FACILITIES MANAGEMENT

OPEN CALL FOR BIDS

FOR

Thermal Lab Mechanical Upgrades

EN-189-21

Request for Open Call Number: **TFM-002-25**

Issued: **January 15, 2025**

Submission Deadline: **Thursday, February 13, 2025 @ 3:00PM NST**

REQUEST FOR OPEN CALL FOR BIDS INFORMATION SHEET

Request for Open Call			
Title:	**Thermal Lab Mechanical Upgrades EN-189-21**		
Open Call #:	**TFM-002-25**	Issue Date:	**January 15, 2025**
Non-Mandatory Site Visit:	**Location:** **Engineering Building, EN-1034**		**January 28, 2025** **10:00 A.M.**
Questions Deadline:	**Eight (8) days prior to closing time, at 3:00pm (NST).**	Closing Date & Time: Bid Submission Format: Opening Date, Time & Location:	**Thursday February 13, 2025 @ 3:00 pm NST** **opencalls@mun.ca** **Thursday, February 13, 2025 @ 3:30 pm NST** **Via Conference line:** **1-416-915-6530 (toll free)** **Access Code: 2771 771 9849** **Attendee ID: Please press Pound(#)**
Bids Irrevocable Period after Submission Deadline:			**45 days (See section 1.6)**

Bid Submission: Responses to this solicitation must be submitted by email to opencalls@mun.ca Email subject line must read: BID SUBMISSION: TFM-002-25 Thermal Lab Mechanical Upgrades EN-189-21 .

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-002-25 Thermal Lab Mechanical Upgrades, 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.

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*

PROCUREMENT AND CONTRACTING DOCUMENTS GROUP

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

Open Call for Bids Strategic Procurement Sections

General Conditions and Agreement between Owner and Contractor for the Stipulated Price Contract

SPECIFICATIONS GROUP

General Requirements Subgroup

DIVISION 01 - GENERAL REQUIREMENTS

Facility Construction Subgroup

DIVISION 22 - PLUMBING

DIVISION 23 - HEATING VENTILATING AND AIR CONDITIONING

DIVISION 26 - ELECTRICAL

REFER TO DRAWINGS

END OF SECTION

PART 1 - GENERAL

1.1 MECHANICAL

.1 M-1.0 - MECHANICAL DEMOLITION

.2 M-2.0 - NEW MECHANICAL LAYOUT

.3 M-3.0 - MECHANICAL SCHEDULES, DETAILS & LEGEND

1.2 ELECTRICAL

.1 E-0.1 - ELECTRICAL SPECIFICATIONS AND CONTROL DETAIL

.2 E-0.2 - ELECTRICAL LEGEND AND DEMOLITION FLOOR PLANS

.3 E-1.1 - REVISED ELECTRICAL FLOOR PLANS

.4 E-1.2 - CONDUIT ROUTING PLAN

.5 E-2.1 - ELECTRICAL SINGLE LINE DIAGRAM AND PANEL SCHEDULES

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 of Bids

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

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

The Owner does not accept any responsibility for amendments submitted by means other than the email listed above. Bidders making submission near the deadline do so at their own rick 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.nl.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 it 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 of gases.

(f) Some University buildings contain asbestos and other hazardous materials. Do not alter or disturb any goods believed to contain asbestos goods (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 PROPONENT 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)	$10,000.00	HST EXCLUDED
Price C: Total: [$(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:

Thermal Lab Mechanical Upgrades
as per specifications listed in Appendix A

3. MANDATORY SUBMISSION REQUIREMENTS

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

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

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

APPENDIX C2 – UNIT RATES

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APPENDIX C2 – UNIT PRICE TABLE

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APPENDIX C3 - FURNITURE BIDDING TABLE

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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.

