.
 - .3 Routine and normal operating instructions.
 - .4 Regulation and control procedures.
 - .5 Control sequences.
 - .6 Safety procedures.
 - .7 Instructions on stopping.
 - .8 Normal shutdown instructions.
 - .9 Operating procedures for emergencies.
 - .10 Operating procedures for system, subsystem, or equipment failure.
 - .11 Seasonal and weekend operating instructions.
 - .12 Required sequences for electric or electronic systems.

- .13 Special operating instructions and procedures.
- .5 Adjustments: Include the following:
 - .1 Alignments.
 - .2 Checking adjustments.
 - .3 Noise and vibration adjustments.
 - .4 Economy and efficiency adjustments.
- .6 Troubleshooting: Include the following:
 - .1 Diagnostic instructions.
 - .2 Test and inspection procedures.
- .7 Maintenance: Include the following:
 - .1 Inspection procedures.
 - .2 Types of cleaning agents to be used and methods of cleaning.
 - .3 List of cleaning agents and methods of cleaning detrimental to product.
 - .4 Procedures for routine cleaning
 - .5 Procedures for preventive maintenance.
 - .6 Procedures for routine maintenance.
 - .7 Instruction on use of special tools.
- .8 Repairs: Include the following:
 - .1 Diagnosis instructions.
 - .2 Repair instructions.
 - .3 Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - .4 Instructions for identifying parts and components.
 - .5 Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section *Operations and Maintenance Data*.
- .2 Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- .1 Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - .1 Owner will furnish Contractor with names and positions of participants.
- .2 Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - .1 Schedule training with Owner, through Owner's Representative, with at least seven days' advance notice.
- .3 Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction / Demolition Waste Management and Disposal.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 21 05 01 – Common Work Results - Mechanical

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 – Submittal Procedures. All mechanical submissions shall be electronic searchable and editable (non locked) PDF's.
- .2 Shop drawings; submit drawings stamped and signed for approval by Owner's Representative.
- .3 Shop drawings to show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
- .4 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
- .5 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .6 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Operation and maintenance manual approved by, and final copies deposited with, Owner's Representative before final inspection.
 - .3 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.

- .5 Description of actions to be taken in event of equipment failure.
- .6 Valves schedule and flow diagram.
- .7 Colour coding chart.
- .4 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .5 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .6 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Owner's Representative for approval. Submission of individual data will not be accepted unless directed by Owner's Representative.
 - .2 Make changes as required and re-submit as directed by Owner's Representative.
- .7 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
 - .2 Provide a detailed trouble shooting and fault location guide to facilitate quick return of malfunctioning equipment to operation.
 - .3 In addition to manufacturers data sheets provide typed text descriptions and diagrams as required to supplement product data. Provide logical sequence for instructions for each procedure, incorporating manufacturers instructions as required. This shall address proper start up and shut down of each piece of equipment to facilitate all maintenance
 - .4 Provide flow diagrams for all systems.
 - .5 Start up reports for all systems.
- .8 Site records:
 - .1 Owner's Representative will provide 1 set of reproducible mechanical drawings or AutoCAD files. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour for each service.
 - .4 Make available for reference purposes and inspection.
- .9 As-built drawings:

- .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
- .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
- .3 Submit to Owner's Representative for approval and make corrections as directed.
- .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
- .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .10 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Refer to Section 21 05 01 – Common Work Results - Mechanical
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .4 Mock ups: Complete mock-ups of all installations for each room for approval prior to completing installation. Contractor shall not proceed with any work until installation is acceptable to owner. Quality of installation will be paramount and only the highest quality installation will be acceptable. All required re-work shall be completed at the cost of the contractor until installation is deemed acceptable.
- .5 Provide all materials and equipment and perform all labor required to install complete and operable mechanical systems as indicated on the drawings, as specified, and as required by code.
- .6 Contract document drawings for mechanical work (HVAC, plumbing, fire protection, and controls) are diagrammatic and are intended to convey sizing, scope and general arrangement only.
- .7 Install all mechanical equipment and appurtenances in accordance with manufacturers' recommendations, contract documents, and applicable codes and regulations.
- .8 Provide vibration isolation for all mechanical equipment to prevent transmission of vibration to building structure. Provide vibration isolators for all piping supports connected to, and within 15m of, isolated equipment (except at base elbow supports and anchor points) throughout mechanical equipment rooms. Unless otherwise noted isolators shall be type H1 Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment. Ceiling suspended fans and equipment shall have
- .9 Coordinate construction of all mechanical work with architectural, structural, civil, electrical work, etc., shown on other contract document drawings
- .10 All tests shall be completed before any mechanical equipment or piping insulation is applied.

- .11 Locate all temperature, pressure, and flow measuring devices in accessible locations with the straight section of pipe or duct up- and downstream as recommended by the manufacturer for good accuracy.
- .12 Coordinate all equipment connections with manufacturers' certified drawings. Coordinate and provide all duct and piping transitions required for final equipment connections to furnished equipment. Field verify and coordinate all duct and piping dimensions before fabrication.
- .13 Concrete housekeeping pads to suit mechanical equipment shall be sized and located by the mechanical contractor. Minimum concrete pad thickness shall be 150mm. Pad shall extend beyond the equipment a minimum of 150 mm on each side. Concrete housekeeping pads shall be provided by the general contractor. It shall be the responsibility of the mechanical contractor to coordinate the size and location of concrete housekeeping pads with the general contractor.
- .14 When mechanical work (HVAC, plumbing, sheet metal, fire protection, controls, balancing etc.) is subcontracted, it shall be the mechanical contractor's responsibility to coordinate subcontractors and the associated contracts.
- .15 The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined by the project site conditions. Do not scale drawings.
- .16 All miscellaneous steel required to ensure proper installation and as shown in details for piping, ductwork, and equipment (unless otherwise noted) shall be furnished and installed by the mechanical contractor.
- .17 All equipment, piping, ductwork, etc., shall be supported as detailed, specified, and required to provide a vibration-free installation.
- .18 All ductwork, piping, and equipment supported from structural steel shall be coordinated with the general contractor.
- .19 Locations and sizes of all floor, wall, and roof openings shall be coordinated with all other trades involved.
- .20 Refer to typical details for ductwork, piping, and equipment installation.
- .21 Install piping so all valves, strainers, unions, traps, flanges, and other appurtenances requiring access are accessible.
- .22 All valves shall be installed so that the valve remains in service when equipment or piping on the equipment side of the valve is removed.
- .23 Provide chainwheel operators for all valves in equipment rooms mounted greater than 2.1 m" above floor level; chain shall extend to 2.1m above floor level.
- .24 Unions and/or flanges shall be installed at each piece of equipment, in bypasses, and in long piping runs (30 m or more) to permit disassembly for alteration and repairs.

- .25 All piping work shall be coordinated with all trades involved. Offsets in piping around obstructions shall be provided at no additional cost to the owner.
- .26 Certain items such as rises and drops in ductwork, access doors, volume dampers, etc., are indicated on the contract document drawings for clarity for a specific location requirement and shall not be interpreted as the extent of the requirements for these items.
- .27 Coordinate diffuser, register, and grille locations with architectural reflected ceiling plans, lighting, and other ceiling items and make minor duct modifications to suit.
- .28 Provide flexible connections in all ductwork systems (supply, return, and exhaust) connected to air handling units, fans, and other equipment that require vibration isolation. Flexible connections shall be provided at the point of connection to the equipment unless otherwise indicated.
- .29 All ductwork shall be coordinated with all trades involved. Offsets in ducts, including divided ducts and transitions around obstructions, shall be provided at no additional cost to the owner.
- .30 Provide access doors in ductwork to provide access for all smoke detectors, fire dampers, smoke dampers, volume dampers, humidifiers, coils, and other items located in the ductwork that require service and/or inspection.
- .31 Smoke detectors shall be furnished and wired by the electrical contractor. The mechanical contractor shall be responsible for coordinating with the electrical contractor and in accordance with the manufacturer's printed instructions to ensure proper operation of smoke detectors
- .32 Louver sizes, locations, and attachment details shall be coordinated with the general contractor. Refer to specification.
- .33 All equipment provided by Div 21, 22, 23, 25 and shall be started up a factory trained and experienced journeyman or approved equal. All equipment shall have start up reports provided in an organized PDF with bookmarks. (Mech Addendum 2)

1.4 MAINTENANCE

- .1 As applicable:
 - .1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One head gasket set for each heat exchanger.
 - .4 One glass for each gauge glass.
 - .5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
 - .2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.
 - .3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 All materials used on this project shall be new and CSA approved unless noted otherwise.

.2 Access Doors

- .1 Access doors for concealed equipment, valves to allow for operation, inspection adjusting, and servicing shall be provided by general contractor in accordance with requirements of architectural specifications. Mechanical to coordinate size location and quantity's.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install all work in keeping to trade and industry practice with all work completed and overseen by journeymen experienced in the relevant trade.
- .2 All work to be completed to the requirement of manufacturers with direct involvement for manufacturer trained technicians to ensure the equipment is installed and commissioned properly.
- .3 Plan and coordinate all work to maintain set project schedule.
- .4 Coordinate all work with other trades to plan all installation prior to starting and fabrication work or installation works. Failure to do so and resulting interferences will require re-work at the contractor's expense.
- .5 All ceiling mounted equipment requiring service access shall have locations planned to allow for ease of access from ceiling hatches/tiles. Any equipment not deemed easily accessible by owner/engineer will be required to be removed and reinstalled to allow proper access. This would include but not be limited to VAV boxes, reheat coils, valves, dampers, etc.

3.2 PAINTING, REPAIRS AND RESTORATION

- .1 Do painting in accordance with Section 09 91 23 - Interior Painting.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged.

3.3 CLEANING

- .1 Clean interior and exterior of all systems including strainers. Protect open ends of ducts, diffusers, grilles and registers during construction to prevent ingress of dust and dirt into interior of ducts. If dust or dirt is detected prior to startup, vacuum interior of all ducts and air handling units. Prior to vacuuming use video camera to record condition of ductwork. Also use video camera to record condition of ducts after cleaning.

3.4 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.
 - .1 Submit tests as specified in other sections of this specification.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.5 DEMONSTRATION

- .1 Owner's Representative will use equipment and systems for test purposes prior to acceptance. Contractor to supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 Owner's Representative may record these demonstrations on video tape for future reference.

3.6 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 74 11 – Cleaning.
- .2 Section 01 74 21 – Construction / Demolition Waste Management and Disposal
- .3 Section 07 84 00 – Firestopping.
- .4 Section 23 08 02 – Cleaning and Start-up of Mechanical Piping Systems.

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Owner's Representative.

1.3 QUALITY ASSURANCE

- .1 Installers to be certified to journeyperson.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
 - .1 Unions are not required in installations using grooved mechanical couplings (The couplings shall serve as unions).
- .3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.
- .4 The flexible type grooved joint couplings may be used in lieu of a flexible connector at equipment connections for vibration attenuation and stress relief. Couplings shall be placed in close proximity to the source of the vibration, as per manufacturer's recommendations.

3.2 CLEARANCES

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components.

3.3 DRAINS

- .1 Install piping with grade in direction of flow except as indicated.
- .2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.
- .3 Pipe each drain valve discharge separately to above floor drain. Discharge to be visible.
- .4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.4 AIR VENTS

- .1 Install automatic air vents at high points in piping systems.
- .2 Install isolating valve at each automatic air valve.
- .3 Install drain piping to approved location and terminate where discharge is visible.

3.5 DIELECTRIC WATERWAY FITTINGS AND COUPLINGS

- .1 General: Compatible with system, to suit pressure rating of system.
- .2 Locations: Where dissimilar metals are joined.
- .3 NPS 2 and under: Isolating waterway fittings, unions or bronze valves.
 - .1 Waterway fittings shall be complete with thermoplastic liner.
- .4 Over NPS 2: Isolating waterway fittings and flanges.
 - .1 Waterway fittings shall be complete with thermoplastic liner.

3.6 PIPEWORK INSTALLATION

- .1 Installation by certified journey person.
- .2 Screwed fittings jointed with Teflon tape or pipe dope as recommended by manufacturer.
- .3 Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions.

- .1 Gaskets shall be verified as suitable for the intended service prior to installation. Gaskets shall be molded and produced by the coupling manufacturer.
- .2 The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.
- .4 Protect openings against entry of foreign material.
- .5 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .6 Assemble piping using fittings manufactured to ANSI standards.
- .7 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main.
 - .1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- .8 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .9 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .10 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .11 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .12 Group piping wherever possible and as indicated.
- .13 Ream pipes, remove scale and other foreign material before assembly.
- .14 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .15 Provide for thermal expansion as indicated.
- .16 Valves:
 - .1 Install in accessible locations.
 - .2 Remove interior parts before soldering.
 - .3 Install with stems above horizontal position unless otherwise indicated.
 - .4 Valves accessible for maintenance without removing adjacent piping.
 - .5 Install globe valves in bypass around control valves.
 - .6 Use ball or butterfly valves at branch take-offs for isolating purposes except where otherwise specified.
 - .7 Install butterfly valves on chilled water and related condenser water systems only.
 - .8 Install butterfly valves between weld neck flanges to ensure full compression of liner.
 - .9 Install ball valves for glycol service.

- .10 Use chain operators on valves NPS 2-1/2 and larger where installed more than 2400 mm above floor in Mechanical Rooms.
- .17 Check Valves:
 - .1 Install silent check valves on discharge of pumps and in vertical pipes with downward flow and elsewhere as indicated.
 - .2 Install swing check valves in horizontal lines on discharge of pumps and elsewhere as indicated.
- 3.7 SLEEVES
 - .1 General: Install where pipes pass through masonry, concrete structures, fire rated assemblies, and elsewhere as indicated.
 - .2 Material: Schedule 40 black steel pipe.
 - .3 Construction: Foundation walls and where sleeves extend above finished floors to have annular fins continuously welded on at mid-point.
 - .4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.
 - .5 Installation:
 - .1 Concrete, masonry walls, concrete floors on grade: Terminate flush with finished surface.
 - .2 Other floors: Terminate 25 mm above finished floor.
 - .3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint.
 - .6 Sealing:
 - .1 Foundation walls and below grade floors: Fire retardant, waterproof non-hardening mastic.
 - .2 Elsewhere: Provide space for firestopping. Maintain fire rating integrity.
 - .3 Sleeves installed for future use: Fill with lime plaster or other easily removable filler.
 - .4 Ensure no contact between copper pipe or tube and sleeve.
- 3.8 ESCUTCHEONS
 - .1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
 - .2 Construction: One piece type with set screws. Chrome or nickel plated brass or type 302 stainless steel.
 - .3 Sizes: Outside diameter to cover opening or sleeve. Inside diameter to fit around pipe or outside of insulation if so provided.
- 3.9 PREPARATION FOR FIRESTOPPING
 - .1 Material and installation within annular space between pipes, ducts, insulation and adjacent fire separation to Section 07 84 00 - Firestopping.

- .2 Uninsulated unheated pipes not subject to movement: No special preparation.
- .3 Uninsulated heated pipes subject to movement: Wrap with non-combustible smooth material to permit pipe movement without damaging firestopping material or installation, or install per manufacturer's recommendation as specified within the associated approval.
- .4 Insulated pipes and ducts: Ensure integrity of insulation and vapour barriers.

3.10 FLUSHING OUT OF PIPING SYSTEMS

- .1 In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .2 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 11 - Cleaning supplemented as specified in relevant sections of other Divisions.
- .3 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.11 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

- .1 Advise Owner's Representative, 48 hours minimum prior to performance of pressure tests.
- .2 Pework: Test as specified in relevant sections of other sections or Divisions.
- .3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant sections of other Divisions.
- .4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- .5 Conduct tests in presence of Owner's Representative. Work to be carried out in off hours after 5 p.m., weekends or holidays.
- .6 Pay costs for repairs or replacement, retesting, and making good. Owner's Representative to determine whether repair or replacement is appropriate.
- .7 Insulate or conceal work only after approval and certification of tests by Owner's Representative.

3.12 EXISTING SYSTEMS

- .1 Connect into existing piping systems at times approved by Owner's Representative. Work to be carried out off hours after 5 p.m., weekends or holidays.
- .2 Request written approval ten (10) working days minimum, prior to commencement of work.
- .3 Be responsible for damage to existing plant by this work.
- .4 Ensure daily clean-up of existing areas.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

- .1 Bronze – valves.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 35 29.06 – Health and Safety Requirements.
- .3 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .4 Section 01 78 00 – Closeout Submittals.
- .5 Section 23 05 05 – Installation of Pipework

1.3 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
 - .1 ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch.)
 - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings
 - .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 276, Specification for Stainless Steel Bars and Shapes.
 - .2 ASTM A536, Specification for Ductile Iron Castings.
 - .3 ASTM B 16, Specification for Free-Cutting Brass Rod Bar and Shapes for Use in Screw Machines.
 - .4 ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.
 - .5 ASTM B 283, Specification for Copper and Copper Alloy Die Forgings (Hot Pressed)
 - .6 ASTM B 505/B505M, Specification for Copper-Base Alloy Continuous Castings.
 - .7 ASTM B584, Specification for Copper Alloy Sand Castings for General Applications.
- .3 Canadian Standards Association (CSA)
 - .1 CSA B242, Groove and Solder Type Mechanical Pipe Couplings.
- .4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
 - .1 MSS SP-25, Standard Marking System for Valves, Fittings, Flanges and Unions.
 - .2 MSS SP-80, Bronze Gate, Globe, Angle and Check Valves.

- .3 MSS SP-110, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS – Material Safety Data Sheets.
 - .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Submit data for valves specified this section.
 - .3 Grooved joint couplings and fittings to be indicated on product submittals and to be specifically identified with the applicable style or series designation.
- .3 Closeout Submittals
 - .1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.5 QUALITY ASSURANCE

- .1 Health and Safety
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.
- .2 All grooved joint couplings, fittings, valves, and specialties to be the products of a single manufacturer. Grooving tools to be of the same manufacturer as the grooved components.

1.6 DELIVERY, STORAGE AND DISPOSAL

- .1 Waste Management and Disposal
 - .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
 - .2 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.7 MAINTENANCE

- .1 Extra Materials
 - .1 Furnish following spare parts:
 - .1 Valve seats: one for every 10 valves each size. Minimum 1.
 - .2 Discs: one for every 10 valves, each size. Minimum 1.
 - .3 Stem packing: one for every 10 valves, each size. Minimum 1.
 - .4 Valve handles: 2 of each size.
 - .5 Gaskets for flanges: one for every 10 flanged joints.

- .6 Grooved couplings: IPS and copper-tube dimensioned, one for every 10 (ten) grooved joints.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Except for specialty valves, to be single manufacturer.
- .2 All products to have Canadian registration numbers (CRN).
- .3 End Connections
 - .1 Connection into adjacent piping/tubing:
 - .1 Steel pipe systems: Screwed ends to ANSI/ASME B1.20.1.
 - .2 Copper tube systems.
 - .1 Solder ends ANSI/ASME B16.18.
 - .2 Grooved ends to copper tube dimensions and CSA B242.
 - .3 Push-to-connect ends to ANSI/ASME B16.22 and manufacturer's standards.
- .4 Lockshield Keys
 - .1 Where lockshield valves are specified, provide 10 keys of each size: malleable iron cadmium plated.

2.2 GATE VALVES

- .1 Requirements common to all gate valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Bonnet: with hex. shoulders.
 - .3 Connections: with hex. shoulders.
 - .4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.
 - .5 Packing: high grade non-asbestos packing.
 - .6 Handwheel: non-ferrous.
 - .7 Handwheel Nut: bronze to ASTM B62.
 - .8 Class 125, WP=860 kPa steam, 1.4 mPa WOG
 - .9 Class 150 WP=1.03 mPa steam, 2.07 mPa WOG.
- .2 NPS 2 and under, non-rising stem, solid wedge disc, Class 125:
 - .1 Body: with long disc guides, screwed bonnet with stem retaining nut.
 - .2 Operator: Handwheel
- .3 NPS 2 and under, non-rising stem, solid wedge disc, Class 150:
 - .1 Body: with long disc guides, screwed bonnet with stem retaining nut.

- .2 Operator: Handwheel
 - .4 NPS 2 and under, rising stem, split wedge disc, Class 125:
 - .1 Body: with long disc guides, screwed bonnet.
 - .2 Disc: split wedge, bronze to ASTM B283, loosely secured to stem.
 - .3 Operator: Handwheel
 - .5 NPS 2 and under, rising stem, solid wedge disc, Class 125:
 - .1 Body: with long disc guides, screwed bonnet.
 - .2 Operator: Handwheel
 - .6 NPS 2 and under, rising stem, solid wedge disc, Class 150:
 - .1 Body: with long disc guides, screwed bonnet.
 - .2 Operator: Handwheel
- 2.3 GLOBE VALVES
- .1 Requirements common to all globe valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Bonnet: union with hex. shoulders.
 - .3 Connections: screwed with hex. shoulders.
 - .4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.
 - .5 Packing: non-asbestos.
 - .6 Handwheel: non-ferrous.
 - .7 Handwheel Nut: bronze to ASTM B62.
 - .8 Class 125, WP=860 kPa steam, 1.4 MPa WOG
 - .9 Class 150 WP=1.03 mPa steam, 2.07 MPa WOG.
 - .2 NPS 2 and under, composition disc, Class125:
 - .1 Body and bonnet: screwed bonnet.
 - .2 Disc and seat: renewable rotating PTFE disc regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
 - .3 Operator: Handwheel.
 - .3 NPS 2 and under, composition disc, Class 150:
 - .1 Body and bonnet: union bonnet.
 - .2 Disc and seat: renewable rotating PTFE disc in easily removable disc holder, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
 - .3 Operator: Handwheel
 - .4 NPS 2 and under, plug disc, Class 150, screwed ends:
 - .1 Body and bonnet: union bonnet.

- .2 Disc and seat ring: tapered plug type with disc stem ring of stainless steel to ASTM A276, loosely secured to stem.
- .3 Operator: Handwheel
- .5 Angle valve, NPS 2 and under, composition disc, Class 150:
 - .1 Body and bonnet: union bonnet.
 - .2 Disc and seat: renewable rotating PTFE disc in slip-on easily removable disc holder having integral guides, regrindable bronze seat, loosely secured to stem.
 - .3 Operator: Handwheel.

2.4 CHECK VALVES

- .1 Requirements common to all check valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Connections: with hex agonal shoulders.
 - .3 Class 125, WP=860 kPa steam, 1.4 MPa WOG
 - .4 Class 150 WP=1.03 mPa steam, 2.07 MPa WOG
 - .5 Class 200 1.4 MPa CWP
- .2 NPS 2 and under, swing type, bronze disc, Class 125:
 - .1 Body: Y-pattern with integral seat at 45°, screw-in cap with hex head.
 - .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.
- .3 NPS 2 and under, swing type, bronze disc, Class 150:
 - .1 Body: Y-pattern with integral seat at 45°, screw-in cap with hex head.
 - .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.
- .4 NPS 2 and under, swing type, composition disc, Class 200:
 - .1 Body: Y-pattern with integral seat at 45°, screw-in cap with hex. head.
 - .2 Disc: renewable rotating disc, of number 6 composition to suit service conditions, bronze two-piece hinge disc construction.
- .5 NPS 2 and under, horizontal lift type, composition disc, Class150:
 - .1 Body: with integral seat, union bonnet ring with hex. shoulders, cap.
 - .2 Disc: renewable PTFE for steam, #6 composition rotating disc for water, oil or gas service in disc holder having guides top and bottom, of bronze to ASTM B62.
- .6 NPS 2 and under, vertical lift type, bronze disc, Class 125:
 - .1 Disc: rotating disc having guides top and bottom, disc guides, retaining rings.
- .7 NPS 2 and under, vertical or horizontal, lift type, 1380 kPa CWP.
 - .1 Disc: 301 stainless steel, center guided.

2.5 SILENT CHECK VALVES

.1 NPS 2 and under:

- .1 Body: cast high tensile bronze to ASTM B62 with integral seat.
- .2 Pressure rating: Class 125.
- .3 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.
- .4 Disc and seat: renewable rotating disc.
- .5 Stainless steel spring, heavy duty.
- .6 Seat: regrindable.