TRADE/DIVISION	SUBCONTRACTOR - SUPPLIER - MANUFACTURER
Plumbing	
HVAC	
Controls	
Electrical	
ADD TRADES AS REQUIRED	

DEPARTMENT OF FACILITIES MANAGEMENT

GENERAL CONDITIONS

AND

AGREEMENT BETWEEN OWNER AND CONTRACTOR

FOR

THE STIPULATED PRICE CONTRACT

May 2023

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

INDEX

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 aforegoing 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 extend 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 ANDSUPERINTENDENCE

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^{o} 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.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Types of items described in this Section:

B. Types of items described in this Section:
1. Work Covered By the Contract Documents.
2. Type of Contract.
3. Work Phases.
4. Work Under Other Contracts.
5. Products Ordered In Advance.
6. Owner-Furnished Products.
7. Use of Premises.
8. Owner's Occupancy Requirements.
9. Work Restrictions.
10. Interpretation Of Documents
11. Specification Formats and Conventions.
12. Project Management and Coordination.
13. Construction Progress Documentation.
14. Photographic Documentation.
15. Substitution Procedures.
16. Submittal Procedures.
17. Environmental Procedures.
18. Wildlife Protection.
19. Quality Requirements.
20. Regulatory Requirements.
21. Temporary Facilities and Control.
22. Temporary Barriers and Enclosures.
23. Product Requirements.
24. Execution.
25. Construction Waste Management And Disposal.
26. Closeout Procedures.
27. List of Incomplete Items (Punch List)
28. Operation and Maintenance Data.
29. Project Record Documents.
30. Demonstration and Training.

C. Types of items you will not find described in this Section:
1. Health and Safety Requirements

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: En-189-21 Thermal Lab Mechanical Upgrades
1. Project Location: Engineering Building

B. Owner: Memorial University of Newfoundland
   1. Owner's Representative: Department of Facilities Management, Tel. 709-864-8725

C. The Work consists of the following:
   1. The Work includes supply, installation and testing of specialized refrigeration systems for environmental room control into 3 existing freezer rooms and all other associated 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 will furnish products indicated. The Work includes providing support systems to receive Owner's equipment and making plumbing, mechanical, and electrical connections.
   1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
   2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
   3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
   4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
   5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
   6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
   7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Owner's Representative noting discrepancies or anticipated problems in use of product.
   8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
   9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
   10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
   11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

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

1.9 USE OF PREMISES

A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

C. Use of Site: Limit use of premises to areas under construction. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. 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.

D. Use of Existing Building: If the work involves construction in an existing building, maintain the existing building in a weather tight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.10 OWNER'S OCCUPANCY REQUIREMENTS

A. 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.

B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits, unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
   2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

C. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
   1. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
   2. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
   3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.11 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours, Monday through Friday, except otherwise indicated.
   1. Weekend Hours: **Contractor to notify Owner's representative 48hrs prior to scheduling.**
   2. Early Morning Hours: **Contractor to notify Owner's representative 48hrs prior to scheduling.**
   3. Hours for Utility Shutdowns: **Dependant on Scope of shutdown. Contractor to notify Owner's representative 2 weeks prior to scheduling.**
   4. Hours for Core Drilling and other noise generating activities: **To be scheduled after regular work hours. Contractor to notify Owner's representative 48hrs prior to scheduling.**

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's Representative's written permission.

C. No smoking is permitted on MUN Campus.

1.12 INTERPRETATION OF DOCUMENTS

A. In the event of discrepancies or conflicts in interpreting the Plans (drawings) and Specifications,
   1. Supplementary General Conditions take precedence over all other documents.

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

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

1.13 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's *MasterFormat* numbering system.
1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

C. The words *shall*, *shall be*, or *shall comply with*, depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.14 PROJECT MANAGEMENT AND COORDINATION

A. Coordination
1. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

B. Administrative and supervisory personnel
1. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
2. Maintain same superintendent on Project for duration of Project. Immediately notify Owner`s Representative if superintendent should become unavailable to work and immediately replace with an alternate person acceptable to the Owner`s Representative.

C. Project meetings
1. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
2. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Owner`s Representative, within three days of the meeting.

3. Progress Meetings: Conduct progress meetings at monthly intervals. Coordinate dates of meetings with preparation of payment requests.

1.15 Requests For Interpretation (RFIs)

1. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
   a. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
2. Allow seven working days for Owner`s Representative's response for each RFI.
3. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Owner`s Representative in writing within 10 days of receipt of the RFI response.