2.6 BALL VALVES

.1 NPS 2 and under:

- .1 Body and cap: cast high tensile bronze to ASTM B16 or ASTM B62.
- .2 Pressure rating: Class 125, 860 MPa steam.
- .3 Connections: Screwed ends to ANSI B1.20.1 and with hex. shoulders. Push-to-connect, Pressfit ends.
- .4 Stem: tamperproof ball drive.
- .5 Stem packing nut: external to body.
- .6 Ball and seat: replaceable stainless steel or hard chrome, plated brass solid ball and teflon seats.
- .7 Stem seal: TFE, EPDM, Nitrile, Fluoroelastomer with with external packing nut.
- .8 Operator: removable lever handle with extension for insulated pipe.
- .9 Cap and drain for drain service.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install rising stem valves in upright position with stem above horizontal.
- .2 Remove internal parts before soldering.
- .3 Adjoining tube, couplings, and fittings with grooved joint valves shall be copper-tube dimensioned. Flaring tube or fitting ends to accommodate IPS sized valves is not permitted.
- .4 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.
 - .1 Unions are not required in installations using grooved mechanical couplings. The couplings shall serve as unions.

3.2 COMMISSIONING

- .1 As part of commissioning activities, develop schedule of valves and record thereon identifier, location, service, purchase order number and date, manufacturer, identification data specified above.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section includes:

- .1 Hangers and supports for mechanical piping, ducting and equipment.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .3 Section 03 30 00 - Cast-in-Place Concrete.
- .4 Section 05 12 23 - Structural Steel for Buildings.
- .5 Section 05 50 00 - Metal Fabrications.

1.3 REFERENCES

- .1 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
 - .1 ANSI/ASME B31.1, Power Piping, (SI Edition).
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM A125, Specification for Steel Springs, Helical, Heat-Treated.
 - .2 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A563, Specification for Carbon and Alloy Steel Nuts.
- .3 Factory Mutual (FM)
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
 - .1 Materials Safety Data Sheets (MSDS).
- .5 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP-58, Pipe Hangers and Supports - Materials, Design and Manufacture.
 - .2 ANSI/MSS SP-69, Pipe Hangers and Supports - Selection and Application.
 - .3 MSS SP-89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .6 Underwriter's Laboratories of Canada (ULC)

1.4 SYSTEM DESCRIPTION

.1 Design Requirements

- .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

- .2 Base maximum load ratings on allowable stresses prescribed by MSS SP58 or ASME B31.1.
 - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
 - .4 Design hangers and supports stamped by structural P.Eng. licenced in NL to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
 - .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP58.
- .2 Performance Requirements
 - .1 Design supports, platforms, catwalks, hangers, to withstand seismic events for location as per the National Building Code
- 1.5 SUBMITTALS
 - .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop drawings: submit drawings stamped and signed for approval by Owner's Representative.
 - .3 Submit shop drawings and product data for following items:
 - .1 Bases, hangers and supports.
 - .2 Connections to equipment and structure.
 - .3 Structural assemblies.
 - .4 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .1 Owner's Representative will make available 1 copy of systems supplier's installation instructions.
 - .5 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals
- 1.6 QUALITY ASSURANCE
 - .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 GENERAL

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP-58 and SP-89.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

.1 Finishes:

- .1 Pipe hangers and supports: galvanized painted with zinc-rich paint after manufacture.
- .2 Use electro-plating galvanizing process or hot dipped galvanizing process.
- .3 Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.
- .4 Underground plumbing hangers to be type 304 stainless incl. all threaded rods, nuts, washers and attachments.

.2 Upper attachment structural: Suspension from lower flange of I-Beam.

- .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
 - .1 Rod: 9 mm UL listed, 13 mm FM approved.
- .2 Cold piping NPS 2 1/2 or greater, hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed, FM approved where required to MSS-SP58 and MSS-SP69.

.3 Upper attachment structural: Suspension from upper flange of I-Beam.

- .1 Cold piping NPS 2 maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed FM approved where required to MSS SP69.
- .2 Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed, FM approved where required.

- .4 Upper attachment to concrete.
 - .1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
 - .2 Concrete inserts: wedge shaped body with knockout protector plate UL listed FM approved where required to MSS SP-69.
 - .5 Shop and field-fabricated assemblies.
 - .1 Trapeze hanger assemblies: MSS SP-89.
 - .2 Steel brackets: MSS SP-89.
 - .3 Sway braces for seismic restraint systems: to MSS SP-89.
 - .6 Hanger rods: threaded rod material to MSS SP-58.
 - .1 Ensure that hanger rods are subject to tensile loading only.
 - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
 - .3 Do not use 22 mm or 28 mm rod.
 - .7 Pipe attachments: material to MSS SP-58.
 - .1 Attachments for steel piping: carbon steel galvanized.
 - .2 Attachments for copper piping: copper plated black steel.
 - .3 Use insulation saddles for hot pipework.
 - .4 Oversize pipe hangers and supports for insulated pipes.
 - .8 Adjustable clevis: material to MSS SP-69, UL listed FM approved, where required clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
 - .1 Ensure "U" has hole in bottom for rivetting to insulation shields.
 - .9 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP-69.
 - .10 U-bolts: carbon steel to MSS SP-69 with 2 nuts at each end to ASTM A563.
 - .1 Finishes for steel pipework: galvanized.
 - .2 Finishes for copper, glass, brass or aluminum pipework: black with formed portion plastic coated or epoxy coated.
 - .11 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP-69.
- 2.3 RISER CLAMPS
- .1 Steel or cast iron pipe: galvanized black carbon steel to MSS SP-58, type 42, UL listed FM approved where required.
 - .2 Copper pipe: carbon steel copper plated to MSS SP-58, type 42.
 - .3 Bolts: to ASTM A307.
 - .4 Nuts: to ASTM A563.

2.4 INSULATION PROTECTION SHIELDS

- .1 Insulated cold piping:
 - .1 64 kg/m³ density insulation plus insulation protection shield to: MSS SP-69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
- .2 Insulated hot piping:
 - .1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP-69.

2.5 EQUIPMENT SUPPORTS

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

- .1 Provide templates to ensure accurate location of anchor bolts.

2.7 PLATFORMS AND CATWALKS

- .1 To Section 05 50 00 - Metal Fabrication.

2.8 OTHER EQUIPMENT SUPPORTS

- .1 From structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings.
- .2 Submit structural calculations stamped by P.Eng. Licensed to practice in NL with shop drawings.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install in accordance with:
 - .1 Manufacturer's instructions and recommendations.
- .2 Vibration Control Devices:
 - .1 Install on piping systems at pumps, boilers, chillers, cooling towers, elsewhere as indicated.
- .3 Clamps on riser piping:

- .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
- .2 Bolt-tightening torques to be to industry standards.
- .3 Steel pipes: Install below coupling or shear lugs welded to pipe.
- .4 Cast iron pipes: Install below joint.
- .4 Clevis plates:
 - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .6 Use approved constant support type hangers where:
 - .1 vertical movement of pipework is 13 mm or more,
 - .2 transfer of load to adjacent hangers or connected equipment is not permitted.
- .7 Use variable support spring hangers where:
 - .1 transfer of load to adjacent piping or to connected equipment is not critical.
 - .2 variation in supporting effect does not exceed 25 % of total load.

3.3 HANGER SPACING

- .1 Plumbing piping: most stringent requirements of Canadian Plumbing Code
- .2 Fire protection: to applicable fire code.
- .3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.
- .4 Copper piping: up to NPS 1/2: every 1.5 m.
- .5 Hydronic, steam, condensate, rigid, and flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

Maximum Pipe Size: NPS	Maximum Spacing: Steel	Maximum Spacing: Copper
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
2	3.0 m	2.7 m
2-1/2	3.6 m	3.0 m
3	3.6 m	3.0 m
3-1/2	3.9 m	3.3 m
4	4.2 m	3.6 m
5	4.8 m	
6	5.1 m	
8	5.7 m	
10	6.6 m	
12	6.9 m	

- .6 Within 300 mm of each elbow.
- .7 Pipework greater than NPS 12: to MSS SP69.

3.4 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members, comprised of angel iron or c-channel.

3.5 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
 - .1 Ensure that rod is vertical under operating conditions.
 - .2 Equalize loads.
- .2 Adjustable clevis:
 - .1 Tighten hanger load nut securely to ensure proper hanger performance.
 - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
 - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
 - .1 Hammer jaw firmly against underside of beam.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

- .1 Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.
- .2 Sustainable requirements for construction and verification.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .3 Section 09 91 23 - Interior Painting.

1.3 REFERENCES

.1 Canadian Gas Association (CGA)

- .1 CSA/CGA B149.1, Natural Gas and Propane Installation Code.
- .2 CSAZ7396.1 Medical Gas pipeline Systems – Part 1: Pipelines for medical gases and vacuum.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-24.3, Identification of Piping Systems.

.3 National Fire Protection Association (NFPA)

- .1 NFPA 13, Standard for the Installation of Sprinkler Systems.
- .2 NFPA 14, Standard for the Standpipe and Hose Systems.

1.4 SUBMITTALS

.1 Product Data:

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data to include paint colour chips, other products specified in this section.
- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.5 QUALITY ASSURANCE

- .1 Quality assurance submittals: submit following in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Health and Safety:

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 61 00 – Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Dispose of unused paint coating material at official hazardous material collections site approved by Owner's Representative.
 - .3 Do not dispose of unused paint coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

PART 2 PRODUCTS

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers to be raised or recessed.
- .3 Information to include, as appropriate:
 - .1 Equipment: Manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- .1 Colours:
 - .1 Hazardous: red letters, white background.
 - .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- .2 Construction:
 - .1 3 mm thick laminated plastic or white anodized aluminum, matte finish, with square corners, letters accurately aligned and machine engraved into core.
- .3 Sizes:
 - .1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: Use size # 5.

.2 Equipment in Mechanical Rooms: Use size # 9.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Owner's Representative. Identification tagging subject to change.

2.4 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Pictograms:

.1 Where required, to Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.3 Use double-headed arrows where flow is reversible.

.5 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

- .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
 - .1 Pipes and tubing 20 mm and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.
 - .2 All other pipes: Pressure sensitive plastic-coated cloth or vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100%RH and continuous operating temperature of 150°C and intermittent temperature of 200°C.

.7 Colours and Legends:

- .1 Where not listed, obtain direction from Owner's Representative.
- .2 Colours for legends, arrows, to following table:

Background colour	Legend, arrows
Yellow	BLACK
Green	WHITE
Red	WHITE

- .3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
** Add design temperature		
++ Add design temperature and pressure		
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
Conduit for low voltage control wiring	To Section 25 05 54 – EMCS: Identification	

2.5 IDENTIFICATION DUCTWORK SYSTEMS

- .1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.
- .2 Colours: Black, or co-ordinated with base colour to ensure strong contrast.
- .3 Identify system : e.g. Supply AHU-1, Exhaust F-7 and include duct dimensions at same interval eg. 1000 x 200
- .4 Identify Isolation room exhaust ducts.
- .5 Identify ducting serving Area of Refuge with additional stencil with "AOR"

2.6 VALVES, CONTROLLERS

- .1 Brass tags 12 mm diameter with stamped identification data filled with black paint.
- .2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.7 CONTROLS COMPONENTS IDENTIFICATION

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in section 25 05 54 – EMCS: Identification. If no EMCS included in project, identification as per this section.
- .2 Inscriptions to include function and (where appropriate) fail-safe position, component ID name.

2.8 LANGUAGE

- .1 Identification to be in English.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 TIMING

- .1 Provide identification only after all painting specified in Section 09 91 23 - Interior Painting has been completed and all piping painting is completed.

3.3 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC and/or CSA registration plates as required by respective agency.

3.4 NAMEPLATES

- .1 Locations:
 - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
 - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection
 - .1 Do not paint, insulate or cover in any way.

3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: At not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.

- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification to be easily and accurately readable from usual operating areas and from access points.
 - .1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.6 VALVES, CONTROLLERS

- .1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Owner's Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively. Identification shall start with "ER" prefix followed by valve number.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- .1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- .2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this Section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

- .1 Submit names of personnel certified to NEBB or SMACNA to perform TAB to Owner's Representative within 90 days of award of contract.
- .2 Provide documentation confirming qualifications, successful experience. TAB contractor shall have a minimum of 5 (five) years experience to NEBB or SMACNA.
- .3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
 - .1 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
 - .2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems – Testing, Adjusting and Balancing.
- .4 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .6 Use TAB standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .7 Where instrument manufacturer calibration recommendations are more stringent than those listed in the TAB standard, use manufacturer's recommendations.
- .8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
 - .1 For systems or system components not covered in TAB standard, use TAB procedures developed by TAB Specialist.
 - .2 Where new procedures and requirements are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (NEBB, or SMACNA), requirements and recommendations contained in these procedures and requirements are mandatory.

- 1.3 PURPOSE OF TAB
 - .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads.
 - .2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
 - .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.
- 1.4 EXCEPTIONS
 - .1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.
- 1.5 CO-ORDINATION
 - .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.
 - .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.
- 1.6 PRE-TAB REVIEW
 - .1 **During pre TAB review contractor shall obtain any preliminary pre construction TAB measurements requested by the engineer.**
 - .2 Review contract documents before project construction is started and confirm in writing to Owner's Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
 - .3 Review specified standards and report to Owner's Representative in writing all proposed procedures which vary from standard.
 - .4 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.
- 1.7 START-UP
 - .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
 - .2 Follow special start-up procedures specified elsewhere in other Divisions.

- 1.8 OPERATION OF SYSTEMS DURING TAB
 - .1 Operate systems for length of time required for TAB and as required by Owner's Representative for verification of TAB reports.
- 1.9 START OF TAB
 - .1 Notify Owner's Representative seven (7) working days prior to start of TAB.
 - .2 Start TAB when building is essentially completed, including:
 - .1 Installation of ceilings, doors, windows, other construction affecting TAB.
 - .2 Application of weatherstripping, sealing, caulking.
 - .3 All pressure, leakage, other tests specified elsewhere in other Divisions.
 - .4 All provisions for TAB installed and operational.
 - .3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
 - .1 Proper thermal overload protection in place for electrical equipment.
 - .2 Air systems:
 - .1 Filters in place, clean.
 - .2 Duct systems clean.
 - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
 - .4 Correct fan rotation.
 - .5 Fire, smoke, volume control dampers installed and open.
 - .6 Coil fins combed, clean.
 - .7 Access doors, installed, closed.
 - .8 Outlets installed, volume control dampers open.
 - .3 Liquid systems:
 - .1 Flushed, filled, vented.
 - .2 Correct pump rotation.
 - .3 Strainers in place, baskets clean.
 - .4 Isolating and balancing valves installed, open.
 - .5 Calibrated balancing valves installed, at factory settings.
 - .6 Chemical treatment systems complete, operational.
- 1.10 APPLICATION TOLERANCES
 - .1 Do TAB to following tolerances of design values:
 - .1 Other HVAC systems: plus 5%, minus 5%.
 - .2 Hydronic systems: plus or minus 10 %.
- 1.11 ACCURACY TOLERANCES
 - .1 Measured values to be accurate to within plus or minus 2 % of actual values.

1.12 INSTRUMENTS

- .1 Prior to TAB, submit to Owner's Representative list of instruments to be used together with serial numbers.
- .2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- .3 Calibrate within 3 (three) months of TAB. Provide certificate of calibration to Owner's Representative.

1.13 SUBMITTALS

- .1 Submit, prior to commencement of TAB:
- .2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

- .1 Submit for checking and approval of Owner's Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
 - .1 Details of instruments used.
 - .2 Details of TAB procedures employed.
 - .3 Calculations procedures.
 - .4 Summaries.
- .2 Allow for two week review period.

1.15 TAB REPORT

- .1 Format to be in accordance with referenced standard.
- .2 TAB report to show results in SI units and to include:
 - .1 Project record drawings.
 - .2 System schematics.
- .3 Submit 3 (three) copies of TAB Report to Owner's Representative for verification and approval, in English in D-ring binders, complete with index tabs.
- .4 Allow for two week review period.

1.16 VERIFICATION

- .1 Reported results subject to verification by Owner's Representative.
- .2 Provide manpower and instrumentation to verify up to 30% of reported results.
- .3 Number and location of verified results to be at discretion of Owner's Representative.

- .4 Bear costs to repeat TAB as required to satisfaction of Owner's Representative.
- 1.17 SETTINGS
 - .1 After TAB is completed to satisfaction of Owner's Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
 - .2 Permanently mark settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.
- 1.18 COMPLETION OF TAB
 - .1 TAB to be considered complete when final TAB Report received and approved by Owner's Representative.
- 1.19 AIR SYSTEMS
 - .1 Standard: TAB to be to most stringent of this section or TAB standards of NEBB.
 - .2 Do TAB of systems, equipment, components, controls specified in other Divisions.
 - .3 Qualifications: personnel performing TAB to be qualified to standards of NEBB.
 - .4 Quality assurance: Perform TAB under direction of supervisor qualified to standards of NEBB.
 - .5 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration, amperage and volts for each stage of electrical heating coils.
 - .6 Calibrate all VAV boxes with correction factors entered into EMCS system and recorded.
 - .7 Calibrate all airflow stations for EMCS system.
 - .8 Locations of equipment measurements: To include, but not be limited to, following as appropriate:
 - .1 Inlet and outlet of dampers, VAV boxes, filter, coil, humidifier, fan, other equipment causing changes in conditions.
 - .2 At controllers, controlled device.
 - .9 Locations of systems measurements to include, but not be limited to, following as appropriate: Main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).
 - .10 Confirm all locations of duct/grille connection leakage for correction by contractor.
- 1.20 HYDRONIC SYSTEMS
 - .1 Definitions: for purposes of this section, to include low pressure hot water heating systems.
 - .2 Standard: TAB to be to most stringent of TAB standards of NEBB.

- .3 Do TAB of systems, equipment, components, controls specified in other Divisions.
 - .4 Qualifications: personnel performing TAB to be qualified to standards of NEBB.
 - .5 Quality assurance: perform TAB under direction of supervisor qualified to standards of NEBB.
 - .6 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: flow rate, static pressure, pressure drop (or loss), temperature, specific gravity, density, RPM, electrical power, voltage, noise, vibration.
 - .7 Locations of equipment measurement: to include, but not be limited to, following as appropriate:
 - .1 Inlet and outlet of heat exchangers (primary and secondary sides), boiler, chiller(heat pump), coil, dry cooler, pump, PRV, control valve, other equipment causing changes in conditions.
 - .2 At controllers, controlled device.
 - .8 Locations of systems measurements to include, but not be limited to, following as appropriate: supply and return of primary and secondary loops (main, main branch, branch, sub-branch) of all hydronic systems, inlet connection of make-up water.
- 1.21 OTHER SYSTEMS
- 1.22 OTHER TAB REQUIREMENTS
- .1 General requirements applicable to work specified this paragraph:
 - .1 Qualifications of TAB personnel: as for air systems specified this section.
 - .2 Quality assurance: as for air systems specified this section.
- 1.23 POST- OCCUPANCY TAB
- .1 Measure DBT, WBT (or %RH), air velocity, air flow patterns, in occupied zone of areas designated by Owner's Representative.
 - .2 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 3 months of termination of Warranty Period.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

- 3.1 CONSTRUCTION TEAM RESPONSIBILITY
- .1 General contractor to provide the NEBB Certified contractor with a complete set of contract documents that pertain to the air barrier (drawings, specifications, and approved submittals), including all current approved change orders and contract modifications

- .2 General Contractor to develop a project schedule with the input of the NEBB Certified contractor that coordinates the work of other disciplines and provides adequate time in the construction process to allow successful completion of the TAB work.
- .3 Notify the NEBB Certified contractor of all schedule changes.
- .4 Ensure that all demolition of ventilation and heating system is coordinated such that all removals do not affect building or plenum pressures which would affect areas outside that of construction.
- .5 Ensure that EMCS controls are sufficiently complete prior to the start of TAB. The preliminary balancing report will not be submitted until controls are sufficiently progressed that graphics can be easily reviewed with the balancing report readings.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .3 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- .4 Section 23 05 53.01 – Mechanical Identification.

1.2 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ANSI/ASHRAE/IESNA 90.1, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM B209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).
 - .2 ASTM C335, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - .3 ASTM C411, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C547, Specification for Mineral Fiber Pipe Insulation.
 - .6 ASTM C553, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .7 ASTM C612, Specification for Mineral Fiber Block and Board Thermal Insulation.
 - .8 ASTM C795, Specification for Thermal Insulation for Use with Austenitic Stainless Steel.
 - .9 ASTM C921, Standard Practice for Determining Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .4 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.
- .5 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
- .6 National Energy Code of Canada for Buildings (NECB)

1.3 DEFINITIONS

- .1 For purposes of this section:

- .1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as defined herein.
 - .3 Insulation systems - insulation material, fasteners, jackets, and other accessories.
- .2 TIAC Codes:
 - .1 CRD: Commercial Round Ductwork,
 - .2 CRF: Commercial Rectangular Finish.
- 1.4 SHOP DRAWINGS
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.
- 1.5 SAMPLES
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix typewritten label beneath sample indicating service.
- 1.6 MANUFACTURERS' INSTRUCTIONS
 - .1 Submit manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Installation instructions to include procedures used and installation standards achieved.
- 1.7 QUALIFICATIONS
 - .1 Installer: certified in performing work of this section, and have at least 5 years successful experience in this size and type of project, qualified to standards of TIAC.
- 1.8 DELIVERY, STORAGE AND HANDLING
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
 - .2 Protect from weather and construction traffic.
 - .3 Protect against damage from any source.
 - .4 Store at temperatures and conditions recommended by manufacturer.
- 1.9 WASTE MANAGEMENT AND DISPOSAL
 - .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

- .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Owner's Representative.
- .5 Divert unused adhesive material from landfill to official hazardous material collections site approved by Owner's Representative.
- .6 Do not dispose of unused adhesive materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

PART 2 PRODUCTS

2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.2 INSULATION

- .1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).
- .4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).
 - .1 Mineral fibre: to ASTM C553.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to ASTM C553.

2.3 JACKETS

- .1 Canvas:
 - .1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
- .2 Lagging adhesive: Compatible with insulation.
- .3 Aluminum:
 - .1 To ASTM B209 with moisture barrier as scheduled in PART 3 of this section.
 - .2 Thickness: 0.40 mm sheet.
 - .3 Finish: Stucco embossed or corrugated.

- .4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.
- .4 Stainless steel:
 - .1 Type: 304 or 316 where additional corrosion protection is required.
 - .2 Thickness: 0.25 mm sheet.
 - .3 Finish: Corrugated or stucco embossed.
 - .4 Jacket banding and mechanical seals: 12mm wide, 0.5 mm thick stainless steel.
- 2.4 ACCESSORIES
 - .1 Vapour retarder lap adhesive:
 - .1 Water based, fire retardant type, compatible with insulation.
 - .2 Indoor Vapour Retarder Finish:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
 - .3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.
 - .4 ULC Listed Canvas Jacket:
 - .1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
 - .5 Outdoor Vapour Retarder Mastic:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
 - .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m².
 - .6 Tape: self-adhesive, aluminum, reinforced, 75 mm wide minimum.
 - .7 Contact adhesive: quick-setting
 - .8 Canvas adhesive: washable.
 - .9 Tie wire: 1.5 mm stainless steel.
 - .10 Banding: 12 mm wide, 0.5 mm thick stainless steel.
 - .11 Facing: 25 mm galvanized steel hexagonal wire mesh stitched on one face of insulation.
 - .12 Fasteners: 4 mm diameter pins with 35 mm diameter or square clips, length to suit thickness of insulation.
- PART 3 EXECUTION
 - 3.1 PRE-INSTALLATION REQUIREMENTS
 - .1 Pressure testing of ductwork systems complete, witnessed and certified.
 - .2 Surfaces clean, dry, free from foreign material.

3.2 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturer's instructions and as indicated.
- .3 Use two layers with staggered joints when required nominal thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Hangers, supports to be outside vapour retarder jacket.
- .5 Supports, Hangers in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
 - .1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
- .6 Fasteners: At 300 mm oc in horizontal and vertical directions, minimum two rows each side.