1.16 CONSTRUCTION PROGRESS DOCUMENTATION

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.
   1. Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   2. At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

B. Reports
   1. Daily Construction Reports: Prepare a daily construction report and submit to Owner`s Representative each week recording the following information concerning events at Project site:
      a. List of subcontractors at Project site.
      b. List of separate contractors at Project site.
      c. Approximate count of personnel at Project site.
      d. Equipment at Project site.
      e. Material deliveries.
      f. High and low temperatures and general weather conditions.
      g. Accidents.
      h. Meetings and significant decisions.
      i. Unusual events.
      j. Stoppages, delays, shortages, and losses.
      k. Meter readings and similar recordings.
      l. Emergency procedures.
      m. Orders and requests of authorities having jurisdiction.
      n. Change Orders received and implemented.
      o. Construction Change Directives received and implemented.
      p. Services connected and disconnected.
      q. Equipment or system tests and start-ups.
      r. Partial Completions and occupancies.
      s. Substantial Completions authorized.
   2. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

1.17 PHOTOGRAPHIC DOCUMENTATION

A. Preconstruction Photographs: Before starting construction take, digital photographs of Project site and surrounding areas, including existing items to remain during construction, from different vantage points.

B. Periodic Construction Photographs: Take digital photographs weekly, with timing each month adjusted to coincide with the cut-off date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

C. E-mail or otherwise submit photos to Owner`s representative on monthly basis to coincide with the each Application for Payment.

1.18 SUBSTITUTION PROCEDURES

A. Substitution Requests: Submit PDF copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. Certificates and qualification data, where applicable or requested.
      g. List of similar installations for completed projects with project names and addresses and names and addresses of Owner's Representatives and owners.
      h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
      i. Research reports evidencing compliance with building code in effect for Project.
      j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
      k. Cost information, including a proposal of change, if any, in the Contract Sum.
      l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
      m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
   2. Owner's Representative's Action: If necessary, Owner's Representative will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Owner's Representative will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
      a. Forms of Acceptance: Change Order, Construction Change Directive, or Owner's Representative's Supplemental Instructions for minor changes in the Work.
      b. Use product specified if Owner's Representative does not issue a decision on use of a proposed substitution within time allocated.

B. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
   1. Conditions: Owner's Representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner's Representative will return requests without action, except to record noncompliance with these requirements:
      a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
      b. Substitution request is fully documented and properly submitted.
      c. Requested substitution will not adversely affect Contractor's construction schedule.
      d. Requested substitution has received necessary approvals of authorities having jurisdiction.
      e. Requested substitution is compatible with other portions of the Work.
      f. Requested substitution has been coordinated with other portions of the Work.
      g. Requested substitution provides specified warranty.
      h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

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

1.19 SUBMITTAL PROCEDURES

A. Contractor's Review
   1. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Owner`s Representative.

B. Preferred Size for Paper Submittals
   1. Provide paper submittals on sheets no less than 8 ½ x 11” Whenever practical, provide paper submittals on sheet size not greater than 11 x 17”. In all cases ease of readability of submittal content by Engineer shall take precedent over providing information on preferred sheet size.

C. Submittal Procedures
   1. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
      a. Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and

statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

2. Submit three paper copies of each submittal, unless otherwise indicated. The Owner`s Representative will return no copies on any submittals but instead will e-mail a web link to a web site which will host PDFs of the reviewed documents.
3. Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owner`s Representative's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
    a. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Owner`s Representative will advise Contractor when a submittal being processed must be delayed for coordination.
    b. Resubmittal Review: Allow 15 days for review of each resubmittal.
    c. Sequential Review: Where sequential review of submittals by Owner`s Representative's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
4. Owner`s Representative will review each submittal, make marks to indicate corrections or modifications required, and return it. Owner`s Representative will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
    a. REVIEWED – NO COMMENTS
    b. REVIEWED WITH COMMENTS. REVISE & RESUBMIT PRIOR TO START OF WROK.
    c. REVIEVED WITH COMMENTS. PROCEED WITH WORK SUBJECT TO IMPLEMENTATION OF NOTED COMMENTS, REVISE AND RESUBMIT.
    d. NOT ACCEPTED.