3.3 DUCTWORK INSULATION SCHEDULE

- .1 Insulation types and thicknesses: Conform to following Table:

.2

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts (exposed)	C-1	yes	50
Round cold and dual temperature supply air ducts (concealed)	C-2	yes	50
Round warm air ducts (exposed)	C-1	no	25
Rectangular cold and dual temperature supply air ducts (concealed)	C-2	Yes	25

- .3 Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse:

- .1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

- .4 Finishes: Conform to following table:

	TIAC Code	
Indoor, concealed	Rectangular None	Round none
Indoor, exposed within mechanical room	CRF/1	CRD/2
Indoor, exposed elsewhere	CRF/2	CRD/3

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

- .1 Thermal insulation for piping and piping accessories in commercial type applications.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .3 Section 07 92 00 – Joint Sealing.
- .4 Section 23 07 16 – HVAC Equipment Insulation.
- .5 Section 23 05 53.01 – Mechanical Identification.

1.3 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- .1 ASHRAE Standard 90.1, Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings (Including all Addenda).
- .2 American Society for Testing and Materials (ASTM)
- .1 ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
- .2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
- .3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- .4 ASTM C449/C449M, Standard Specification for Mineral Fibre-Hydraulic-Setting Thermal Insulating and Finishing Cement.
- .5 ASTM C533 Standard specification for Calcium Silicate Insulation Block and Pipe.
- .6 ASTM C547 Standard Specification for Mineral Fibre Pipe Insulation.
- .7 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
- .8 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .9 ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
- .3 Canadian General Standards Board (CGSB)
- .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

- .2 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), c. 37.
 - .2 Canadian Environmental Protection Act, (CEPA), c. 33.
 - .3 Transportation of Dangerous Goods Act (TDGA), c. 34.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets.
- .6 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.
- .7 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
- .8 National Energy Code of Canada for Buildings (NECB).
- 1.4 DEFINITIONS
 - .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as defined herein.
 - .2 TIAC ss:
 - .1 CRF: Commercial Rectangular Finish
 - .2 CPF: Commercial Piping Finish.
- 1.5 SUBMITTALS
 - .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
 - .3 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.
 - .5 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions to Owner's Representative.
- 1.6 QUALITY ASSURANCE
 - .1 Qualifications:
 - .1 Installer: certified in performing work of this Section, and have at least 5 years successful experience in this size and type of project, qualified to standards of TIAC.
 - .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- 1.7 DELIVERY, STORAGE AND HANDLING
 - .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.
 - .2 Storage and Protection:
 - .1 Protect from weather, construction traffic.
 - .2 Protect against damage.
 - .3 Store at temperatures and conditions required by manufacturer.
 - .3 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Place excess or unused insulation and insulation accessory materials in designated containers.
 - .3 Divert unused metal materials from landfill to metal recycling facility approved by Owner's Representative.
 - .4 Dispose of unused adhesive material at official hazardous material collections site approved by Owner's Representative.

PART 2 PRODUCTS

2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102.
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 °C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-3: Rigid moulded mineral fibre with factory applied vapour retarder jacket.
 - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to CAN/ULC-S702.
- .4 TIAC Code C-2: Mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
 - .1 Mineral fibre: to ASTM C547.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to CAN/ULC-S702.

2.3 INSULATION SECUREMENT

- .1 Tape: Self-adhesive, aluminum, plain reinforced, 50 mm wide minimum.
- .2 Contact adhesive: Quick setting.
- .3 Canvas adhesive: Washable.
- .4 Tie wire: 1.5 mm diameter stainless steel.
- .5 Bands: Stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Hydraulic setting or air drying on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

- 2.6 INDOOR VAPOUR RETARDER FINISH
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
- 2.7 OUTDOOR VAPOUR RETARDER FINISH
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
 - .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m².
- 2.8 JACKETS
 - .1 Polyvinyl Chloride (PVC):
 - .1 One-piece moulded type and sheet to ASTM D1784 with pre-formed shapes as required.
 - .2 Colours: to match adjacent finish paint. Confirm colour with Owner's Representative.
 - .3 Minimum service temperatures: -20°C.
 - .4 Maximum service temperature: 65°C.
 - .5 Moisture vapour transmission: 0.02 perm.
 - .6 Thickness: 0.55 mm.
 - .7 Fastenings:
 - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
 - .2 Tacks.
 - .3 Pressure sensitive vinyl tape of matching colour.
 - .8 Special requirements:
 - .1 Indoor: flame spread rating 25, smoke developed rating 50.
 - .2 Outdoor: UV rated material at least 0.5 mm thick.
 - .9 Within mechanical penthouse use fully coloured PVC jacketing and fittings to differentiate between each of the following services;
 - .1 Chilled glycol supply and chilled return (Blue)
 - .2 Low temperature heating glycol supply and return (Red)
 - .3 Geothermal source/sink supply and return (Green)
 - .4 Fluid Coolers supply return. (Light Green)
 - .5 Submit PDF markup of both hydronic floor plan and hydronic schematic indicating the approximate colours and the extent of the jacketing.
 - .6 Submit samples of the proposed colours for approval.
 - .2 Canvas:
 - .1 220gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
 - .2 Lagging adhesive: Compatible with insulation.
 - .3 Aluminum:
 - .1 To ASTM B209.
 - .2 Thickness: 0.50 mm sheet.

- .3 Finish: Embossed or corrugated.
- .4 Joining: Longitudinal and circumferential slip joints with 50 mm laps.
- .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
- .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.
- .4 Stainless steel:
 - .1 Type: 304 or type 316.
 - .2 Thickness: 0.25 mm.
 - .3 Finish: Smooth.
 - .4 Joining: Longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.
- 2.9 WEATHERPROOF CAULKING FOR JACKETS INSTALLED OUTDOORS
 - .1 Caulking to: Section 07 92 00 - Joint Sealing.

PART 3 EXECUTION

3.1 MANUFACTURE'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE- INSTALLATION REQUIREMENT

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces to be clean, dry, free from foreign material.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
 - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

- 3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES
- .1 See Section 23 07 16 – HVAC Equipment Insulation.
- 3.5 INSTALLATION OF ELASTOMERIC INSULATION
- .1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.
- 3.6 PIPING INSULATION SCHEDULES
- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified. Insulate vent pipes 3.0 m from roof penetration.
- .2 TIAC Code: A-3.
- .1 Securements: Tape at 300 mm oc.
- .2 Seals: VR lap seal adhesive, VR lagging adhesive.
- .3 Installation: TIAC Code: 1501-C.
- .3 TIAC Code: A-6.
- .1 Insulation securements: as per manufacturer's recommendation.
- .2 Seals: lap seal adhesive, lagging adhesive.
- .3 Installation: TIAC Code: 1501-CA.
- .4 TIAC Code: C-2 with vapour retarder jacket.
- .1 Insulation securements: 18 ga SS wire or 12 mm x 0.5 mm SS bands at 300 mm oc.
- .2 Seals: lap seal adhesive, lagging adhesive.
- .3 Installation: TIAC Code: 1501-C.
- .5 Thickness of insulation to be as listed in following table.
- .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
- .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp °C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			<i>Run out</i>	<i>to 1</i>	<i>1 1/4 to 2</i>	<i>2 1/2 to 4</i>	<i>5 to 6</i>	<i>8 & over</i>
Hot Water Heating	60 - 94	A-3	25	38	38	38	38	38

- .6 Finishes:
- .1 Exposed indoors: PVC jacket.
- .2 Exposed in mechanical rooms: PVC jacket.

- .3 Concealed, indoors: canvas on valves, fittings. No further finish.
- .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
- .5 Finish attachments: SS screws or bands, at 150 mm oc. Seals: wing or closed.
- .6 Installation: To appropriate TIAC code CPF/1 through CPF/5.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 91 13 – General Commissioning (Cx) Requirements: supplemented as specified herein.
- .2 Section 22 42 01 – Plumbing Specialties and Accessories.
- .3 Section 23 05 93 – Testing, Adjusting and Balancing for HVAC.
- .4 Section 23 08 02 – Cleaning and Start-up of Mechanical Piping Systems.
- .5 Section 23 21 13.02 – Hydronic Systems: Steel.

1.2 REFERENCES

- .1 ASTM E202, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

1.3 CLEANING AND START-UP OF MECHANICAL PIPING SYSTEMS

- .1 In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

1.4 HYDRONIC SYSTEMS - PERFORMANCE VERIFICATION (PV)

- .1 Perform hydronic systems performance verification after cleaning is completed and system is in full operation.
- .2 When systems are operational, perform following tests:
 - .1 Conduct full scale tests at maximum design flow rates, temperatures and pressures for continuous consecutive period of two (2) working days to demonstrate compliance with design criteria.
 - .2 Verify performance of hydronic system by simulating maximum design conditions and varying.
 - .1 Maximum heating demand.
 - .2 Maximum cooling demand.
 - .3 Outdoor reset.

1.5 HYDRONIC SYSTEM CAPACITY TEST

- .1 Timing: After:
 - .1 TAB has been completed
 - .2 Verification of operating, limit, safety controls.
 - .3 Verification of primary and secondary pump flow rates.
 - .4 Verification of accuracy of temperature and pressure sensors and gauges.

- .2 When capacity test is completed, return controls and equipment status to normal operating conditions.

1.6 REPORTS

- .1 In accordance with Section 01 91 13 – General Commissioning (Cx) Requirements: supplemented as specified herein.

1.7 TRAINING

- .1 In accordance with Section 01 91 13 – General Commissioning (Cx) Requirements: supplemented as specified in relevant specification sections

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

- .1 Procedures and cleaning solutions for cleaning mechanical piping systems.

1.2 RELATED SECTIONS

- .1 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .2 Section 23 05 93 - Testing, Adjusting and Balancing of HVAC
- .3 Section 23 25 00 - HVAC Water Treatment Systems.

1.3 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM E202 – Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).

1.4 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 – Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .2 Submit plan for cleaning and sample report showing information that will be provided.
 - .3 Quality assurance submittals: submit following in accordance with Section 01 33 00 – Submittal Procedures.
 - .1 Instructions: submit manufacturer's installation instructions.
 - .1 Owner's Representative will make available one (1) copy of systems supplier installation instructions.

1.5 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading.

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 – Common Product Requirements.

.2 Waste Management and Disposal:

.1 Construction / Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction / Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 CLEANING SOLUTIONS

.1 Low foaming detergent at all temperatures

.2 No pH neutralization required

.3 Designed for use on most metals including aluminium

.4 Bio-degradable

.5 Phosphate Free

.6 Nitrite Free

PART 3 EXECUTION

3.1 CLEANING HYDRONIC AND STEAM SYSTEMS

.1 Timing

.1 Systems to be operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.

.2 Cleaning Agency:

.1 Retain qualified water treatment specialist to perform system cleaning.

.3 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete by water treatment specialist.

.4 Cleaning procedures:

.1 Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:

-
- .1 Cleaning procedures, flow rates, elapsed time.
 - .2 Chemicals and concentrations to be used.
 - .3 Inhibitors and concentrations.
 - .4 Specific requirements for completion of work.
 - .5 Special precautions for protecting piping system materials and components.
 - .6 Complete analysis of water to be used to ensure water will not damage systems or equipment.
 - .5 Conditions at time of cleaning of systems
 - .1 Systems to be free from construction debris, dirt and other foreign material.
 - .2 Control valves to be operational, fully open to ensure that terminal units can be cleaned properly.
 - .3 Strainers to be clean prior to initial fill.
 - .4 Install temporary filters on pumps not equipped with permanent filters.
 - .5 Install pressure gauges on strainers to detect plugging.
 - .6 Report on Completion of Cleaning
 - .1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.
 - .7 Hydronic Systems:
 - .1 Flush system thoroughly with water, back flush pump, strainers, blow down drain valves and risers to remove all loose debris. Remove accumulated sludge in boilers if necessary.
 - .2 Then add 2% solution of low foaming detergent to the system through a by-pass feeder or another feeding device.
 - .3 Circulate for 36 hours at 82° C. For chilled systems, circulate at least 48 hours at ambient temperature.
 - .4 During recirculation, back flush strainers, drain valves and risers at their lowest point once every 8 hours.
 - .5 Drain cleaning water completely.
 - .6 Then fill and drain system several times. Circulate 30 minutes every time the system is refilled.
 - .7 Bleed system at several points until water is clear and non-foaming. Clean pump strainers.
 - .8 Draw a water sample from the system and send it to out laboratory for analysis.
 - .9 If the laboratory report is satisfactory, the system must then be treated with the appropriate formula.
- 3.2 START-UP OF HYDRONIC SYSTEMS
- .1 After cleaning is completed and system is filled:
 - .1 Establish circulation and expansion tank level, set pressure controls.

- .2 Ensure air is removed.
- .3 Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.
- .4 Dismantle system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.
- .5 Clean out strainers repeatedly until system is clean.
- .6 Check water level in expansion tank with cold water with circulating pumps OFF and again with pumps ON.
- .7 Repeat with water at design temperature.
- .8 Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.
- .9 Bring system up to design temperature and pressure slowly.
- .10 Perform TAB as specified in Section 23 05 93 - Testing, Adjusting and Balancing (TAB).
- .11 Adjust pipe supports, hangers, springs as necessary.
- .12 Monitor pipe movement, performance of expansion joints, loops, guides, anchors.
- .13 If sliding type expansion joints bind or if bellows type expansion joints flex incorrectly, shut down system, re-align, repeat start-up procedures.
- .14 Re-tighten bolts, etc. using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.
- .15 Check operation of drain valves.
- .16 Adjust valve stem packings as systems settle down.
- .17 Fully open all balancing valves (except those that are factory-set).
- .18 Check operation of over-temperature protection devices on circulating pumps.
- .19 Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

3.3 CLEANING

- .1 Provide in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes.

- .1 Materials and installation for steel piping, valves and fittings for hydronic systems in building services piping.

1.2 RELATED SECTIONS.

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06- Health and Safety Requirements.
- .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 21 05 01 - Common Work Results -Mechanical.
- .6 Section 23 05 00 – Common Work Results for Plumbing.
- .7 Section 23 05 05 - Installation of Pipework.
- .8 Section 23 05 23.01 - Valves - Bronze.
- .9 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .10 Section 23 07 13 – Duct Insulation.
- .11 Section 23 10 16 – HVAC Equipment Insulation.
- .12 Section 23 07 19 – HVAC Piping Insulation.
- .13 Section 23 08 01 - Performance Verification of Mechanical Piping.
- .14 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

1.3 REFERENCES

- .1 American Society of Mechanical Engineers (ASME).
- .1 ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- .2 ASME B16.3, Malleable Iron Threaded Fittings: Classes 150 and 300.
- .3 ASME B16.5, Pipe Flanges and Flanged Fittings: NPS through NPS 24 Metric/Inch Standard.
- .4 ASME B16.9, Factory-Made Wrought Buttwelding Fittings.
- .5 ASME B18.2.1, Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange. Loded Head and Lag Screws (Inch Series).

- .6 ASME B18.2.2, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
 - .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
 - .3 ASTM A536, Standard Specification for Ductile Iron Castings.
 - .4 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.
 - .5 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - .6 ASTM E202, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.
 - .3 American Water Works Association (AWWA).
 - .1 AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - .4 Canadian Standards Association (CSA International).
 - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
 - .2 CAN/CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS).
 - .1 MSS-SP-67, Butterfly Valves.
 - .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - .3 MSS-SP-71, Cast Iron Swing Check Valves Flanged and Threaded Ends.
 - .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
 - .5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.
 - .6 Province of Newfoundland and Labrador Boiler, Pressure Vessel and Compressed Gas Regulations.
- 1.4 SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Closeout Submittals.
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals, and include the following:
 - .1 Special servicing requirements.
 - .3 Grooved joint couplings and fittings to be indicated on product submittals and to be specifically identified with the applicable style or series designation.
 - .4 Grooved products manufacturer to supply on site tools and products for installation training.
 - .5 All grooved products to be of one manufacturer.
 - .6 Groove products to have current CRN numbers.

1.5 QUALITY ASSURANCE

.1 Health and Safety.

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal.

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.7 MAINTENANCE

.1 Extra Materials; As applicable.

- .1 Provide following spare parts:
- .1 Valve seats: one for every ten valves, each size. Minimum one.
- .2 Discs: one for every ten valves, each size. Minimum one.
- .3 Stem packing: one for every ten valves, each size. Minimum one.
- .4 Valve handles: two of each size.
- .5 Gaskets for flanges: one for every ten flanges.

PART 2 PRODUCTS

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B as follows:

- .1 To NPS 6: schedule 40.
- .2 NPS 8 and 10: schedule 40.
- .3 NPS 12 and over, 10 mm wall thickness.

2.2 PIPE JOINTS

- .1 NPS 2 and under: screwed fittings with PTFE tape or lead-free pipe dope.
- .2 Roll grooved: rigid coupling to CSA B242.
- .3 Flexible couplings to CSA B242 to be used where noted on drawings and on elbows utilized on expansion joints.
- .4 Flanges: plain ASME, B16.1, raised face, slip-on or weld neck to ASME B16.5.

- .5 Orifice flanges: slip-on raised face, 2100 kPa.
- .6 Flange gaskets: to AWWA C111
- .7 Pipe thread: taper.
- .8 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.
- .9 Roll grooved coupling gaskets: NPS 2 to 8, type EHP, EPDM high performance, -40°C to +120°C for continuous operation, NPS 10 and above type EPDM, -30°C to +110°C for continuous acceptable on hot water, glycol water, chilled water and condenser water.

2.3 FITTINGS

- .1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.
- .2 Pipe flanges and flanged fittings:
 - .1 Cast iron: to ASME B16.1, Class 125.
 - .2 Steel: to ASME B16.5.
- .3 Butt-welding fittings: steel, to ASME B16.9.
- .4 Unions: malleable iron, to ASTM A47/A47M and ASME B16.3.
- .5 Fittings for roll grooved piping: malleable iron to ASTM A47/A47M, ductile iron to ASTM A536.

2.4 VALVES

- .1 Connections:
 - .1 NPS2 and smaller: screwed ends.
- .2 Gate valves: to MSS-SP-70 and MSS-SP-80 Application: Isolating equipment, control valves, pipelines:
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: Class 125 rising stem, solid wedge disc, as specified Section 23 05 23.01 – Valves – Bronze.
 - .2 Elsewhere: Class 125, non- rising stem, solid wedge disc, as specified Section 23 05 23.01 – Valves – Bronze.
- .3 Globe valves: to MSS-SP-80 and 85 Application: Throttling, flow control, emergency bypass.
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: with plug disc, as specified Section 23 05 23.01 – Valves – Bronze.
 - .2 Elsewhere: Globe, with composition disc, as specified Section 23 05 23.01 – Valves - Bronze.
- .4 Balancing, for TAB:

- .1 Sizes: Calibrated balancing valves, as specified this section.
- .2 NPS 2 and under:
 - .1 copper alloy body threaded and, 2.1 MPa rating, globe style, self sealing measuring ports for temperature or pressure probes, locking tamper proof setting.
 - .2 Mechanical Rooms and Elsewhere: Globe, with plug disc as specified Section 23 05 23.01 - Valves – Bronze.
 - .3 In lieu of standard malleable iron or copper fittings the Contractor may install the following component system:
 - .1 Union port fitting with air vent and pressure/temperature port.
 - .2 Balancing valve, strainer with drain valve, ball valve combination may also be used.
- .5 Drain valves: Gate, Class 125 non-rising stem, solid wedge disc, as specified Section 23 05 23.01 – Valves - Bronze.
- .6 Bypass valves on gate and globe valves NPS 8 and larger: NPS $\frac{3}{4}$ as specified Section 23 05 23.01 – Valves - Bronze.
- .7 Swing check valves: to MSS-SP-71.
 - .1 NPS 2 and under:
 - .1 Class 125 swing, with composition disc, as specified Section 23 05 23.01 – Valves - Bronze.
- .8 Silent check valves:
 - .1 NPS 2 and under:
 - .1 As specified Section 23 05 23.01 – Valves – Bronze.
- .9 Ball valves:
 - .1 NPS 2 and under: as specified Section 23 05 23.01 – Valves - Bronze.

PART 3 EXECUTION

3.1 PIPING INSTALLATION

- .1 Install pipework in accordance with Section 23 05 05 – Installation of Pipework by certified journeyman and authority having jurisdiction.

3.2 CIRCUIT BALANCING VALVES

- .1 Install flow measuring stations and flow balancing valves as indicated.

3.3 CLEANING, FLUSHING AND START-UP

- .1 In accordance with Section 23 08 02 – Cleaning and Start-up of Mechanical Piping Systems.

- 3.4 TESTING
- .1 Test system in accordance with Section 21 05 01 – Common Work Results - Mechanical.
Minimum 1.5 times working pressure or 1000 kPa.
- 3.5 BALANCING
- .1 Balance water systems to within plus or minus 5 % of design output.
- .2 Refer to Section 23 05 93 – Testing, Adjusting and Balancing for HVAC, for applicable procedures.
- 3.6 PERFORMANCE VERIFICATION
- .1 In accordance with Section 23 08 01 – Performance Verification of Mechanical Systems.
- .2 Provide copies of test reports for Commissioning Manuals.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section includes:

- .1 The supply and installation of hydronic specialties equipment.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 29.06– Health and Safety Requirements
- .3 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .4 Section 01 78 00 – Closeout Submittals.
- .5 Section 23 05 05 – Installation of Pipework.
- .6 Section 23 08 01 – Performance Verification of Mechanical Piping Systems.

1.3 REFERENCES

- .1 American Society of Mechanical Engineers (ASME)
- .1 ANSI/ASME, Boiler and Pressure Vessels Code.
- .2 American Society for Testing and Materials (ASTM)
- .1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A48, Standard Specification for Gray Iron Castings.
- .3 ASTM A216, Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, For high Temperature Service.
- .4 ASTM A278M, Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 345° C.
- .5 ASTM A516/A516M, Specification for Pressure Vessel Plates, Carbon Steel, for Moderate and Lower Temperature Service.
- .6 ASTM A536, Specification for Ductile Iron Castings.
- .7 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .3 Canadian Standards Association (CSA)
- .1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.
- .4 Provincial Boiler, Pressure Vessel and Compressed Gas Regulations.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Product Data: Submit WHMIS MSDS – Material Safety Data Sheets.
 - .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate on product data expansion tanks, air vents, separators, valves, and strainers.
- .3 Closeout Submittals:
 - .1 Submit maintenance data in accordance with Section 01 78 00 – Closeout Submittals.
- 1.5 QUALITY ASSURANCE
 - .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.
- 1.6 DELIVERY STORAGE AND DISPOSAL
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
 - .2 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- PART 2 PRODUCTS
- 2.1 CANADIAN REGISTRATION NUMBERS (CRN)
 - .1 Required on all products as per Provincial Regulations and CSA B51.
- 2.2 AUTOMATIC AIR VENT
 - .1 Standard float vent: brass body and NPS 1/8 connection and rated at 1000 kPa working pressure.
 - .2 Industrial float vent: ASTM A48 Class 30 cast iron body and NPS 1/2 connection and rated at minimum 860 kPa working pressure.
 - .3 Float: solid material suitable for 115°C working temperature.
- 2.3 PIPE LINE STRAINER
 - .1 NPS 1/2 to 2: 1.7 MPa steam non-shock bronze body to ASTM B62, screwed or grooved connections, Y pattern.
 - .2 Blowdown connection: NPS 1.
 - .3 Screen: stainless steel with 1.19 mm perforations.

- .4 Working pressure: 860 kPa.
- .5 Acceptable materials: Watts 7775, Hoffman, Wilkins, Victaulic, Armstrong.

PART 3 EXECUTION

3.1 GENERAL

- .1 Install as indicated and to manufacturer's recommendations.
- .2 Run drain lines and blow off connections to terminate above nearest drain.
- .3 Maintain proper clearance to permit service and maintenance.
- .4 Should deviations beyond allowable clearances arise, request and follow Owner's Representative's directive.
- .5 Check shop drawings for conformance of all tappings for ancillaries and for equipment operating weights.

3.2 STRAINERS

- .1 Install in horizontal or down flow lines.
- .2 Ensure clearance for removal of basket.
- .3 Install ahead of each pump.
- .4 Install ahead of each automatic control valve larger than NPS 1 and radiation and as directed.

3.3 AIR VENTS

- .1 Install at high points of systems.
- .2 Install gate valve on automatic air vent inlet. Run discharge to nearest drain or service sink.

3.4 EXPANSION TANKS

- .1 Adjust expansion tank pressure to suit design criteria.
- .2 Install lockshield type valve at inlet to tank.

3.5 PERFORMANCE VERIFICATION

- .1 In accordance with Section 23 08 01 - Performance Verification of Mechanical Piping Systems, supplemented as specified herein.
- .2 Provide copies of test reports for Commissioning Manuals.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

- .1 Materials and installation for duct accessories including flexible connections, access doors, vanes and collars.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 29.06 – Health and Safety Requirements.
- .3 Section 01 45 00 – Quality Control.
- .4 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5 Section 01 78 00 – Closeout Submittals.

1.3 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
 - .1 SMACNA – HVAC Duct Construction Standards – Metal and Flexible.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
 - .1 Flexible connections
 - .2 Duct access doors.
 - .3 Turning vanes.
 - .4 Instrument test ports.
 - .2 Submit WHMIS MSDS in accordance with Section 02 62 00.01 – Hazardous Materials. Indicate VOC's for adhesive and solvents during application and curing.
- .3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

- .1 Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
 - .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .5 Instructions: submit manufacturer's installation instructions.
 - .6 Manufacturer's Field Reports: manufacturer's field reports specified.
 - .7 Closeout Submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.
- 1.5 QUALITY ASSURANCE
- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
 - .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
 - .4 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in accordance with Waste Management Plan (WMP).
 - .5 Divert unused metal materials from landfill to metal recycling facility as approved by Owner's Representative.
- PART 2 PRODUCTS
- 2.1 GENERAL
- .1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 ACCESS DOORS IN DUCTS

- .1 Access doors shall have an effective seal (i.e., no air leakage) and latching or lever mechanisms.
- .2 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.
- .3 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.
- .4 Gaskets: neoprene.
- .5 Hardware:
 - .1 Hold open devices.
 - .2 300 x 300 mm glass viewing panels.
 - .3 Up to 300 x 300 mm: two sash locks complete with safety chain.
 - .4 301 to 450 mm: four sash locks complete with safety chain.
 - .5 451 to 1000 mm: piano hinge and minimum two sash locks.
 - .6 Doors over 1000 mm: piano hinge and two handles operable from both sides.
 - .1 Hold open devices.
 - .2 300 X 300 mm glass viewing panels.

2.3 TURNING VANES

- .1 Factory or shop fabricated double thickness with trailing edge, to recommendations of SMACNA and as indicated.

2.4 INSTRUMENT TEST PORTS

- .1 1.6 mm thick steel zinc plated after manufacture.
- .2 Cam lock handles with neoprene expansion plug and handle chain.
- .3 28 mm minimum inside diameter. Length to suit insulation thickness.
- .4 Neoprene mounting gasket.

2.5 SPIN-IN COLLARS

- .1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.
- .2 Sheet metal thickness to co-responding round duct standards.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1
- .2 Access doors and viewing panels:
 - .1 Size:
 - .1 600 x 600 mm for person size entry.
 - .2 450 x 450 mm for servicing entry.
 - .3 300 x 300 mm for viewing.
 - .4 As indicated.
 - .2 Locations:
 - .1 Control dampers.
 - .2 Devices requiring maintenance.
 - .3 Required by code.
 - .4 Reheat coils.
 - .5 Elsewhere as indicated.
- .3 Duct access doors shall be provided for the inspection of duct-mounted components and cleaning of duct systems. Where the duct size permits, access doors should be at least 450 x 350 mm (18 x 14 in).
 - .1 Access doors shall be located
 - .2 at the base of all main risers;
 - .3 in front of and behind turning vanes, silencers, and duct-mounted coils;
 - .4 at fire, smoke, and motorized dampers;
 - .5 at locations having an internally mounted piece of equipment or device;
 - .6 in fresh air ducts near the intake louvers;
 - .7 such that any section of duct is not more than 15 m (590 in) from a point of access; and such that any section of duct downstream of a HEPA filter is not more than 3 m (118 in) from a point of access.
- .4 Instrument test ports.
 - .1 General:
 - .1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
 - .2 Locate to permit easy manipulation of instruments.
 - .3 Install insulation port extensions as required.

- .4 Locations.
 - .1 For traverse readings:
 - .1 Ducted inlets to roof and wall exhausters.
 - .2 Inlets and outlets of other fan systems.
 - .3 Main and sub-main ducts.
 - .4 And as indicated.
 - .2 For temperature readings:
 - .1 At outside air intakes.
 - .2 In mixed air applications in locations as approved by Owner's Representative.
 - .3 At inlet and outlet of coils.
 - .4 Downstream of junctions of two converging air streams of different temperatures.
 - .5 And as indicated.

- .5 Turning vanes:
 - .1 Install in accordance with recommendations of SMACNA and as indicated.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Have manufacturer's representative of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.
 - .2 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of the Work, after cleaning is carried out.
 - .4 Obtain reports, within three (3) working days of review, and submit, immediately, to Owner's Representative.

3.4 CLEANING

- .1 Perform cleaning operations as specified in Section 01 74 11 – Cleaning and in accordance with Manufacturer's recommendations.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 General

1.1 **Summary**

.1 Section Includes:

- .1 General requirements for building Energy Monitoring and Control System (EMCS) that are common to NMS EMCS Sections.

1.2 **Related Sections**

- .2 The contractor is to ensure that all related work is co-ordinated among all specification sections, as well as between other Divisions, and that the tender price includes all related work. The referenced sections below are for guidance only and are not necessarily a complete list of related sections.
- .3 Section 01 33 00 – Submittal Procedures.
- .4 Section 01 35 29.06 – Health and Safety Requirements.
- .5 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .6 Section 01 91 13 – General Commissioning (Cx) Requirements.
- .7 Section 09 91 23 - Interior Painting.
- .8 Section 25 01 11 - EMCS: Start-up, Verification and Commissioning.
- .9 Section 25 01 12 - EMCS: Training.
- .10 Section 25 05 02 - EMCS: Submittals and Review Process.
- .11 Section 25 05 03 - EMCS: Project Record Documents.
- .12 Section 25 05 54 - EMCS: Identification.
- .13 Section 25 05 60 - EMCS: Field Installation.
- .14 Section 25 08 20 - EMCS: Warranty and Maintenance.
- .15 Section 25 10 01 - EMCS: Local Area Network (LAN).
- .16 Section 25 10 02 - EMCS: Operator Work Station (OWS).
- .17 Section 25 30 01 - EMCS: Building Controllers
- .18 Section 25 30 02 - EMCS: Field Control Devices.
- .19 Section 25 90 01 - EMCS: Site Requirements, Applications and Systems Sequences of Operation.

1.3 **References**

- .1 American National Standards Institute (ANSI)
 - .20 ANSI/ISA 5.5, Graphic Symbols for Process Displays.
- .2 American National Standards Institute (ANSI)/ Institute of Electrical and Electronics Engineers (IEEE).
 - .21 ANSI/IEEE 260.1, American National Standard Letter Symbols Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).

- .3 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
 - .22 ASHRAE STD 135, BACNET - Data Communication Protocol for Building Automation and Control Network.
- .4 Canadian Standards Association (CSA International).
 - .23 CAN/CSA-Z234.1, Canadian Metric Practice Guide.
- .5 Consumer Electronics Association (CEA).
 - .24 CEA-709.1-B, Control Network Protocol Specification.
- .6 Department of Justice Canada (Jus).
 - .25 Canadian Environmental Assessment Act (CEAA).
 - .26 Canadian Environmental Protection Act (CEPA).
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .27 Material Safety Data Sheets (MSDS).
- .8 Transport Canada (TC).
 - .28 Transportation of Dangerous Goods Act (TDGA).
- .9 National Electrical Manufacturers Association (NEMA)

1.4 Acronyms, Abbreviations and Definitions

- .1 Acronyms used in EMCS.
 - .29 AEL - Average Effectiveness Level
 - .30 AI - Analog Input
 - .31 AO - Analog Output
 - .32 BACnet - Building Automation and Control Network
 - .33 BC(s) - Building Controller(s)
 - .34 BECC - Building Environmental Control Centre
 - .35 CAB - Canadian Automated Building (CAB) Protocol
 - .36 CAD - Computer Aided Design
 - .37 CDL - Control Description Logic
 - .38 CDS - Control Design Schematic
 - .39 COSV - Change of State or Value
 - .40 CPU - Central Processing Unit
 - .41 DI - Digital Input
 - .42 DO - Digital Output
 - .43 DP - Differential Pressure
 - .44 ECU - Equipment Control Unit
 - .45 EMCS - Energy Monitoring and Control System

- .46 HVAC - Heating, Ventilation, Air Conditioning
- .47 IDE - Interface Device Equipment
- .48 I/O - Input/Output
- .49 ISA - Industry Standard Architecture
- .50 LAN - Local Area Network
- .51 LCU - Local Control Unit
- .52 MCU - Master Control Unit
- .53 NC - Normally Closed
- .54 NO - Normally Open
- .55 OS - Operating System
- .56 O&M - Operation and Maintenance
- .57 OWS - Operator Work Station
- .58 PC - Personal Computer
- .59 PCI - Peripheral Control Interface
- .60 PCMCIA - Personal Computer Micro-Card Interface Adapter
- .61 PID - Proportional, Integral and Derivative.
- .62 RAM - Random Access Memory
- .63 ROM - Read Only Memory
- .64 SP - Static Pressure
- .65 TCU - Terminal Control Unit
- .66 USB - Universal Serial Bus
- .67 UPS - Uninterruptible Power Supply
- .68 WAN- Wide Area Network

1.5 Definitions

- .1 Point: may be logical or physical.
 - .69 Logical points: values calculated by system such as setpoints, totals, counts, derived corrections and may include, but not limited to result of and statements in CDL's.
 - .70 Physical points: inputs or outputs which have hardware wired to controllers which are measuring physical properties, or providing status conditions of contacts or relays which provide interaction which related equipment (stop, start) and value or damper actuators.
- .2 Point Name: composed of two parts, point identifier and point expansion.
 - .71 Point identifier: comprised of three descriptors, "area" descriptor, "system" descriptor and "point" descriptor, for which database to provide 25 character field for each point identifier. "System" is system that point is located on.
 - .1 Area descriptor: building or part of building where point is located.
 - .2 System descriptor: system that point is located on.

- .3 Point descriptor: physical logical point description. For point identifier "area", "system" and "point" will be shortforms or acronyms. Database must provide 25 character field for each point identifier.
- .72 Point expansion: comprised of three fields, one for each descriptor. Expanded form of shortform or acronym used in "area", "system", and "point" descriptors is placed into appropriate point expansion field. Database must provide 32 character field for each point expansion.
- .73 Bilingual systems to include additional point identifier expansion fields of equal capacity for each point name for second language.
- .4 System to support use of numbers and readable characters including blanks, periods or underscores to enhance user readability for each of the above strings.
- .3 Point Object Type: points fall into following object types:
 - .74 AI (analog input)
 - .75 AO (analog output)
 - .76 DI (digital input)
 - .77 DO (digital output)
 - .78 Pulse inputs
- .4 Symbols and engineering unit abbreviations utilized in displays: to ANSI/ISA S5.5.
 - .79 Printouts: to ANSI/IEEE 260.1.
 - .80 Refer also to Section 25 05 54 - EMCS: Identification.
- .1

1.6 SYSTEM DESCRIPTION

- .1 Refer to control schematics, sequences of operation and related Divisions of specifications for system architecture.
- .2 Work covered by sections referred to above consists of fully operational EMCS, including, but not limited to, following:
 - .81 Building Controllers.
 - .82 Control devices as listed in I/O point summaries and/or shown on the control drawings.
 - .83 OWS
 - .84 Data communications equipment necessary to affect EMCS data transmission system.
 - .85 Field control devices.
 - .86 Software/Hardware complete with full documentation.
 - .87 Complete operating and maintenance manuals.
 - .88 Training of personnel.
 - .89 Acceptance tests, technical support during commissioning, full documentation.
 - .90 Wiring interface co-ordination of equipment supplied by others.
 - .91 Miscellaneous work as specified in these sections and as indicated.

- .3 Design Requirements:
 - .92 Design and provide conduit and wiring linking elements of system.
 - .93 Supply sufficient programmable controllers of types to meet project requirements. Quantity and points contents as reviewed prior to installation.
 - .94 Location of controllers as reviewed by Owner's Representative prior to installation.
 - .95 Provide utility and emergency power to EMCS.
 - .96 Metric references: in accordance with CAN/CSA Z234.1.
- .4 Language Operating Requirements:
 - .97 Provide English interface to system through operator selectable access codes.
 - .98 Use non-linguistic symbols for displays on graphic terminals wherever possible. Other information to be in English.
 - .99 Operating system executive: provide primary hardware-to-software interface specified as part of hardware purchase with associated documentation to be in English.
 - .100 System manager software: include in English system definition point database, additions, deletions or modifications, control loop statements, use of high level programming languages, report generator utility and other OS utilities used for maintaining optimal operating efficiency.
- .5 Include, in English:
 - .101 Input and output commands and messages from operator-initiated functions and field related changes and alarms as defined in CDL's or assigned limits (i.e. commands relating to day-to-day operating functions and not related to system modifications, additions, or logic re-definitions).
 - .102 Graphic "display" functions, point commands to turn systems on or off, manually override automatic control of specified hardware points. To be in English at specified OWS. Point name expansions in English.
 - .103 Reporting function such as trend log, trend graphics, alarm report logs, energy report logs, maintenance generated logs.
- .6 The network design to be a fully distributed network, with each primary system having its own locally mounted dedicated controller. Any failure in the network shall **not** in any way affect the control of these primary systems. Connecting hardware points from one system to more than one controller is not acceptable. Any points associated with a system are to be connected to one dedicated controller. Each dedicated controller to have a locally mounted control and display device to allow the operator to view and adjust any point on the controller.
- .7 All wiring associated with the EMCS communication network as well as all control wiring and conduit associated with the EMCS at 50 volts or less. Wire and conduit above 50 volts by Electrical Division.
- .8 BACnet compliance: full compliance to the BACnet standard (ANSA/ASHRAE) 135, BACnet – A Data communication Protocol for Building Automation and Control Networks is mandatory. Down to the field device level, the EMCS system must meet BACnet standards for system architecture

and administration, and use open communication protocols and user friendly programming and graphics. Install the EMCS installed to communicate at the supervisory layer to the WAN using the BACnet TCP/IP protocol implemented on Ethernet.

- .9 The EMCS system for this facility to be accessible by designated personnel via the WAN for monitoring and programming purposes. The EMCS contractor to provide all the required hardware, software, gateways, etc. needed to permit connection of the EMCS to the WAN. This shall include all hardware, software, programming, start-up and commissioning required. The contractor to supply and install all the required hardware and software on the WAN file server to allow for this remote operation monitoring and programming to take place. The contractor to supply and install all the required hardware and software on the operator workstation(s) located in the Owner's facilities management department. In addition, a remote dial in access directly to the system shall be provided.

1.7 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures and 25 05 02 - EMCS: Submittals and Review Process.
- .2 Submit for review:
 - .104 Equipment list and systems manufacturers within ten (10) working days after award of contract.
- .3 Quality Control:
 - .105 Provide equipment and material from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.
 - .106 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.
 - .107 Submit proof of compliance to specified standards with shop drawings and product data in accordance with Section 25 05 02 – EMCS: Submittals and Review Process. Label or listing of specified organization is acceptable evidence.
 - .108 In lieu of such evidence, submit certificate from testing organization, approved by third party Engineer registered in Canada, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.
 - .109 For materials whose compliance with organizational standards/codes/ specifications is not regulated by organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.
 - .110 Permits and fees: in accordance with general conditions of contract.
 - .111 Existing devices intended for re-use: submit test report.

1.8 QUALITY ASSURANCE

- .1 Have local office for at least 5 years staffed by factory trained personnel capable of installing and providing instruction, routine maintenance and emergency service on systems.

- .2 Provide record of successful previous installations submitting tender showing experience with similar installations utilizing computer-based systems.
- .3 Have access to local supplies of essential parts and provide 7 year guarantee of availability of spare parts after obsolescence.
- .4 Ensure factory qualified supervisory personnel continuously direct and monitor work and attend site meetings.
- .5 Health and Safety:
 - .112 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .6 Be able to provide factory trained personnel on site within two (2) working days notice or provide instructions on maintenance and emergency service on system.
- .7 BACnet devices to bear BACnet testing laboratories BTL mark and listed on BACnet manufacturers association web site.

1.9 **DELIVERY, STORAGE AND HANDLING**

- .1 Material Delivery Schedule: provide Owner's Representative with "Materials Delivery Schedule" within 2 weeks after award of contract.
- .2 Waste Management and Disposal:
 - .113 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .114 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .115 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .116 Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan.
 - .117 Place materials defined as hazardous or toxic in designated containers.
 - .118 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional, Municipal, and Provincial regulations.
 - .119 Label location of salvaged material's storage areas and provide barriers and security devices.
 - .120 Ensure emptied containers are sealed and stored safely.
 - .121 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative Owner's Representative.
 - .122 Fold up metal and plastic banding, flatten and place in designated area for recycling

1.10 **EXISTING CONDITIONS - CONTROL COMPONENTS**

- .1 Utilize existing control wiring and piping as indicated.

- .2 Re-use field control devices that are usable in their original configuration provided that they conform to applicable codes, standards and specifications.
 - .123 Do not modify original design of existing devices without written permission from Owner's Representative.
 - .124 Provide for new, properly designed device where re-usability of components is uncertain.
- .3 Inspect and test existing devices intended for re-use within 30 days of award of contract, and prior to installation of new devices.
 - .125 Furnish test report to Owner's Representative within 40 days of award of contract listing each component to be re-used and indicating whether it is in good order or requires repair by Owner.
 - .126 Failure to produce test report will constitute acceptance of existing devices by owner.
- .4 Non-functioning items:
 - .127 Provide with report specification sheets or written functional requirements to support findings.
 - .128 Owner will repair or replace existing items judged defective yet deemed necessary for EMCS.
- .5 Submit written request for permission to disconnect controls and to obtain equipment downtime before proceeding with Work.
- .6 Assume responsibility for existing controls to be incorporated into EMCS after written receipt of approval from Owner's Representative.
 - .129 Be responsible for items repaired or replaced by Owner.
 - .130 Be responsible for repair costs due to negligence or abuse of equipment repaired or replaced by Owner.
 - .131 Responsibility for existing devices terminates upon final acceptance of EMCS or applicable portions of EMCS as approved by Owner's Representative.
- .7 Remove existing controls not re-used or not required. Place in approved storage for disposition as directed

PART 2 Products

2.1 **Acceptable Systems, manufacturers**

- .1 Honeywell.
- .2 Proposed system to have communication capability utilizing BACnet Protocol.
- .3 Panel to be NEMA rated to suit environmental requirements.
- .4 Panels to have hinged doors equipped with standard keyed-alike cabinet locks, keyed to same key.

- .5 Wiring within panels to be contained within properly sized rigid PVC slotted wall wire duct. All wiring within the wire duct to be concealed with a non-slip cover.
- .6 Terminations for the connection of power wiring, communication wiring and field mounted devices to be at properly identified terminal blocks mounted within the control panel.
- .7 All control panels to be provided with an internally mounted 120 volt duplex power receptacle.
- .8 All control panels to be identified with permanently mounted Lamecoid tags to identify the control panel and the systems served by the control panel. Submit schedule of labels with shop drawing submission.
- .9 Provide low voltage transformers in panels or elsewhere as required.
- .10 Provide adaptors between metric and imperial components.

PART 3 Execution

3.1 Manufacturer's Recommendations

- .1 Installation to be to manufacturer's recommendations. Provide printed copies of recommendations with shop drawings or product data.

3.2 Painting

- .1 Painting to be in accordance with NEMA, supplemented as follows:
- .2 Clean and touch up marred or scratched surfaces of factory finished equipment to match original finish.
- .3 Restore to new condition, finished surfaces which have been damaged too extensively to be primed and touched up to make good.
- .4 Clean and prime exposed hangers, racks, fastenings, and other support components.
- .5 Paint all unfinished equipment installed indoors to NEMA.

END OF SECTION

Memorial University of Newfoundland
BRUNEAU CENTRE FOR RESEARCH AND
INNOVATION (IIC)
LEVEL 1 & LEVEL 2 HEATING SYSTEM UPGRADES

OCTOBER 09, 2025

ISSUED FOR TENDER

TFM-044-25

LIST OF DRAWINGS

- M-1.1 - LEVEL 1 FLOOR PLAN - NEW HYDRONIC PIPING LAYOUT
- M-1.2 - LEVEL 2 FLOOR PLAN - NEW HYDRONIC PIPING LAYOUT
- M-2.1 - LEVEL 1 FLOOR PLAN - NEW VENTILATION LAYOUT
- M-2.2 - LEVEL 2 FLOOR PLAN - NEW VENTILATION LAYOUT
- M-3.1 - LEVEL 1 FLOOR PLAN - NEW CONTROLS LAYOUT
- M-3.2 - LEVEL 2 FLOOR PLAN - NEW CONTROLS LAYOUT
- M-4.1 - EXISTING HYDRONIC FLOW SCHEMATIC
- M-5.1 - MECHANICAL DETAILS, SCHEDULES & LEGEND

IIC-516-19 - ISSUED FOR TENDER

DEPARTMENT OF
FACILITIES MANAGEMENT

*This University was raised by the people of Newfoundland as a memorial
to the fallen in the great wars, 1914-1918, 1939-1945, that in freedom of learning,
their cause and sacrifice might not be forgotten.*

- Dedication plaque, Arts & Administration Building, St. John's Campus



LEVEL 1 ROOM NO / NAME SCHEDULE															
Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name
1100	VESTIBULE	1114	GRADUATE STUDENT OFF.	1128	COMPUTER PROCESSING ROOM	1141	CORRIDOR	1155	MALE STAFF WASHROOM	1169	TECHNOLOGIST OFF.	1183	CHEMICAL STORAGE (FLAMMABLE)	1195	ELECTRICAL ROOM
1101	VESTIBULE	1115	CHANGE ROOM	1129	EXPERIMENTAL GEOCHEMISTRY LAB	1142	WET LAB	1156	FEMALE STAFF WASHROOM	1170	MEETING ROOM	1184	CHARGING ROOM	1196	DATA ROOM
1102	ENTRANCE LOBBY	1116	SAMPLE DIGESTION LAB	1130	CORRIDOR	1143	DRY LAB	1157	GLASS CLEANING ROOM	1171	FACULTY OFFICE	1185	CORRIDOR	1197	UPS ROOM
1103	FACULTY/PRINCIPAL INVEST. OFF.	1117	BALANCE ROOM	1131	RECEPTION	1144	DATA ROOM	1158	CORRIDOR	1172	GRADUATE STUDENT OFF.	1186	PROCESS CONTROL AND AUTO. LAB	1198	CORRIDOR
1104	FACULTY/PRINCIPAL INVEST. OFF.	1118	ANITE ROOM	1132	ADMINISTRATIVE ASSISTANT OFF.	1145	S.E.M. ROOM	1159	FACULTY OFFICE	1173	GRADUATE STUDENT OFF.	1187	MEETING ROOM	1199	CORRIDOR
1105	FACULTY/PRINCIPAL INVEST. OFF.	1119	CHEMICAL SEPARATION LAB	1133	MANAGER'S OFFICE	1146	ANITE ROOM	1160	FACULTY OFFICE	1174	SEISMIC INSTRUMENTS LAB	1188	MECHANICAL ROOM	1200	CORRIDOR
1106	FACULTY/PRINCIPAL INVEST. OFF.	1120	CONTROL ROOM	1134	CLOSET	1147	EQUIPMENT ROOM	1161	FACULTY OFFICE	1175	STORAGE	1189	GRADUATE STUDENT OFF.	1201	CORE STORAGE
1107	RESEARCH ASSISTANT OFF.	1121	REAGENT CLEANING LAB	1135	PROGRAM MANAGER'S OFFICE	1148	HEALTH AND SAFETY LAB	1162	FACULTY OFFICE	1176	TECHNOLOGIST OFF.	1190	GRADUATE STUDENT OFF.	1202	STAGING AREAL/LOADING DOCK
1108	RESEARCH ASSISTANT OFF.	1122	SUPPLIES	1136	STATIONARY STORESWORKROOM	1149	FLUTATION LAB	1163	FACULTY OFFICE	1177	CORRIDOR	1191	GRADUATE STUDENT OFF.	1203	PILOT PLANT
1109	GRADUATE STUDENT OFF.	1123	MULTICOLLECTOR CPMS LAB	1137	STAFF LOUNGE/RESOURCE ROOM	1150	SAMPLE REDUCTION LAB	1164	RESEARCH ASSISTANT OFF.	1178	PARTNER OFFICE	1192	MALE WASHROOM	1204	TECHNOLOGIST OFF.
1110	GRADUATE STUDENT OFF.	1124	MICROWAVE EAGLE 3 ROOM	1138	SEMINAR ROOM	1151	STORAGE	1165	GRADUATE STUDENT OFF.	1179	STORAGE	1193	GRADUATE STUDENT OFF.	1205	HYDROMETALLURGY LAB
1111	CORRIDOR	1125	SAMPLE EX. ROOM	1139	CLOSET	1152	WALK-IN FREEZER	1166	GRADUATE STUDENT OFF.	1180	CORRIDOR	1194	JANITORS ROOM	1206	WAT. STORAGE
1112	GRADUATE STUDENT OFF.	1126	MEETING ROOM	1140	CONTROL CLOSET	1153	FABRICATION LAB	1167	GRADUATE STUDENT OFF.	1181	ROCK PREPARATION AREA	1194	FEMALE WASHROOM	1207	DUST COLLECTION
1113	GRADUATE STUDENT OFF.	1127	GAS STORAGE	1141	STORAGE	1154	PROCESS MODELLING LAB	1168	GRADUATE STUDENT OFF.	1182	CHEMICAL STORAGE	1194a	VEST		

GENERAL NOTES:

1. PROVIDE NECESSARY OFFSETS AS REQUIRED TO RUN ALL PIPING SYSTEMS. CO-ORDINATE ON SITE.
2. PROVIDE AUTOMATIC AIR VENTS ON ALL HIGH POINTS.
3. PROVIDE FIRE STOP AT ALL FIRE RATED ASSEMBLIES.
4. BRANCH PIPING SERVING REHEAT COILS TO BE 20mmØ UNLESS SHOWN OTHERWISE.

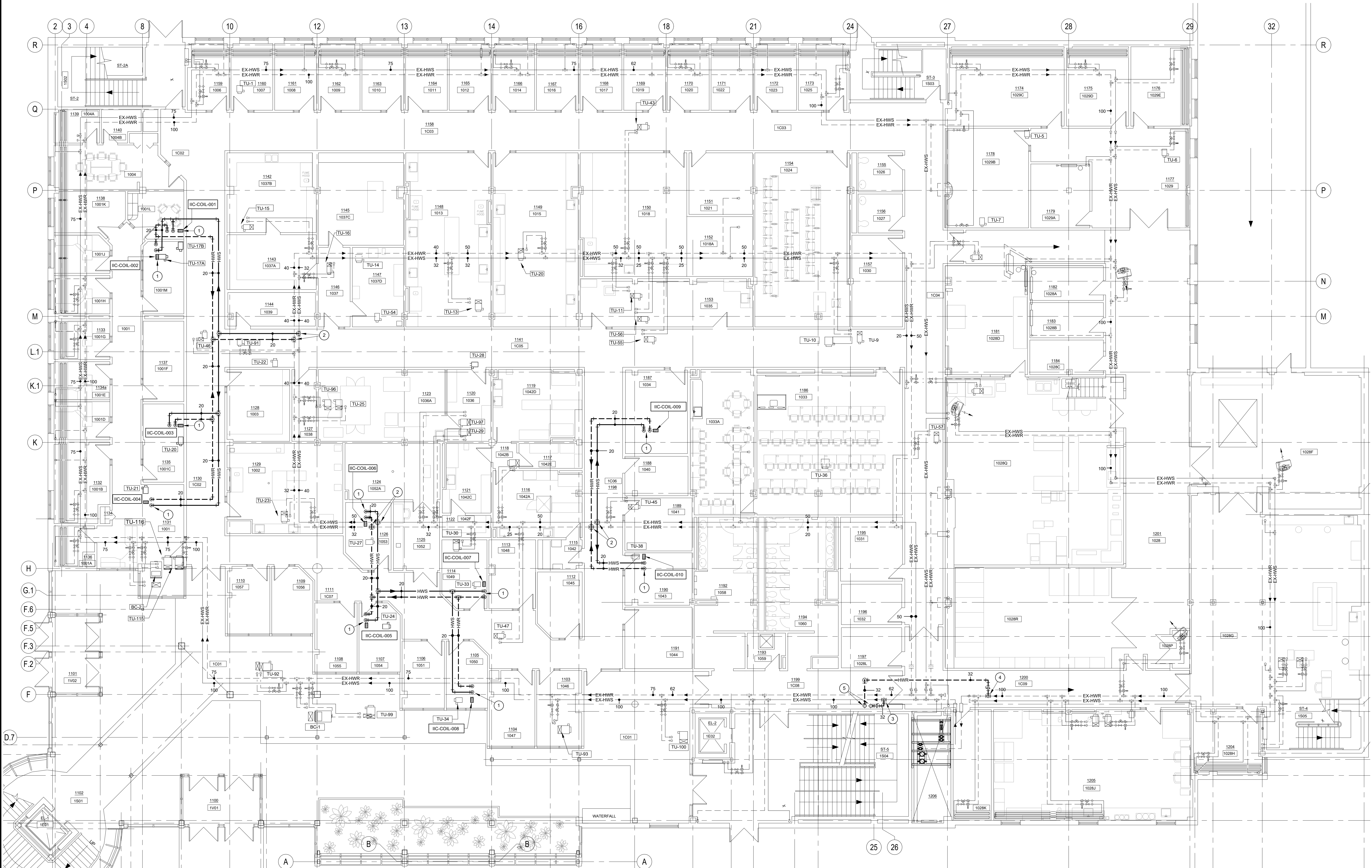
DRAWING NOTES:

1. CONNECT NEW HWS & HWR PIPING TO NEW HYDRONIC HEATING COIL INSTALLED AT THIS APPROXIMATE LOCATION. REFER TO DETAIL 3.5.1
2. CONNECT NEW HWS & HWR PIPING INTO EXISTING HWS & HWR PIPING MAINS AT THIS APPROXIMATE LOCATION. CONFIRM AND DETERMINE EXACT SIZE AND LOCATION OF EXISTING ON SITE.
3. CONNECT NEW HWS & HWR PIPING INTO EXISTING HWS PIPING MAIN AT THIS APPROXIMATE LOCATION. CONFIRM AND DETERMINE EXACT SIZE AND LOCATION OF EXISTING ON SITE.
4. CONNECT NEW HWR PIPING INTO EXISTING HWR PIPING MAIN AT THIS APPROXIMATE LOCATION. CONFIRM AND DETERMINE EXACT SIZE AND LOCATION OF EXISTING ON SITE.
5. NEW 32Ø HWS & HWR PIPING UP THROUGH FLOOR TO LEVEL ABOVE AT THIS LOCATION.

GENERAL NOTES

1. DO NOT SCALE FROM DRAWINGS.
2. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO SUBMISSION OF TENDERS.
3. ALL DEFICIENCIES FOUND IN THIS DRAWING IS TO BE BROUGHT TO THE ATTENTION OF THE FACILITIES ENGINEERING AND DEVELOPMENT OFFICE OF THE DEPARTMENT OF FACILITIES MANAGEMENT, MEMORIAL UNIVERSITY OF NEWFOUNDLAND, PRIOR TO THE SUBMISSION OF THE TENDERS.

PERMITS REQUIRED FOR ELECTRICAL WORK AT MEMORIAL UNIVERSITY OF NEWFOUNDLAND SHALL BE OBTAINED FROM SERVICE NL EFFECTIVE FEBRUARY 1, 2020 AND MADE AVAILABLE TO MUN REPRESENTATIVES UPON REQUEST. SEE STIPULATED PRICE CONTRACT GENERAL CONDITIONS SECTION 2.18.9 LAWS, NOTICES, PERMITS AND FEES.



LEVEL 1 FLOOR PLAN - HYDRONIC PIPING LAYOUT

SCALE: 1:100
0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

CONSULTANT:
CORE ENGINEERING INC.
57 Poppy Place
St. John's, NL, Canada A1B 4H8
Tel: (709)722-6513
Fax: (709)722-0910

STAMP:
DAVE FINNIS
REGISTERED PROFESSIONAL ENGINEER
PROVINCE OF NEWFOUNDLAND

PERMIT:
PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
CORE ENGINEERING INC.
MIRC: 03823
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEONL 20202
which is valid for the year 2025

MEMORIAL UNIVERSITY
Department of Facilities Management
This University was named by the people of Newfoundland as a memorial to the fallen in the great wars, 1914-1918, 1939-1945, that in freedom of learning, their cause and sacrifice might not be forgotten.
- Dedication plaque, Arts & Administration Building, St. John's Campus

PROJECT NAME:
MUN BRUNEAU CENTER FOR RESEARCH AND INNOVATION (IIC) HEATING UPGRADES

DRAWING TITLE:
LEVEL 1 FLOOR PLAN - NEW HYDRONIC PIPING LAYOUT

DESIGNED: DE	DRAWN: JS
REVIEWED: DE	APPROVED: DE
SCALE: AS NOTED	DATE: 2025.10.09
MUN PROJECT No. IIC-516-19	DRAWING No. M-1.1

LEVEL 2 ROOM NO./ NAME SCHEDULE							
Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name
2100	MEZZANINE	2114	SKUNKWORKS	2128	CLOSET	2140	OFFICE
2101	LECTURE THEATRE	2115	CORR'S OFF.	2129	MEETING ROOM	2141	OFFICE
2102	CORRIDOR	2116	OFFICE	2130	BOARD ROOM	2142	STORAGE/PHOTOCOPIER
2103	BREAKOUT AREA	2117	OFFICE	2131	WAITING AREA	2143	RECEPTION
2104	KITCHENETTE	2118	DEANS OFFICE	2132	DATA ROOM	2144	MEETING ROOM
2105	COAT ROOM	2119	2 SECRETARY OFF.	2133	MALE WASHROOM	2145	RESEARCH GENERAL OFF.
2106	SKUNKWORKS (LABOR CHAIR TEMP.)	2120	ASSOCIATE DEANS OFF.	2134	VEST	2146	ASSOCIATE DIRECTORS OFF.
2107	SKUNKWORKS	2121	2 PERSON OFF.	2134	JANITORS ROOM	2147	OFFICE
2108	LINK	2122	GRAD STUDENT GENERAL OFF.	2135	ELECTRICAL ROOM	2148	OFFICE
2109	CORRIDOR	2123	OFFICE	2136	FEMALE WASHROOM	2149	DIRECTORS OFF.
2110	CORRIDOR	2124	2 PERSON OFF.	2136	VEST	2150	CLOSET
2111	SKUNKWORKS	2125	RECEPTION	2137	CORRIDOR	2151	OFFICE
2112	SKUNKWORKS	2126	STORAGE	2138	OFFICE	2152	OFFICE
2113	CORRIDOR	2127	STAFF LOUNGE	2139	OFFICE	2153	OFFICE

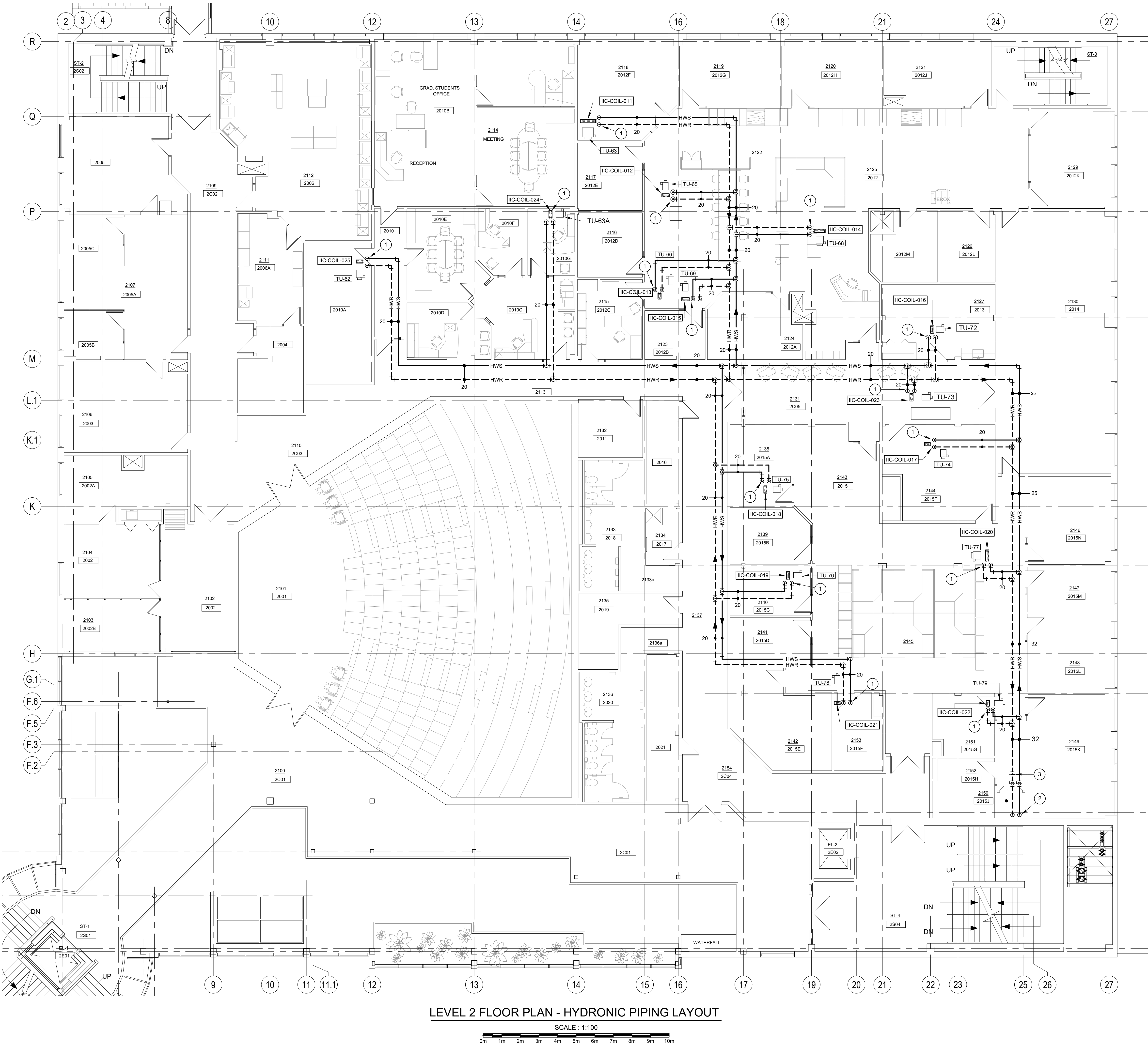
- GENERAL NOTES:
1. PROVIDE NECESSARY OFFSETS AS REQUIRED TO RUN ALL PIPING SYSTEMS. CO-ORDINATE ON SITE.
 2. PROVIDE AUTOMATIC AIR VENTS ON ALL HIGH POINTS.
 3. PROVIDE FIRE STOP AT ALL FIRE RATED ASSEMBLIES.
 4. BRANCH PIPING SERVING REHEAT COILS TO BE 20mmØ UNLESS SHOWN OTHERWISE.

- DRAWING NOTES:
1. CONNECT NEW HWS & HWR PIPING TO NEW HYDRONIC HEATING COIL INSTALLED AT THIS APPROXIMATE LOCATION. REFER TO DETAIL. 3 5.1
 2. NEW HWS & HWR PIPING UP THROUGH FLOOR FROM LEVEL BELOW AT THIS LOCATION. REFER TO DETAIL. 5 5.1
 3. NEW CIRCUIT SETTER BALANCING VALVE. SET AT 0.47 L/s

GENERAL NOTES

1. DO NOT SCALE FROM DRAWINGS.
2. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO SUBMISSION OF TENDERS.
3. ALL DEFICIENCIES FOUND IN THIS DRAWING IS TO BE BROUGHT TO THE ATTENTION OF THE FACILITIES ENGINEERING AND DEVELOPMENT OFFICE OF THE DEPARTMENT OF FACILITIES MANAGEMENT, MEMORIAL UNIVERSITY OF NEWFOUNDLAND, PRIOR TO THE SUBMISSION OF THE TENDERS.

PERMITS REQUIRED FOR ELECTRICAL WORK AT MEMORIAL UNIVERSITY OF NEWFOUNDLAND SHALL BE OBTAINED FROM SERVICE NL EFFECTIVE FEBRUARY 1, 2020 AND MADE AVAILABLE TO MUN REPRESENTATIVES UPON REQUEST. SEE STIPULATED PRICE CONTRACT GENERAL CONDITIONS SECTION 2.18.0 LAWS, NOTICES, PERMITS AND FEES.



CONSULTANT:

CORE
ENGINEERING INC.

57 Piggy Place
St. John's, NL, Canada A1B 4H8

Tel: (709)722-8613
Fax: (709)722-0910

STAMP:

PROFESSIONAL ENGINEER
DAVE FINNIS
PE
PROVINCE OF NEWFOUNDLAND

PERMIT:

PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
CORE ENGINEERING INC.
MUNC 03823
To practice Professional Engineering
in Newfoundland and Labrador.
Permit No. as issued by PEONL D0202
which is valid for the year 2025

MEMORIAL
UNIVERSITY

Department of Facilities Management

This University was named by the people of Newfoundland as a memorial
to the fallen in the great wars, 1914-1918, 1939-1945, that in freedom of learning,
their cause and sacrifice might not be forgotten.

- Dedication plaque, Arts & Administration Building, St. John's Campus

PROJECT NAME:

MUN
BRUNEAU CENTER FOR
RESEARCH AND INNOVATION (IIC)
HEATING UPGRADES

DRAWING TITLE:

LEVEL 2 FLOOR PLAN -
NEW HYDRONIC PIPING
LAYOUT

DESIGNED: DE	DRAWN: JS
REVIEWED: DE	APPROVED: DE
SCALE: AS NOTED	DATE: 2025.10.09
MUN PROJECT No. IIC-516-19	DRAWING No. M-1.2

LEVEL 1 ROOM NO./ NAME SCHEDULE																			
Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name
1102	VESTIBULE	1114	GRADUATE STUDENT OFF.	1128	COMPUTER PROCESSING ROOM	1141	CORRIDOR	1155	MALE STAFF WASHROOM	1169	TECHNOLOGIST OFF.	1183	CHEMICAL STORAGE (FLAMMABLE)	1196	ELECTRICAL ROOM	1211	STAR 1	1225	STAR 2
1101	VESTIBULE	1115	CHANGE ROOM	1129	EXPERIMENTAL GEOCHEMISTRY LAB	1142	WET LAB	1156	FEMALE STAFF WASHROOM	1170	MEETING ROOM	1184	CHARGING ROOM	1197	DATA ROOM	1212	STAR 2	1226	STAR 2
1102	ENTRANCE LOBBY	1116	SAMPLE DIGESTION LAB	1130	CORRIDOR	1131	DRY LAB	1157	GLASS CLEANING ROOM	1171	FACULTY OFFICE	1185	CORRIDOR	1198	UPS ROOM	1213	STAR 3	1227	STAR 3
1103	FACULTY/PRINCIPAL INVEST. OFF.	1117	BALANCE ROOM	1131	RECEPTION	1132	RECEPTION	1158	CORRIDOR	1172	GRADUATE STUDENT OFF.	1186	PROCESS CONTROL AND AUTO. LAB	1199	CORRIDOR	1214	STAR 3	1228	STAR 3
1104	FACULTY/PRINCIPAL INVEST. OFF.	1118	ANITE ROOM	1132	ADMINISTRATIVE ASSISTANT OFF.	1143	S.E.M. ROOM	1159	FACULTY OFFICE	1173	GRADUATE STUDENT OFF.	1187	MEETING ROOM	1200	CORRIDOR	1215	STAR 4	1229	STAR 4
1105	FACULTY/PRINCIPAL INVEST. OFF.	1119	CHEMICAL SEPARATION LAB	1133	MANAGER'S OFFICE	1144	EQUIPMENT ROOM	1160	FACULTY OFFICE	1174	SEISMIC INSTRUMENTS LAB	1188	MECHANICAL ROOM	1201	CORRIDOR	1216	STAR 4	1230	STAR 4
1106	FACULTY/PRINCIPAL INVEST. OFF.	1120	CONTROL ROOM	1134	CLOSET	1145	CLOSET	1161	FACULTY OFFICE	1175	STORAGE	1189	GRADUATE STUDENT OFF.	1202	CORRIDOR	1217	STAR 5	1231	STAR 5
1107	RESEARCH ASSISTANT OFF.	1121	REAGENT CLEANING LAB	1135	PROGRAM MANAGER'S OFFICE	1146	HEALTH AND SAFETY LAB	1162	FACULTY OFFICE	1176	TECHNOLOGIST OFF.	1190	GRADUATE STUDENT OFF.	1203	CORRIDOR	1218	STAR 5	1232	STAR 5
1108	RESEARCH ASSISTANT OFF.	1122	SUPPLIES	1136	STATIONARY STORES/WORKROOM	1147	FLUTATION LAB	1163	FACULTY OFFICE	1177	CORRIDOR	1191	GRADUATE STUDENT OFF.	1204	CORRIDOR	1219	STAR 5	1233	STAR 5
1109	GRADUATE STUDENT OFF.	1123	MULTICOLLECTOR ICP/MS LAB	1137	STAFF LOUNGE/RESOURCE ROOM	1148	SAMPLE REDUCTION LAB	1164	RESEARCH ASSISTANT OFF.	1178	PARTNER OFFICE	1192	MALE WASHROOM	1205	TECHNOLOGIST OFF.	1220	ELEVATOR 1	1234	ELEVATOR 2
1110	GRADUATE STUDENT OFF.	1124	MICRO-XRF (EAGLE 3) ROOM	1138	SEMINAR ROOM	1149	STORAGE	1165	GRADUATE STUDENT OFF.	1179	STORAGE	1193	VEST	1206	HYDROMETALLURGY LAB	1221	ELEVATOR 1	1235	ELEVATOR 2
1111	CORRIDOR	1125	SAMPLE CAT. ROOM	1139	CLOSET	1150	WALK-IN FREEZER	1166	GRADUATE STUDENT OFF.	1180	CORRIDOR	1194	JANITORS ROOM	1207	VAT STORAGE	1222	ELEVATOR 1	1236	ELEVATOR 2
1112	GRADUATE STUDENT OFF.	1126	MEETING ROOM	1140	CONTROL CLOSET	1151	FABRICATION LAB	1167	GRADUATE STUDENT OFF.	1181	ROCK PREPARATION AREA	1195	FEMALE WASHROOM	1208	DUST COLLECTION	1223	ELEVATOR 1	1237	ELEVATOR 2
1113	GRADUATE STUDENT OFF.	1127	GAS STORAGE	1141	STORAGE	1152	PROCESS MODELLING LAB	1168	GRADUATE STUDENT OFF.	1182	CHEMICAL STORAGE	1196a	VEST	1209		1224	ELEVATOR 1	1238	ELEVATOR 2

GENERAL NOTES:

1. PROVIDE PLenums/TRANSITIONS TO CONNECT DUCT TO GRILLE.
2. COORDINATE ALL DUCT ROUTING TO AVOID INTERFERENCE. RE-ROUTE AS REQUIRED.
3. PROVIDE BALANCING DAMPERS ON ALL SUB-BRANCH DUCTS. LOCATE BALANCING DAMPERS AT CONNECTION TO MAIN DUCT.
4. PROVIDE OFFSETS TO AVOID STRUCTURAL BEAMS, PIPING, OTHER DUCT, ETC. WHERE REQUIRED.

DRAWING NOTES:

1. INSTALL NEW HYDRONIC HEATING COIL IN EXISTING SUPPLY AIR DUCT. PROVIDE TRANSITIONS AS REQUIRED. PROVIDE NEW THERMAL INSULATION ON NEW DUCT/TRANSITIONS. CONFIRM EXACT DUCT SIZE AND LOCATION ON SITE. REFER TO DETAIL 3.
2. EXISTING SUPPLY AIR DUCT TO BE REMOVED TO ALLOW FOR INSTALLATION OF NEW.
3. CONNECT NEW SUPPLY AIR DUCT TO EXISTING IN THIS APPROXIMATE LOCATION. CONFIRM EXACT LOCATION ON SITE.
4. EXISTING TERMINAL UNIT TO REMAIN (TYPICAL). CONTROLS AND BALANCING CONTRACTOR TO WORK TOGETHER TO VERIFY THE CALIBRATION AND MINIMUM/MAXIMUM FLOWS ON EXISTING TERMINAL UNITS. REFER TO SCHEDULE.
5. RE-BALANCE EXISTING SUPPLY AIR GRILLE TO AIR FLOWS INDICATED (TYPICAL).

GENERAL NOTES

1. DO NOT SCALE FROM DRAWINGS.
2. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO SUBMISSION OF TENDERS.
3. ALL DEFICIENCIES FOUND IN THIS DRAWING IS TO BE BROUGHT TO THE ATTENTION OF THE FACILITIES ENGINEERING AND DEVELOPMENT OFFICE OF THE DEPARTMENT OF FACILITIES MANAGEMENT, MEMORIAL UNIVERSITY OF NEWFOUNDLAND, PRIOR TO THE SUBMISSION OF THE TENDERS.

PERMITS REQUIRED FOR ELECTRICAL WORK AT MEMORIAL UNIVERSITY OF NEWFOUNDLAND SHALL BE OBTAINED FROM SERVICE NL EFFECTIVE FEBRUARY 1, 2020 AND MADE AVAILABLE TO MUN REPRESENTATIVES UPON REQUEST. SEE STIPULATED PRICE CONTRACT GENERAL CONDITIONS SECTION 2.18.9 LAWS, NOTICES, PERMITS AND FEES.



LEVEL 1 FLOOR PLAN - VENTILATION LAYOUT

SCALE : 1:100
0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

No.	REVISION	DATE (YYMMDD)
0	ISSUED FOR TENDER	2025.10.09
GENERAL NOTES		
1. DO NOT SCALE FROM DRAWINGS.		
2. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO SUBMISSION OF TENDERS.		
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PERMITS REQUIRED FOR ELECTRICAL WORK AT MEMORIAL UNIVERSITY OF NEWFOUNDLAND SHALL BE OBTAINED FROM SERVICE NL EFFECTIVE FEBRUARY 1, 2020 AND MADE AVAILABLE TO MUN REPRESENTATIVES UPON REQUEST. SEE STIPULATED PRICE CONTRACT GENERAL CONDITIONS SECTION 2.18.9 LAWS, NOTICES, PERMITS AND FEES.		
CONSULTANT:		
CORE ENGINEERING INC. 57 Poppy Place St. John's, NL, Canada A1B 4H8 Tel: (709) 722-8613 Fax: (709) 722-0910		
STAMP:		
PERMIT:		
PROVINCE OF NEWFOUNDLAND PERMIT HOLDER This Permit Allows CORE ENGINEERING INC. MUNC 03823 To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by PEONL 02020 which is valid for the year 2025.		
MEMORIAL UNIVERSITY Department of Facilities Management This University was named by the people of Newfoundland as a memorial to the fallen in the great wars. 1914-1918, 1939-1945, that in freedom of learning, their cause and sacrifice might not be forgotten. - Dedication plaque, Arts & Administration Building, St. John's Campus		
PROJECT NAME:		
MUN BRUNEAU CENTER FOR RESEARCH AND INNOVATION (IIC) HEATING UPGRADES		
DRAWING TITLE:		
LEVEL 1 FLOOR PLAN - NEW VENTILATION LAYOUT		
DESIGNED:	DE	DRAWN: JS
REVIEWED:	DE	APPROVED: DE
SCALE:	AS NOTED	DATE: 2025.10.09
MUN PROJECT No.	IIC-516-19	DRAWING No. M-2.1

LEVEL 2 ROOM NO / NAME SCHEDULE							
Rm.No.	Room Name	Rm.No.	Room Name	Rm.No.	Room Name	Rm.No.	Room Name
2100	MEZZANINE	2114	SKUNKWORKS	2128	CLOSET	2140	OFFICE
2101	LECTURE THEATRE	2115	CORDS OFF.	2129	MEETING ROOM	2141	OFFICE
2102	CORRIDOR	2116	OFFICE	2130	BOARD ROOM	2142	STORAGE/PHOTOCOPIER
2103	BREAKOUT AREA	2117	OFFICE	2131	WAITING AREA	2143	RECEPTION
2104	KITCHENETTE	2118	DEANS OFFICE	2132	DATA ROOM	2144	MEETING ROOM
2105	COAT ROOM	2119	2 SECRETARY OFF.	2133	MALE WASHROOM	2145	RESEARCH GENERAL OFF.
2106	SKUNKWORKS (LABOR. CHAIR TEMP.)	2120	ASSOCIATE DEANS OFF.	2134a	VEST	2146	ASSOCIATE DIRECTOR'S OFF.
2107	SKUNKWORKS	2121	2 PERSON OFF.	2134	JANITOR'S ROOM	2147	OFFICE
2108	LINK	2122	GRAD STUDENT GENERAL OFF.	2135	ELECTRICAL ROOM	2148	OFFICE
2109	CORRIDOR	2123	OFFICE	2136	FEMALE WASHROOM	2149	DIRECTOR'S OFF.
2110	CORRIDOR	2124	2 PERSON OFF.	2136a	VEST	2150	CLOSET
2111	SKUNKWORKS	2125	RECEPTION	2137	CORRIDOR	2151	OFFICE
2112	SKUNKWORKS	2126	STORAGE	2138	OFFICE	2152	OFFICE
2113	CORRIDOR	2127	STAFF LOUNGE	2139	OFFICE	2153	OFFICE

GENERAL NOTES:

1. PROVIDE PLENUMS/TRANSITIONS TO CONNECT DUCT TO GRILLE.
2. COORDINATE ALL DUCT ROUTING TO AVOID INTERFERENCES. RE-ROUTE AS REQUIRED.
3. PROVIDE BALANCING DAMPERS ON ALL SUB-BRANCH DUCTS. LOCATE BALANCING DAMPERS AT CONNECTION TO MAIN DUCT.
4. PROVIDE OFFSETS TO AVOID STRUCTURAL BEAMS, PIPING, OTHER DUCT, ETC. WHERE REQUIRED.

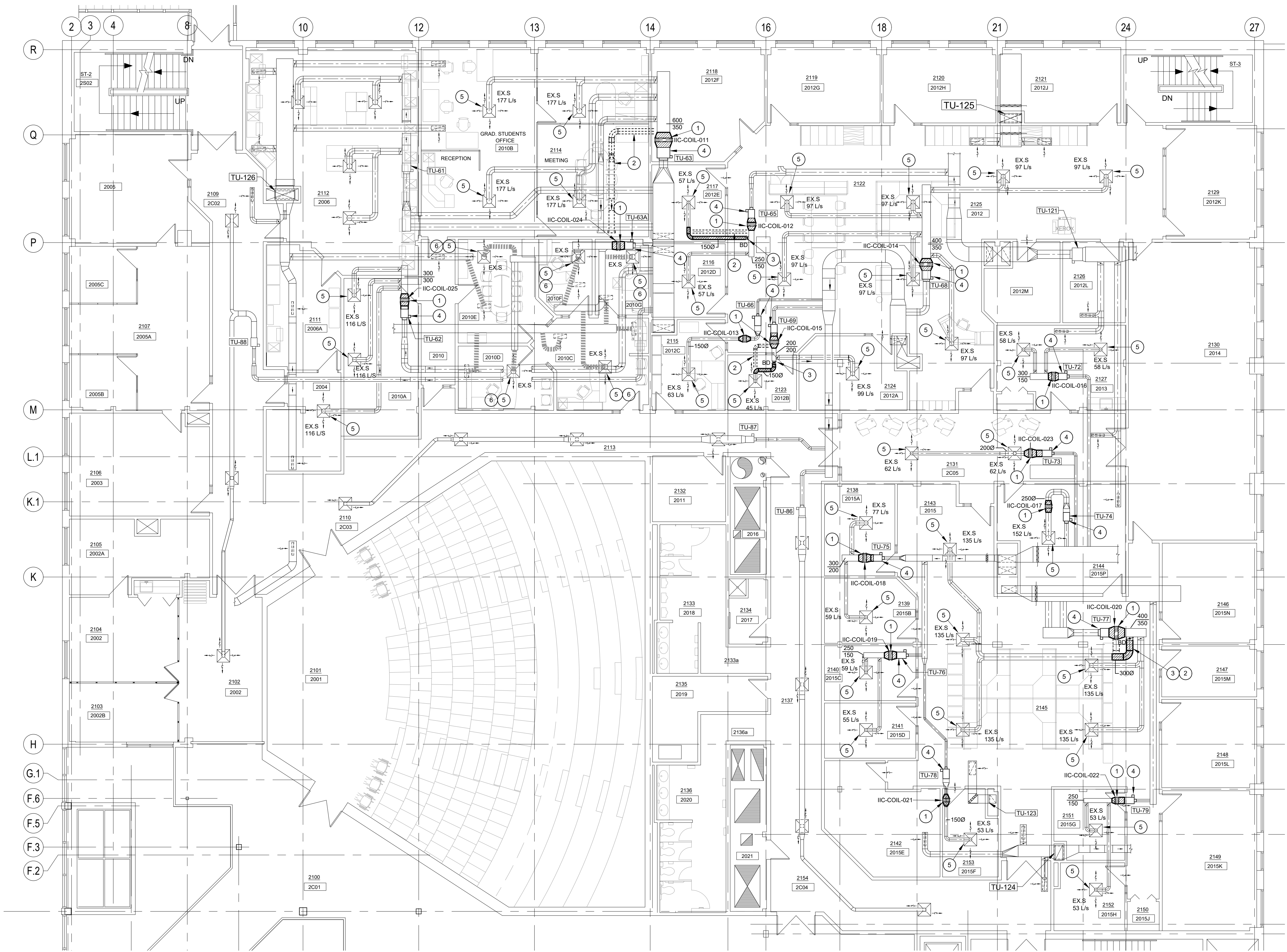
DRAWING NOTES:

1. INSTALL NEW HYDRONIC HEATING COIL IN EXISTING SUPPLY AIR DUCT. PROVIDE TRANSITIONS AS REQUIRED. PROVIDE NEW THERMAL INSULATION ON NEW DUCT/TRANSITIONS. CONFIRM EXACT DUCT SIZE AND LOCATION ON SITE. REFER TO DETAIL 5.1
2. EXISTING SUPPLY AIR DUCT TO BE REMOVED TO ALLOW FOR INSTALLATION OF NEW.
3. CONNECT NEW SUPPLY AIR DUCT TO EXISTING IN THIS APPROXIMATE LOCATION. CONFIRM EXACT LOCATION ON SITE.
4. EXISTING TERMINAL UNIT TO REMAIN (TYPICAL). CONTROLS AND BALANCING CONTRACTOR TO WORK TOGETHER TO VERIFY THE CALIBRATION AND MINIMUM/MAXIMUM FLOWS ON EXISTING TERMINAL UNITS
5. RE-BALANCE EXISTING SUPPLY AIR GRILLE TO VALUES INDICATED (TYPICAL).
6. EXISTING DIFFUSER AIRFLOW TO BE MEASURED PRIOR TO CONSTRUCTION. SET TO PRE-CONSTRUCTION AIR FLOWS.

GENERAL NOTES

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3. ALL DEFICIENCIES FOUND IN THIS DRAWING IS TO BE BROUGHT TO THE ATTENTION OF THE FACILITIES ENGINEERING AND DEVELOPMENT OFFICE OF THE DEPARTMENT OF FACILITIES MANAGEMENT, MEMORIAL UNIVERSITY OF NEWFOUNDLAND, PRIOR TO THE SUBMISSION OF THE TENDERS.

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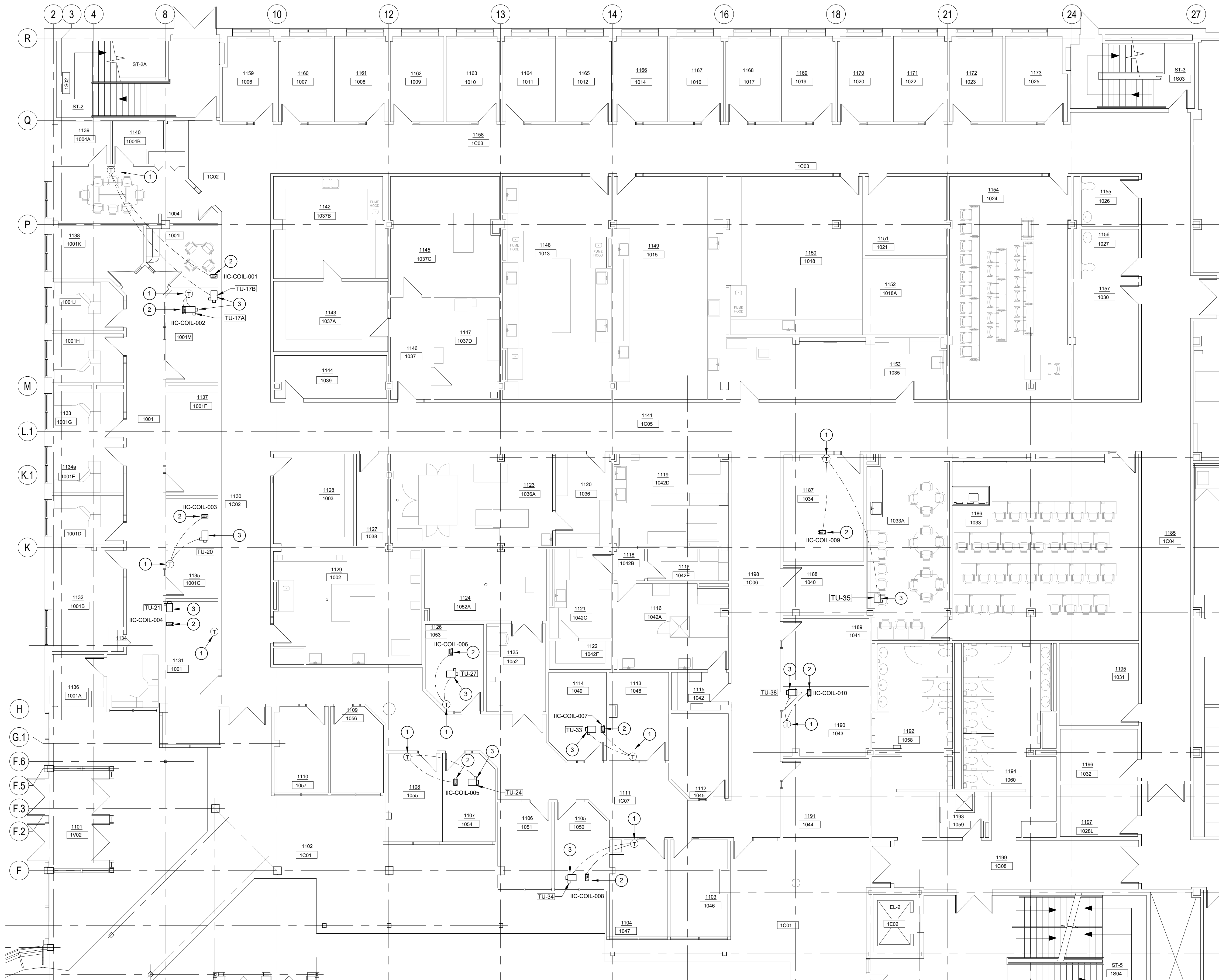
LEVEL 1 ROOM NO./ NAME SCHEDULE																			
Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name	Rm No.	Room Name
1102	VESTIBULE	1114	GRADUATE STUDENT OFF.	1128	COMPUTER PROCESSING ROOM	1141	CORRIDOR	1155	MALE STAFF WASHROOM	1169	TECHNOLOGIST OFF.	1183	CHEMICAL STORAGE (FLAMMABLE)	1196	ELECTRICAL ROOM	ST-1	STAIR 1		
1101	VESTIBULE	1115	CHANGE ROOM	1129	EXPERIMENTAL GEOCHEMISTRY LAB	1142	WET LAB	1156	FEMALE STAFF WASHROOM	1170	MEETING ROOM	1184	CHARGING ROOM	1196	DATA ROOM	ST-2	STAIR 2		
1102	ENTRANCE LOBBY	1116	SAMPLE DIGESTION LAB	1130	CORRIDOR	1143	DRY LAB	1157	GLASS CLEANING ROOM	1171	FACULTY OFFICE	1185	CORRIDOR	1197	UPS ROOM	ST-2A	STORAGE		
1103	FACULTY/PRINCIPAL INVEST. OFF.	1117	BALANCE ROOM	1131	RECEPTION	1144	DATA ROOM	1158	CORRIDOR	1172	GRADUATE STUDENT OFF.	1186	PROCESS CONTROL AND AUTO. LAB	1198	CORRIDOR	ST-3	STAIR 3		
1104	FACULTY/PRINCIPAL INVEST. OFF.	1118	ANTE ROOM	1132	ADMINISTRATIVE ASSISTANT OFF.	1145	S.E.M. ROOM	1159	FACULTY OFFICE	1173	GRADUATE STUDENT OFF.	1187	MEETING ROOM	1199	CORRIDOR	ST-4	STAIR 4		
1105	FACULTY/PRINCIPAL INVEST. OFF.	1119	CHEMICAL SEPARATION LAB	1133	MANAGER'S OFFICE	1146	ANTE ROOM	1160	FACULTY OFFICE	1174	SEISMIC INSTRUMENTS LAB	1188	MECHANICAL ROOM	1200	CORRIDOR	ST-5	STAIR 5		
1106	FACULTY/PRINCIPAL INVEST. OFF.	1120	CONTROL ROOM	1134	CLOSET	1147	EQUIPMENT ROOM	1161	FACULTY OFFICE	1175	STORAGE	1189	GRADUATE STUDENT OFF.	1201	CORE STORAGE				
1107	RESEARCH ASSISTANT OFF.	1121	REAGENT CLEANING LAB	1135	PROGRAM MANAGER'S OFFICE	1148	HEALTH AND SAFETY LAB	1162	FACULTY OFFICE	1176	TECHNOLOGIST OFF.	1190	GRADUATE STUDENT OFF.	1202	STAGING AREA/LOADING DOCK	ELEV1	ELEVATOR 1		
1108	RESEARCH ASSISTANT OFF.	1122	SUPPLIES	1136	STATIONARY STORES/WORKROOM	1149	FLUTATION LAB	1163	FACULTY OFFICE	1177	CORRIDOR	1191	GRADUATE STUDENT OFF.	1203	PILOT PLANT	ELEV2	ELEVATOR 2		
1109	GRADUATE STUDENT OFF.	1123	MULTICOLLECTOR ICP/MS LAB	1137	STAFF LOUNGE/RESOURCE ROOM	1150	SAMPLE REDUCTION LAB	1164	RESEARCH ASSISTANT OFF.	1178	PARTNER OFFICE	1192	GRADUATE STUDENT OFF.	1204	TECHNOLOGIST OFF.				
1110	GRADUATE STUDENT OFF.	1124	MICRO-XRF (EAGLE 3) ROOM	1138	SEMINAR ROOM	1151	STORAGE	1165	GRADUATE STUDENT OFF.	1179	STORAGE	1192a	VEST	1205	HYDROMETALLURGY LAB				
1111	CORRIDOR	1125	SAMPLE CAT. ROOM	1139a		1152	WALK-IN FREEZER	1166	GRADUATE STUDENT OFF.	1180	CORRIDOR	1193	JANITOR'S ROOM	1206	VAT STORAGE				
1112	GRADUATE STUDENT OFF.	1126	MEETING ROOM	1139	CONTROL CLOSET	1153	FABRICATION LAB	1167	GRADUATE STUDENT OFF.	1181	ROCK PREPARATION AREA	1194	FEMALE WASHROOM	1207	DUST COLLECTION				
1113	GRADUATE STUDENT OFF.	1127	GAS STORAGE	1140	STORAGE	1154	PROCESS MODELLING LAB	1168	GRADUATE STUDENT OFF.	1182	CHEMICAL STORAGE	1194a	VEST						

GENERAL NOTES:

- ALL CONNECTIONS TO THERMOSTATS OR OTHER DEVICES IS SYMBOLIC ONLY. REFER TO CONTROLS SCHEMATICS.

DRAWING NOTES:

- EXISTING THERMOSTAT AT THIS LOCATION TO BE REMAIN. REFER TO CONTROL SCHEMATICS.
- NEW HYDRONIC HEATING COIL INSTALLED IN EXISTING DUCT REFER TO CONTROL SCHEMATIC. CONTROLS CONTRACTOR TO SUPPLY CONTROL VALVE FOR MECHANICAL TO INSTALL.
- EXISTING TERMINAL UNIT TO REMAIN. REFER TO CONTROL SCHEMATIC. CONNECT NEW CONTROL VALVE TO EXISTING CONTROLLER.



LEVEL 1 FLOOR PLAN - CONTROLS LAYOUT

SCALE : 1:100
0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

No.	REVISION	DATE (YYMMDD)
0	ISSUED FOR TENDER	2025.10.09

GENERAL NOTES

- DO NOT SCALE FROM DRAWINGS.
- THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO SUBMISSION OF TENDERS.
- ALL DEFICIENCIES FOUND IN THIS DRAWING IS TO BE BROUGHT TO THE ATTENTION OF THE FACILITIES ENGINEERING AND DEVELOPMENT OFFICE OF THE DEPARTMENT OF FACILITIES MANAGEMENT, MEMORIAL UNIVERSITY OF NEWFOUNDLAND, PRIOR TO THE SUBMISSION OF THE TENDERS.

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CONSULTANT:

CORE
ENGINEERING INC.
57 Poppy Place
St. John's, NL, Canada A1B 4H8
Tel: (709)722-8613
Fax: (709)722-0910

STAMP:



PERMIT:

PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
CORE ENGINEERING INC.
MUNC: 03823
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEONL D0202 which is valid for the year 2025.



Department of Facilities Management

This University was named by the people of Newfoundland as a memorial to the fallen in the great wars, 1914-1918, 1939-1945, that in freedom of learning, their cause and sacrifice might not be forgotten.

Dedication plaque, Arts & Administration Building, St. John's Campus

PROJECT NAME:

MUN
BRUNEAU CENTER FOR
RESEARCH AND INNOVATION (IIC)
HEATING UPGRADES

DRAWING TITLE:

LEVEL 1 FLOOR PLAN -
NEW CONTROLS LAYOUT

DESIGNED: DE	DRAWN: JS
REVIEWED: DE	APPROVED: DE
SCALE: AS NOTED	DATE: 2025.10.09
MUN PROJECT No. IIC-516-19	DRAWING No. M-3.1

LEVEL 2 ROOM NO / NAME SCHEDULE							
Rm.No.	Room Name	Rm.No.	Room Name	Rm.No.	Room Name	Rm.No.	Room Name
2100	MEZZANINE	2114	SKUNKWORKS	2128	CLOSET	2140	OFFICE
2101	LECTURE THEATRE	2115	CORR'S OFF.	2129	MEETING ROOM	2141	OFFICE
2102	CORRIDOR	2116	OFFICE	2130	BOARD ROOM	2142	STORAGE/PHOTOCOPIER
2103	BREAKOUT AREA	2117	OFFICE	2131	WAITING AREA	2143	RECEPTION
2104	KITCHENETTE	2118	DEANS OFFICE	2132	DATA ROOM	2144	MEETING ROOM
2105	COAT ROOM	2119	2 SECRETARY OFF.	2133	MALE WASHROOM	2145	RESEARCH GENERAL OFF.
2106	SKUNKWORKS (LABOR. CHAIR TEMP.)	2120	ASSOCIATE DEANS OFF.	2134a	VEST	2146	ASSOCIATE DIRECTOR'S OFF.
2107	SKUNKWORKS	2121	2 PERSON OFF.	2134	JANITOR'S ROOM	2147	OFFICE
2108	LINK	2122	GRAD STUDENT GENERAL OFF.	2135	ELECTRICAL ROOM	2148	OFFICE
2109	CORRIDOR	2123	OFFICE	2136	FEMALE WASHROOM	2149	DIRECTOR'S OFF.
2110	CORRIDOR	2124	2 PERSON OFF.	2136a	VEST	2150	CLOSET
2111	SKUNKWORKS	2125	RECEPTION	2137	CORRIDOR	2151	OFFICE
2112	SKUNKWORKS	2126	STORAGE	2138	OFFICE	2152	OFFICE
2113	CORRIDOR	2127	STAFF LOUNGE	2139	OFFICE	2153	OFFICE

GENERAL NOTES:

1. ALL CONNECTIONS TO THERMOSTATS OR OTHER DEVICES IS SYMBOLIC ONLY. REFER TO CONTROLS SCHEMATICS

DRAWING NOTES:

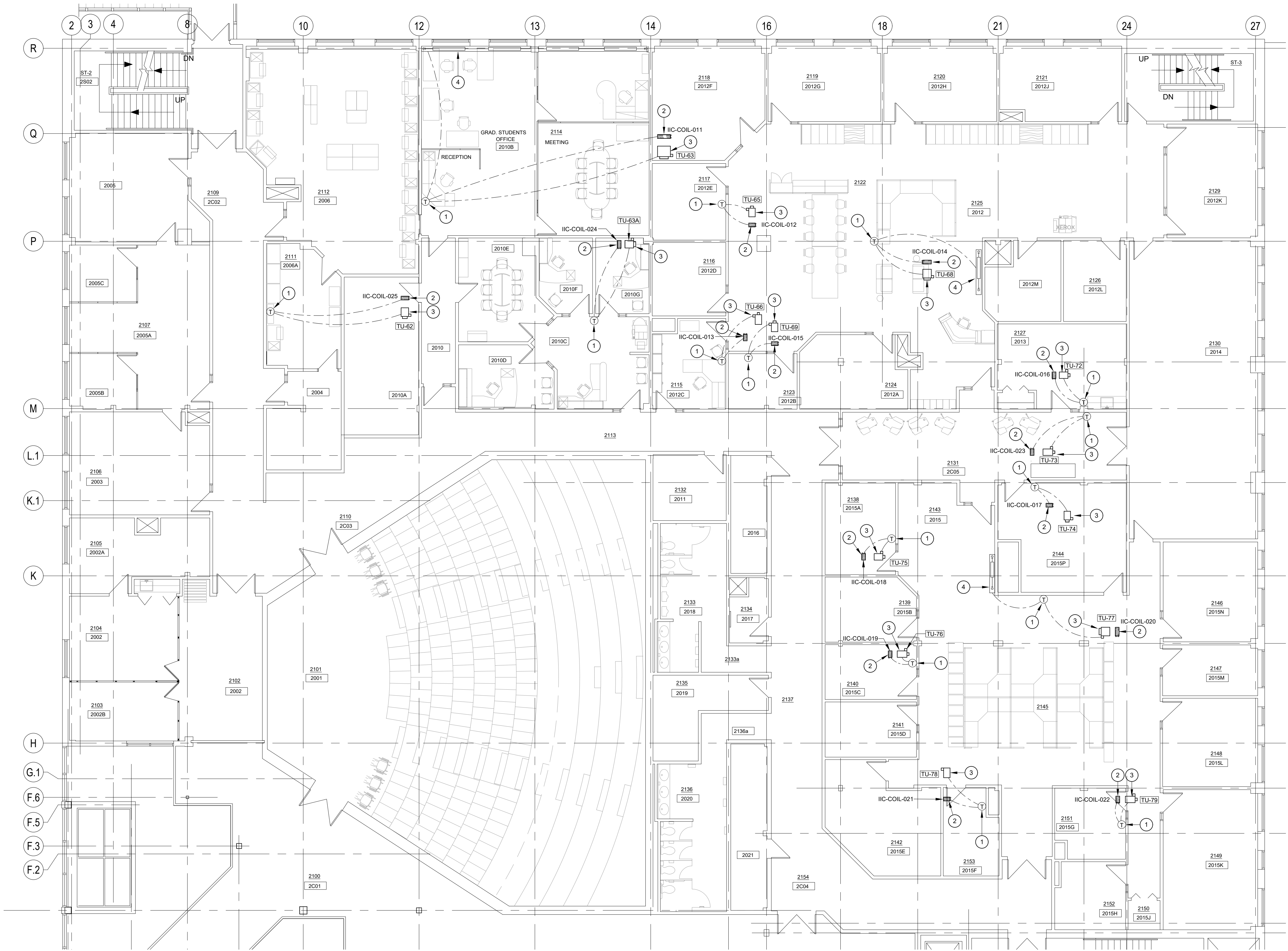
1. EXISTING THERMOSTAT AT THIS LOCATION IS TO REMAIN. REFER TO CONTROL SCHEMATICS.
2. NEW HYDRONIC HEATING COIL INSTALLED IN EXISTING DUCT. REFER TO CONTROL SCHEMATIC. CONTROLS CONTRACTOR TO SUPPLY CONTROL VALVE FOR MECHANICAL TO INSTALL.
3. EXISTING TERMINAL UNIT TO REMAIN. REFER TO CONTROL SCHEMATIC. CONNECT NEW CONTROL VALVE TO EXISTING CONTROLLER.
4. EXISTING BASEBOARD AND ASSOCIATED CONTROL VALVE TO REMAIN.

No.	REVISION	DATE (YYMMDD)
0	ISSUED FOR TENDER	2025.10.09

GENERAL NOTES

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2. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO SUBMISSION OF TENDERS.
3. ALL DEFICIENCIES FOUND IN THIS DRAWING IS TO BE BROUGHT TO THE ATTENTION OF THE FACILITIES ENGINEERING AND DEVELOPMENT OFFICE OF THE DEPARTMENT OF FACILITIES MANAGEMENT, MEMORIAL UNIVERSITY OF NEWFOUNDLAND, PRIOR TO THE SUBMISSION OF THE TENDERS.

PERMITS REQUIRED FOR ELECTRICAL WORK AT MEMORIAL UNIVERSITY OF NEWFOUNDLAND SHALL BE OBTAINED FROM SERVICE NL EFFECTIVE FEBRUARY 1, 2020 AND MADE AVAILABLE TO MUN REPRESENTATIVES UPON REQUEST. SEE STIPULATED PRICE CONTRACT GENERAL CONDITIONS SECTION 2.18.0 LAWS, NOTICES, PERMITS AND FEES.

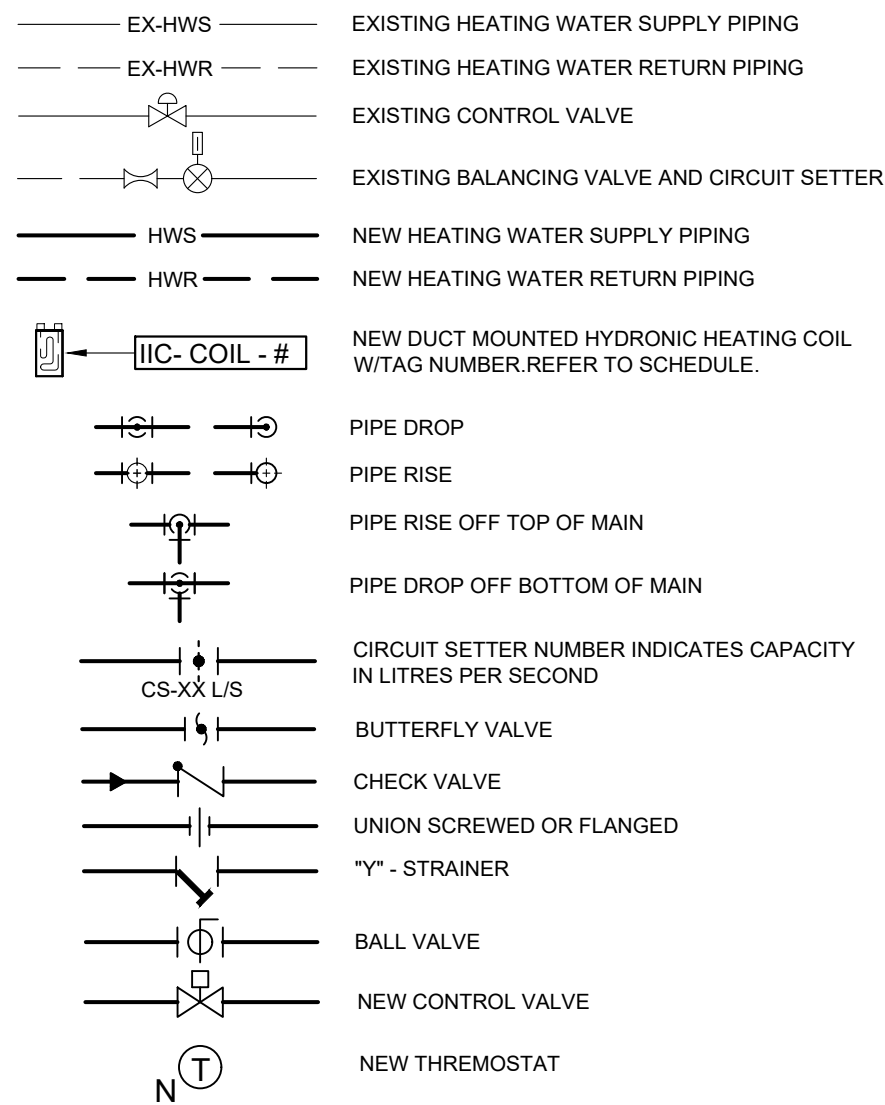




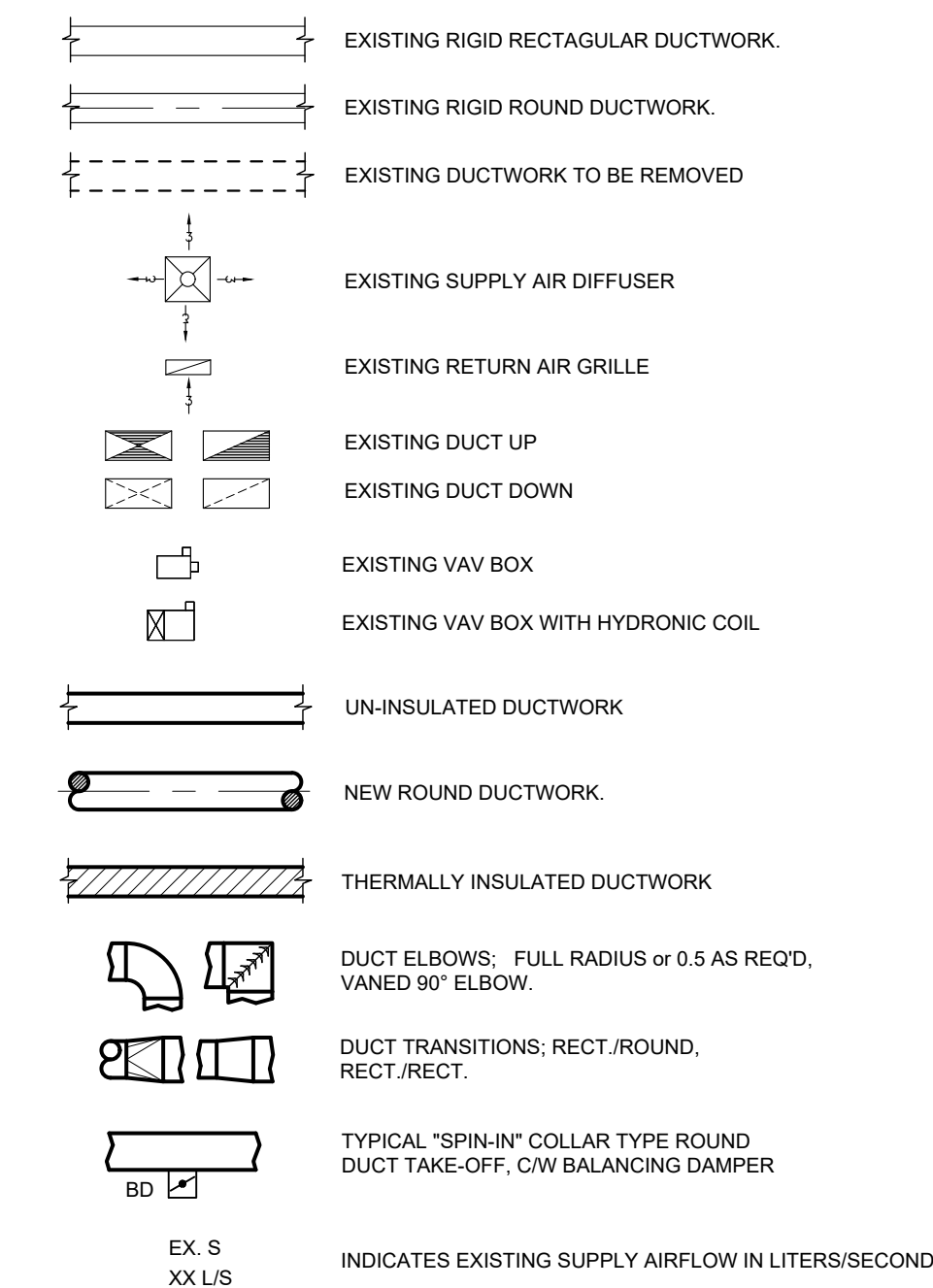
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CONSULTANT:		
CORE ENGINEERING INC. 57 Pippy Place ST. John's, NL, Canada A1B 4H8Tel (709)722-8613 Fax (709)722-0910		
STAMP:	PERMIT:	
	PROVINCE OF NEWFOUNDLAND  PERMIT HOLDER This Permit Allows CORE ENGINEERING INC. MHC / US&I To practice Professional Engineering in Newfoundland and Labrador: Permit No. as issued by PECON: P0009 which is valid for the year 2025.	
 Department of Facilities Management This University was raised by the people of Newfoundland as a memorial to the fallen in the great wars, 1914-1918, 1939-1945, that in freedom of learning, their cause and sacrifice might not be forgotten. - Dedication plaque, Arts & Administration Building, St. John's Campus		
PROJECT NAME:		
MUN BRUNEAU CENTER FOR RESEARCH AND INNOVATION (IIC) HEATING UPGRADES		
DRAWING TITLE:		
EXISTING HYDRONIC FLOW SCHEMATIC		
DESIGNED:	DRAWN:	
DE	JS	
REVIEWED:	APPROVED:	
DE	DE	
SCALE:	DATE:	
AS NOTED	2025.10.09	
MUN PROJECT No:	DRAWING No:	
IIC-516-19	M-4.1	
R0		

MECHANICAL LEGEND

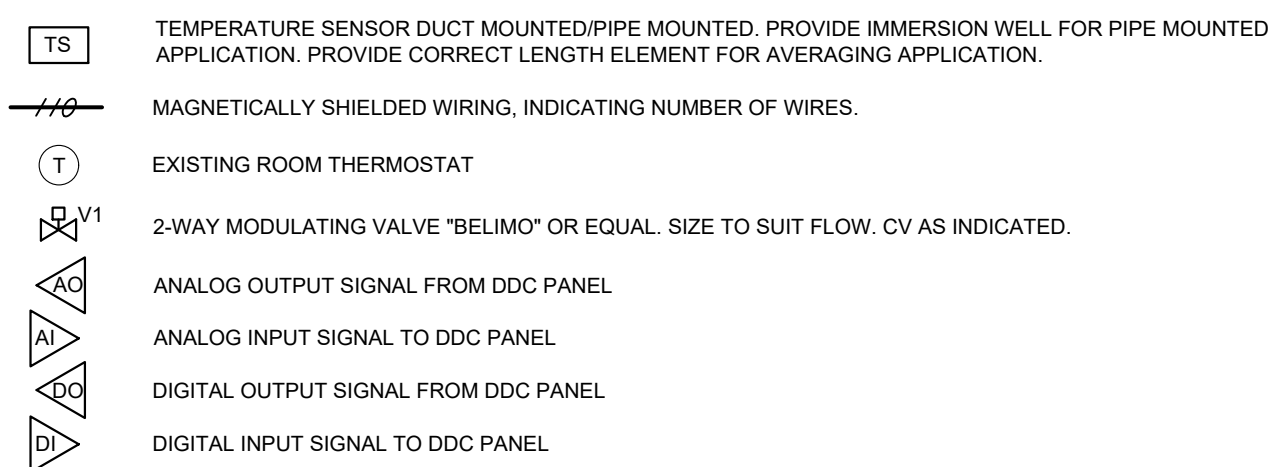
HEATING



VENTILATION

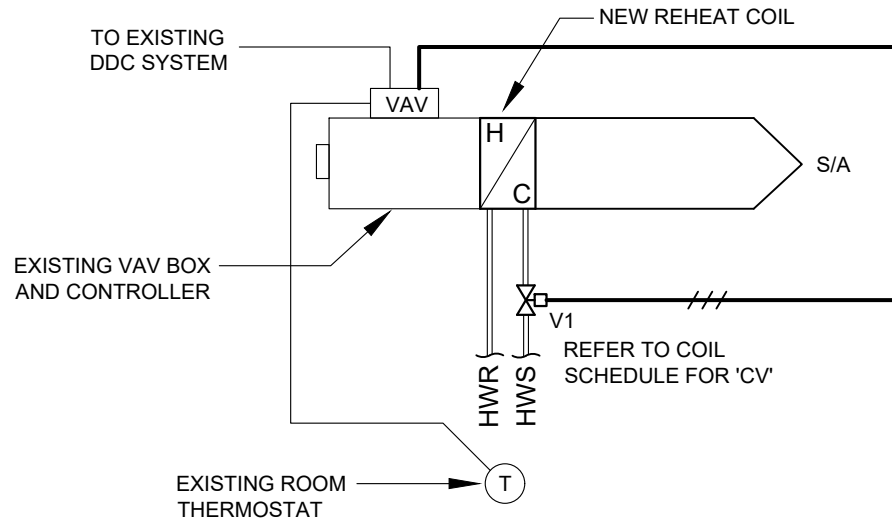


CONTROL LEGEND



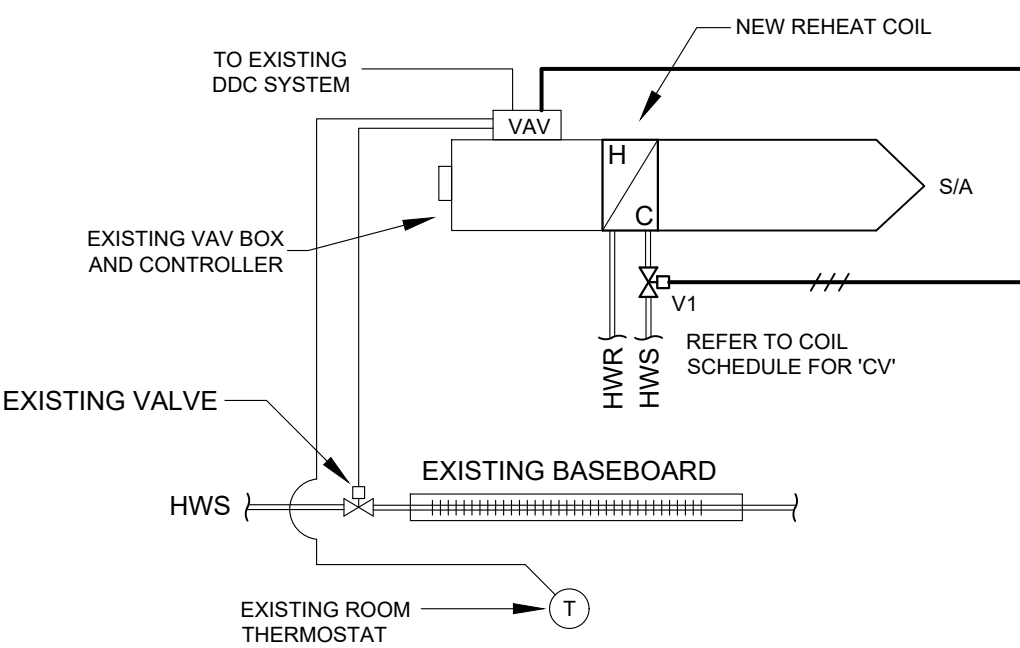
NOTES:

- ALL CONTROL WIRING AND CONDUIT 50 VOLTS AND UNDER TO BE SUPPLIED AND INSTALLED BY THE CONTROLS CONTRACTOR. REFER TO ELEC. SPECIFICATIONS FOR WIRING METHODS.
- UNLESS OTHERWISE NOTED ALL CONTROLS DEVICES TO BE SUPPLIED BY THE CONTROLS CONTRACTOR.
- ALL EXISTING CONTROLS TO BE REMOVED IN AREA OF WORK. THIS INCLUDES ALL PNEUMATIC SYSTEMS, DEVICES, TUBING ETC. AND ALL EXISTING DDC SYSTEMS, DEVICES, CONTROL PANELS ETC.



EXISTING VAV BOX W/ NEW REHEAT CONTROL SCHEMATIC

SCALE: N.T.S.



EXISTING VAV BOX AND EXISTING RADIATION BASEBOARD W/ NEW REHEAT CONTROL SCHEMATIC

SCALE: N.T.S.

CONTROL SEQUENCE

VAV BOX CONTROL WITH OPTIONAL RADIATION/REHEAT

- IN ROOMS SERVED BY VAV BOXES, THE BOX DAMPER SHALL BE CLOSED IF THE ASSOCIATED AIR HANDLING UNIT IS OFF AND REHEAT/RADIATION HEATER VALVES SHALL BE OPEN. PRIOR TO START OF THE SYSTEM, THE VAV BOX DAMPER SHALL OPEN TO ITS MINIMUM POSITION.
- ON A CALL FOR COOLING, THE VAV BOX CONTROLLER SHALL MODULATE THE DAMPER OPEN TO MAINTAIN THE SPACE TEMPERATURE SET POINT (OPERATOR ADJUSTABLE WITHIN DEFINED LIMITS). ON A CALL FOR HEATING, THE VAV BOX CONTROLLER SHALL MODULATE THE DAMPER TO ITS MINIMUM POSITION. ON A FURTHER CALL FOR HEAT, THE CONTROLLER SHALL OPEN THE ROOM'S RADIATION HEATING VALVE (IF APPLICABLE) TO MAINTAIN SPACE TEMPERATURE SET POINT. IF THE TEMPERATURE STILL REMAINS BELOW SET POINT, THE CONTROLLER SHALL MODULATE THE REHEAT COIL VALVE (IF APPLICABLE) TO MAINTAIN ROOM TEMPERATURE SET POINT.
- FOR TWO POSITION ONLY BOXES (OCCUPIED/UNOCCUPIED), THE SEQUENCE OF OPERATION IS SIMILAR TO ABOVE. THE OPERATING POSITION OF THE BOX SHALL BE CONTROLLED CENTRALLY ON A SCHEDULE BY THE EMCS SYSTEM OR BY A LOCAL ROOM OCCUPANCY SWITCH.
- MULTIPLE SPACES WILL BE SERVED FROM ONE VAV BOX/COIL AND CONTROLLED BY A SINGLE THERMOSTAT FOR THE GROUP.

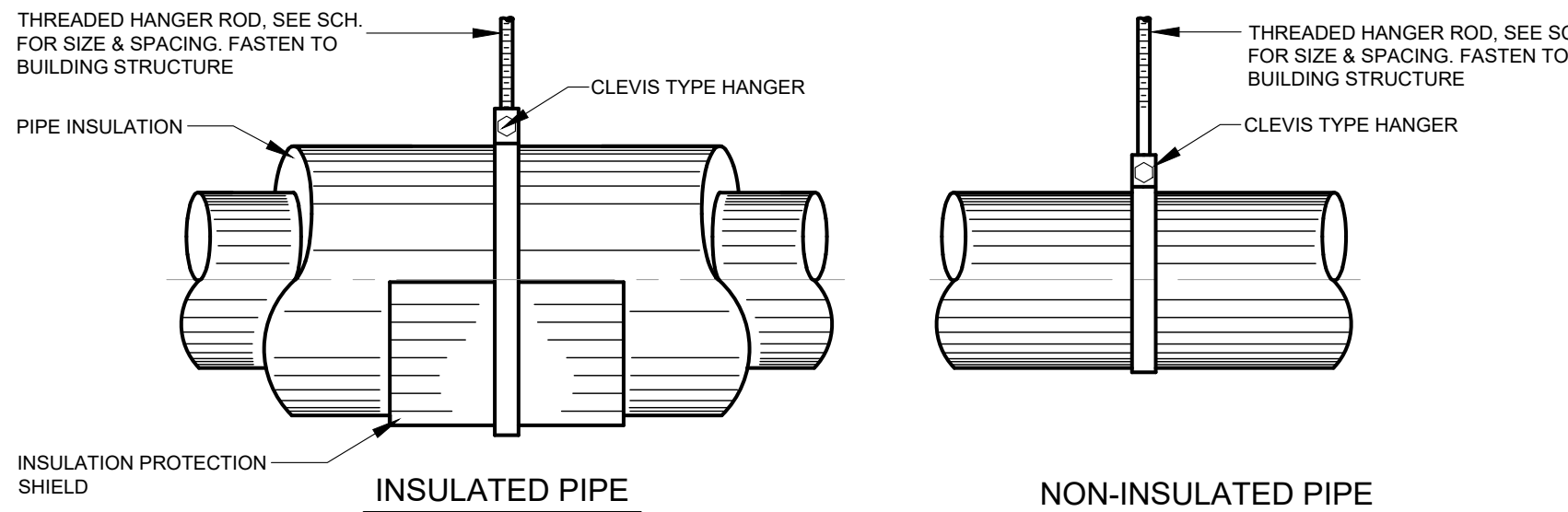
HANGER ROD SCHEDULE

PIPE SIZE (mm)	ROD SIZE (mm)	PIPE SIZE (mm)	ROD SIZE (mm)
UP TO 50	9.5 DIA.	100 THRU 125	16 DIA.
65 THRU 75	12.7 DIA.	150 THRU 300	22 DIA.

HANGER ROD SPACING SCH.

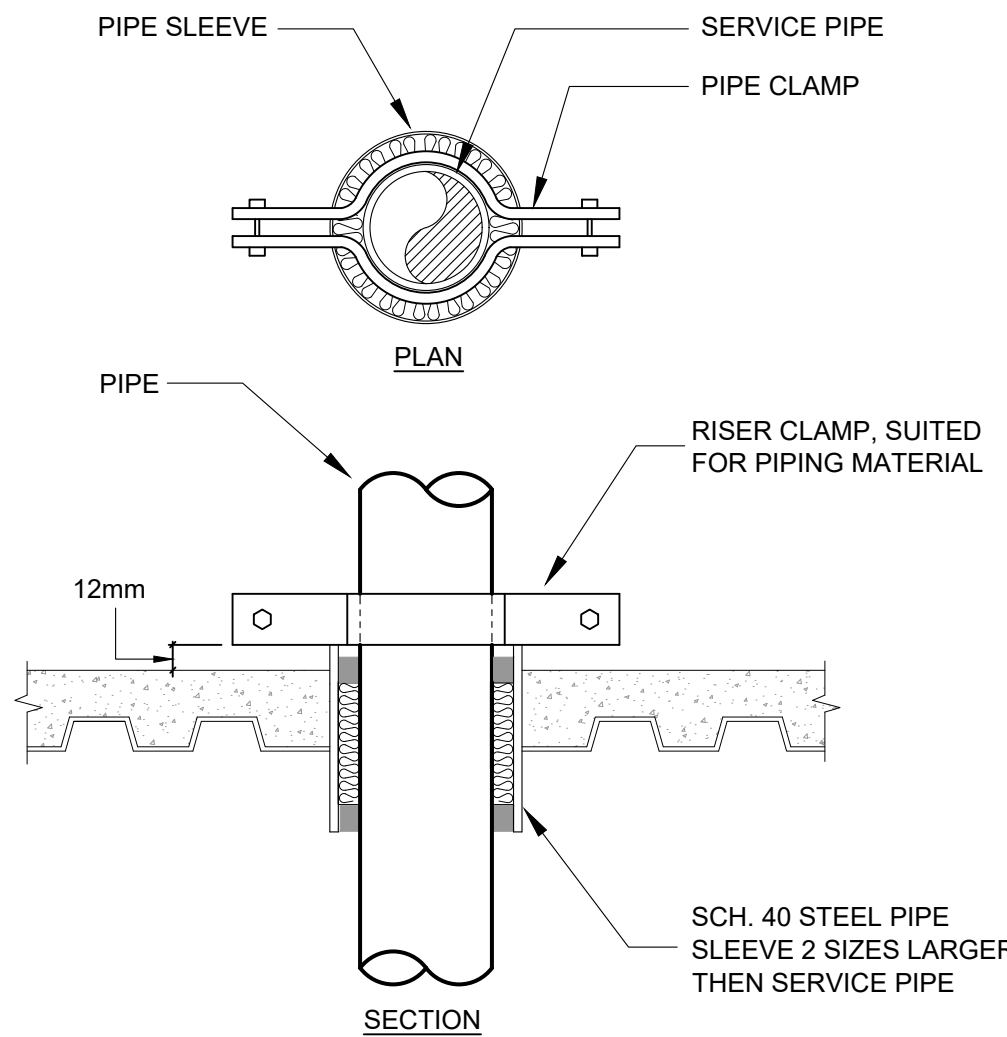
PIPE SIZE (mm)	25	32	40	50	65	75	100	125	150	200	250	300
MAXIMUM ALLOWABLE SPACING (METERS)	2.1	2.4	2.7	3.0	3.3	3.6	4.2	4.8	5.1	5.7	6.7	7.0

NOTE: FOR TRAPEZE HANGER, TAKE SPACING FOR SMALLEST DIAMETER PIPE



TYP. PIPE HANGERS DETAIL

SCALE: N.T.S.



PIPE PENETRATING FLOOR DETAIL

SCALE: N.T.S.

HYDRONIC HEATING COIL SCHEDULE - LEVEL 1

TAG	AHU SERVED BY	NEW AREAS SERVED	ASSOCIATED TERMINAL UNIT	MANUFACTURER	MODEL	MAX. HEATING LOAD (KW)	EAT (°C)	AIR SIDE			FLUID SIDE						CV
								LAT (°C)	MAX. FLOW (L/S)	MIN. FLOW (L/S)	P.D. (Pa)	EWT (°C)	LWT (°C)	FLOW (L/S)	MAX. P.D. (KPa)	FLUID	
IIC-COIL-001	AHU-2	1004	TU-17B	-	-	1.1	13	23	220	87	50	93	82	0.027	20.6	WATER	0.19
IIC-COIL-002	AHU-2	1001M	TU-17A	-	-	0.5	13	23	83	30	50	93	82	0.011	20.6	WATER	0.09
IIC-COIL-003	AHU-2	1001C, 1001F	TU-20	-	-	0.6	13	23	116	46	50	93	82	0.016	20.6	WATER	0.10
IIC-COIL-004	AHU-2	1001	TU-21	-	-	1.1	13	23	194	91	50	93	82	0.027	20.6	WATER	0.19
IIC-COIL-005	AHU-2	1054, 1055, 1056, 1057	TU-24	-	-	1.0	13	23	272	77	50	93	82	0.022	20.6	WATER	0.17
IIC-COIL-006	AHU-2	1053	TU-27	-	-	0.5	13	23	86	28	50	93	82	0.011	20.6	WATER	0.09
IIC-COIL-007	AHU-2	1045, 1048, 1049	TU-33	-	-	0.75	13	23	204	60	50	93	82	0.016	20.6	WATER	0.13
IIC-COIL-008	AHU-2	1046, 1047, 1050, 1051	TU-34	-	-	1.0	13	23	280	77	50	93	82	0.022	20.6	WATER	0.17
IIC-COIL-009	AHU-2	1034	TU-35	-	-	0.5	13	23	144	36	50	93	82	0.011	20.6	WATER	0.09
IIC-COIL-010	AHU-2	1041, 1043, 1044	TU-38	-	-	1.0	13	23	282	61	50	93	82	0.022	20.6	WATER	0.17

NOTES:

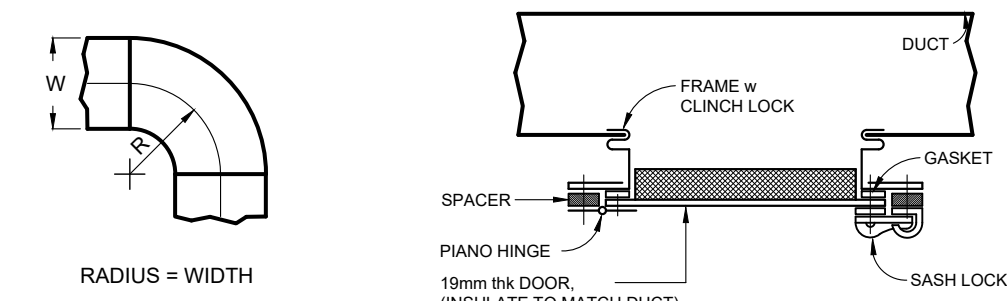
- ALL HEATING COILS HAVE CRN FOR NL.
- MAX AIRFLOW TO BE USED WHEN SIZING COIL FOR AIRSIDE PRESSURE DROP.
- CONTRACTOR TAB AGENT TO MEASURE EXISTING AIRFLOW MAX AND MIN FLOWS PRIOR TO MODIFICATIONS. PROVIDE TO ENGINEER PRIOR TO COIL SHOP DRAWING SUBMISSION FOR REVIEW.

HYDRONIC HEATING COIL SCHEDULE - LEVEL 2

TAG	AHU SERVED BY	SERVES	ASSOCIATED TERMINAL UNIT	MANUFACTURER	MODEL	MAX. HEATING LOAD (KW)	EAT (°C)	AIR SIDE			FLUID SIDE						CV
								LAT (°C)	MAX. FLOW (L/S)	MIN. FLOW (L/S)	P.D. (Pa)	EWT (°C)	LWT (°C)	FLOW (L/S)	MAX. P.D. (KPa)	FLUID	
IIC-COIL-011	AHU-1	RECEPTION, MEETING, 2010B	TU-63	-	-	2.6	13	23	708	212	50	93	82	0.060	20.6	WATER	0.45
IIC-COIL-012	AHU-1	2012D, 2012E	TU-65	-	-	0.75	13	23	114	58	50	93	82	0.022	20.6	WATER	0.13
IIC-COIL-013	AHU-1	2012C	TU-66	-	-	0.50	13	23	63	30	50	93	82	0.011	20.6	WATER	0.09
IIC-COIL-014	AHU-1	2012	TU-68	-	-	4.1	13	23	680	307	50	93	82	0.090	20.6	WATER	0.73
IIC-COIL-015	AHU-1	2012A, 2012B	TU-69	-	-	0.70	13	23	144	57	50	93	82	0.016	20.6	WATER	0.13
IIC-COIL-016	AHU-2	2013	TU-72	-	-	0.60	13	23	116	39	50	93	82	0.013	20.6	WATER	0.10
IIC-COIL-017	AHU-2	2015P	TU-74	-	-	0.60	13	23	152	45	50	93	82	0.013	20.6	WATER	0.10
IIC-COIL-018	AHU-2	2015A, 2015B	TU-75	-	-	0.60	13	23	135	44	50	93	82	0.013	20.6	WATER	0.10
IIC-COIL-019	AHU-2	2015C, 2015D	TU-76	-	-	0.50	13	23	114	39	50	93	82	0.013	20.6	WATER	0.10
IIC-COIL-020	AHU-2	2015	TU-77	-	-	2.4	13	23	673	194	50	93	82	0.052	20.6	WATER	0.41
IIC-COIL-021	AHU-2	2015F	TU-78	-	-	0.50	13	23	53	28	50	93	82	0.011	20.6	WATER	0.09
IIC-COIL-022	AHU-2	2015G, 2015H	TU-79	-	-	0.70	13	23	107	54	50	93	82	0.015	20.6	WATER	0.12
IIC-COIL-023	AHU-2	2005	TU-73	-	-	1.1	13	23	124	87	50	93	82	0.024	20.6	WATER	0.19
IIC-COIL-024	AHU-1	2010C, 2010D, 2010E, 2010F, 2010G	TU-63A	-	-	2.7	13	23	-	222	50	93	82	0.059	20.6	WATER	0.47
IIC-COIL-025	AHU-1	2004, 2010A	TU-62	-	-	1.1	13	23	348	92	50	93	82	0.024	20.6	WATER	0.19

NOTES:

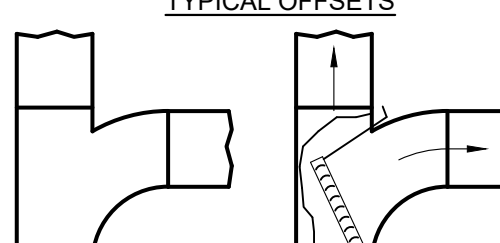
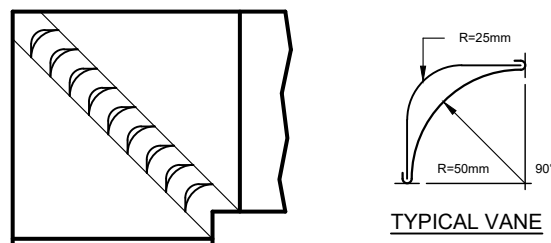
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NOTES:

- 20 DEG. Max. ON DIVERGING AIRFLOW.
- 30 DEG. Max. ON CONVERGING AIRFLOW.

TYPICAL TRANSITIONS



TYPICAL "TEE" CONNECTIONS

NOTES:

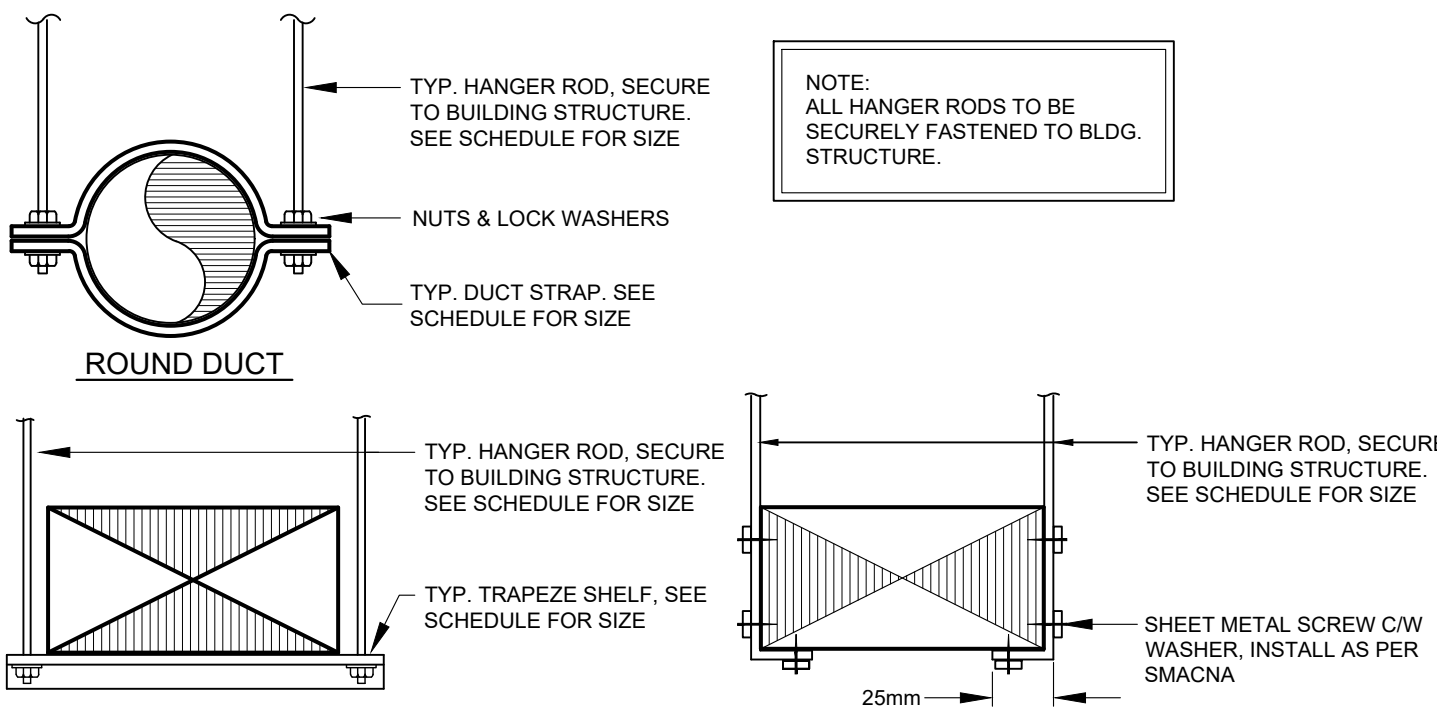
- ALL DUCTWORK CONSTRUCTION SHALL CONFORM TO SMACNA LOW AND/OR HIGH VELOCITY DUCT STANDARDS AS REQUIRED.
- NOT ALL CONDITIONS SHOWN ABOVE MAY APPLY TO THIS JOB. COORDINATE ON-SITE.

TYPICAL DUCT CONSTRUCTION STANDARDS

SCALE: N.T.S.

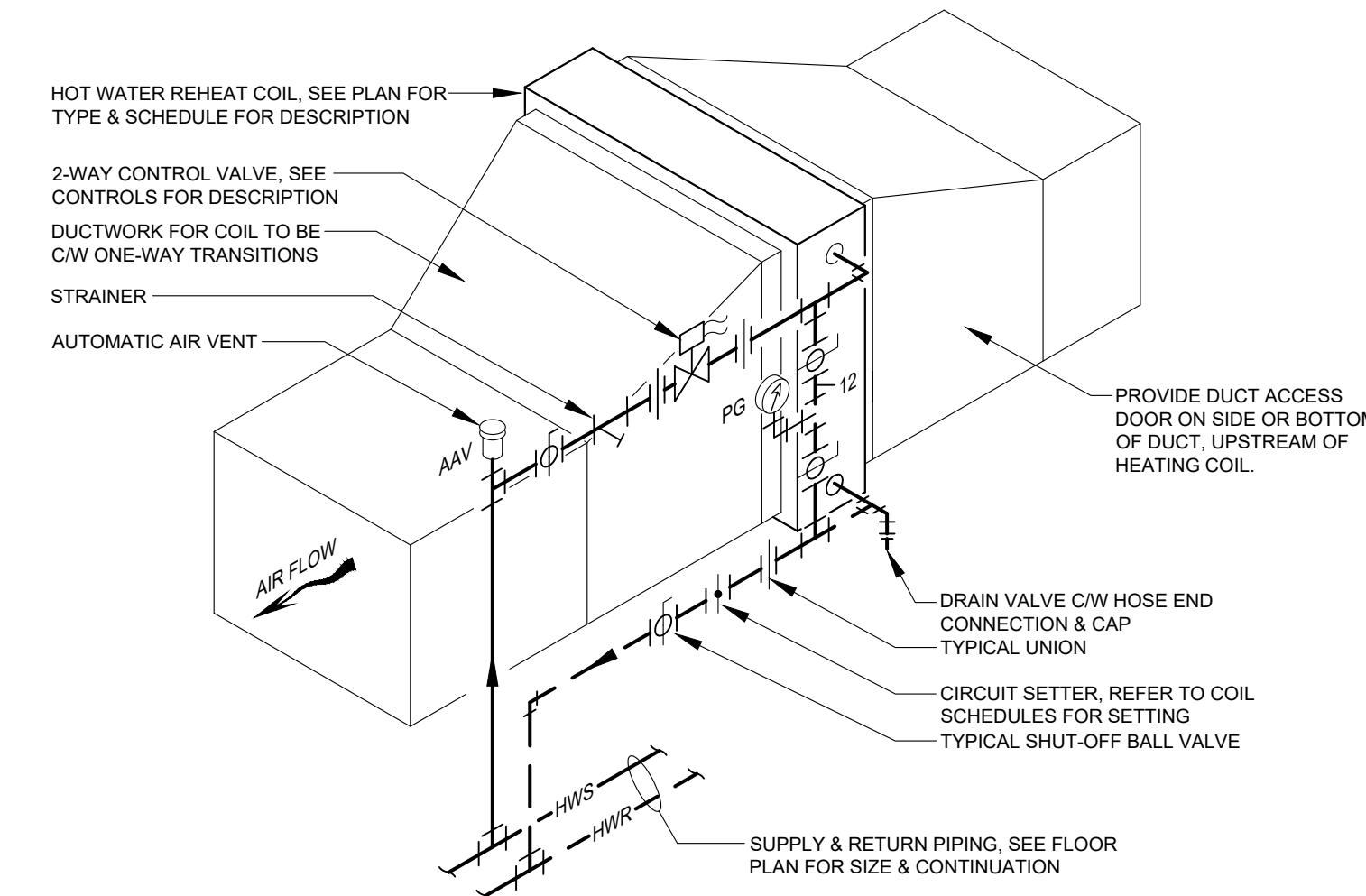
DUCT HANGER SCHEDULE

LONGEST DIMENSION OF DUCT (mm)	HANGER ROD (mmØ)	RECTANGULAR DUCT		MAX. SPACING (mm)
		STRAP HANGERS (mm)	TRAPEZE SHELF HANGERS (mm)	
UP TO 457	3.26 WIRE	25 x 1.29 Ik.	25 x 25 x 3.2	3050
483 - 750	3.26 WIRE	25 x 1.29 Ik.	25 x 25 x 3.2	3050
787 - 1067	6.35	25 x 1.29 Ik.	40 x 40 x 3.2	3050
1092 - 1524	9.5	25 x 1.29 Ik.	40 x 40 x 3.2	3050
1550 - 2134	9.5	40 x 1.29 Ik.	50 x 50 x 3.2	2438
DUCT DIAMETER (mmØ)	HANGER ROD (mmØ)	ROUND DUCT		MAX. SPACING (mm)
		STRAP HANGERS (mm)	No. OF HANGERS	
UP TO 457	3.26 WIRE	25 x 1.29 Ik.	1	3050
483 - 750	---	25 x 2.05 Ik.	1	3050
787 - 1067	---	50 x 1.29 Ik.	1	3050



TYPICAL DUCT SUPPORT DETAILS

SCALE: N.T.S.



TYP. DUCT MOUNTED HOT WATER HEATING COIL PIPING DETAIL

SCALE: N.T.S.

No.	REVISION	DATE (YYMMDD)
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CONSULTANT:

CORE ENGINEERING INC.
57 Plippy Place
St. John's, NL, Canada A1B 4H8
Tel: (709)722-8613
Fax: (709)722-0910

STAMP:

PROFESSIONAL ENGINEER
DAVE FINNIS
PE
PROVINCE OF NEWFOUNDLAND

PERMIT:

PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
CORE ENGINEERING INC.
MIRC: 03823
To practice Professional Engineering in Newfoundland and Labrador:
Permit No. as issued by PEONL 02020
which is valid for the year 2025

MEMORIAL UNIVERSITY
Department of Facilities Management
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- Dedication plaque, Arts & Administration Building, St. John's Campus

PROJECT NAME:

**MUN
BRUNEAU CENTER FOR
RESEARCH AND INNOVATION (IIC)
HEATING UPGRADES**

DRAWING TITLE:

MECHANICAL DETAILS, SCHEDULES & LEGEND

DESIGNED: DE	DRAWN: JS
REVIEWED: DE	APPROVED: DE
SCALE: AS NOTED	DATE: 2025.10.09
MUN PROJECT No. IIC-516-19	DRAWING No. M-5.1