1.20 ENVIRONMENTAL PROCEDURES

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

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

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

D. Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
1. Do not pump water containing suspended materials into waterways, sewer or drainage systems.

E. Protect any trees and plants on site and adjacent properties that are in immediate area of construction.
1. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
2. Restrict tree removal to areas indicated or designated by Owner`s Representative.

F. Minimize stripping of topsoil and vegetation.

1.21 WILDLIFE PROTECTION

A. Should nests of migratory birds (Seagulls) be encountered during work, immediately notify Owner’s Representative for directives to be followed.
1. Do not disturb nest site and neighbouring vegetation until nesting is completed.
2. Minimize work immediately adjacent to such areas until nesting is completed.

3. Protect these areas by following recommendations of Canadian Wildlife Service.

1.22 QUALITY REQUIREMENTS

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

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

1.23 REGULATORY REQUIREMENTS

A. Perform Work in accordance with National Building Code of Canada (NBC) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

B. Meet or exceed requirements of:
1. Contract documents.
2. Specified standards, codes, and referenced documents.

1.24 TEMPORARY FACILITIES AND CONTROLS

A. Temporary Utility Installation
1. General: Install temporary service or connect to existing service.
a. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Sanitary Facilities: If the Owner has existing toilet facilities these may be used as long as these facilities are kept cleaned and maintained in a condition acceptable to the Owner. Otherwise provide temporary toilets,

wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

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

B. Operation, Termination, and Removal
    1. Maintain facilities in good operating condition until removal.
    2. Remove each temporary facility when need for its service has ended.

1.25 TEMPORARY BARRIERS AND ENCLOSURES

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

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

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

D. Protection Of Building Finishes

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

1.26 PRODUCT REQUIREMENTS

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

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

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

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

1.27 EXECUTION

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

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

C. Installation
1. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
a. Make vertical work plumb and make horizontal work level.
b. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
c. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
d. Maintain minimum headroom clearance of 2440 mm in occupied spaces and in unoccupied spaces.
2. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
3. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
a. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner`s Representative.

D. Cutting And Patching
1. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
a. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
2. Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

E. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

F. Progress Cleaning
1. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
2. Site: Maintain Project site free of waste materials and debris.

G. Correction Of The Work
1. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
2. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
3. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

H. Protection Of Installed Construction
1. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
2. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1.28 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

A. Waste Reduction
1. Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:

a. Use of a central cutting area to allow for easy access to off-cuts;
b. Use of off-cuts for blocking and bridging elsewhere.
c. Use of effective and strategically placed facilities on site for storage and staging of left-over or partially cut materials (such as gypsum board, plywood, ceiling tiles, insulation etc...) to allow for easy incorporation into

B. Material Source Separation Process
1. Perform demolition and removal of existing building components and equipment following a systematic deconstruction process.
2. Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
a. Reinstallation into the work where indicated.
b. Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
c. Sending as many items as possible to locally available recycling facility.
d. Segregating remaining waste and debris into various individual waste categories for disposal in a *non-mixed state* as recommended by waste processing/landfill sites.

C. Disposal Requirements
1. Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.

1.29 CLOSEOUT PROCEDURES

A. Substantial Completion
1. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
a. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
b. Advise Owner of pending insurance changeover requirements.
c. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
d. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
e. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
f. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
g. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
h. Complete start-up testing of systems.
i. Submit test/adjust/balance records.
j. Terminate and remove temporary facilities from Project site, along with mock-ups, construction tools, and similar elements.
k. Advise Owner of changeover in heat and other utilities.
l. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
m. Complete final cleaning requirements, including touch-up painting.
n. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
2. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Owner`s Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner`s Representative will prepare the Certificate of Substantial Completion after inspection or will notify

Contractor of items, either on Contractor's list or additional items identified by Owner`s Representative, that must be completed or corrected before certificate will be issued.

3. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

B. Final Completion
   1. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
      a. Submit a final Application for Payment according to the General Conditions.
      b. Submit certified copy of Owner`s Representative's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner`s Representative. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
      c. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
      d. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
   2. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Owner`s Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owner`s Representative will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
      a. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

C. Final Cleaning
   1. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
   2. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1.30 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Owner's Representative.
      d. Name of Contractor.
      e. Page number.
   4. Submit list of incomplete items in the following format:
      a. Three paper copies of product schedule or list, unless otherwise indicated.

1.31 WARRANTIES

A. Submittal Time: Submit written warranties on request of Owner's Representative for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

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

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.32 OPERATION AND MAINTENANCE DATA

A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

C. Manual Contents: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

D. Format: Submit operations and maintenance manuals in the following format:
   1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Owner's Representative.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
      b. Enable inserted reviewer comments on draft submittals.

1.33 PROJECT RECORD DOCUMENTS

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

g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Change Directive.
k. Changes made following Owner`s Representative's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

5. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
6. Mark record sets with erasable, red-coloured pencil. Use other colours to distinguish between changes for different categories of the Work at same location.
7. Mark important additional information that was either shown schematically or omitted from original Drawings.
8. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
9. Submit record drawings to Owner`s Representative prior to requesting Substantial Completion inspection.

1.34 DEMOSTRATION AND TRAINING

A. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of maintenance of each item of equipment.

B. Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

C. Review contents of manual in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

E. The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

.1 Types of items described in this Section:
  .1 Administrative and procedural requirements governing allowances.
    .1 Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
  .2 Types of allowances include the following:
    .1 Revise list below to suit Project.
    .2 Lump-sum allowances.
    .3 Unit-cost allowances.
    .4 Quantity allowances.
    .5 Contingency allowances.
    .6 Testing and inspecting allowances.

.2 Types of items you will not find described in this Section:
  .1 Procedures for using unit prices.
  .2 Procedures governing the use of allowances for testing and inspecting.
  .3 Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

.1 At the earliest practical date after award of the Contract, advise Owner's Representative of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

.2 At Owner's Representative's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

.3 Purchase products and systems selected by Owner's Representative from the designated supplier.

1.4 SUBMITTALS

.1 Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

.2 Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

.3 Submit time sheets and other documentation to show labour time and cost for installation of allowance items that include installation as part of the allowance.

.4 Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

.1 Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 QUANTITY ALLOWANCES

.1 Allowance shall include cost to Contractor of specific products and materials selected by Owner's Representative under allowance and shall include freight, and delivery to Project site.

.2 Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labour, installation, overhead and profit, and similar costs related to products and materials selected by Owner's Representative under allowance shall be included as part of the Contract Sum and not part of the allowance.

.3 Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

.1 If requested by Owner's Representative, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 CONTINGENCY ALLOWANCES

.1 Use the contingency allowance only as directed by Owner's Representative for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

.2 Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, insurance, equipment rental, and similar costs.

.3 Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

.4 At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

.5 The cash allowance shall not include HST.

1.8 TESTING AND INSPECTING ALLOWANCES

.1 Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

.2 The allowance does not include incidental labour required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labour to assist the testing agency shall be included in the Contract Sum.

.3 At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

.1 Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
- .1 Include installation costs in purchase amount only where indicated as part of the allowance.
- .2 If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
- .3 Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

.2 Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labour, installation, overhead, and profit.
- .1 Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
- .2 No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

.1 Control Integration Allowance:
- .1 No control integration Allowances apply to this work.

.2 Lump-Sum Allowance:
- .1 No Lump Sum Allowances apply to this Work.

.3 Unit-Cost Allowance:
- .1 No Unit Cost Allowances apply to this Work.

.4 Contingency Allowance:
- .1 Include a contingency allowance of $10,000 for use according to Owner's instructions.

.5 Testing and Inspection Allowance:
- *.1* No testing and Inspection Allowance apply to this Work.

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 by 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 requirments as outlined by the Department of Envrionmental 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 contacts, 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 that 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 (½) 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.areat.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, UA, 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 AWPA - American Wire Producer's Association, 6232 Roudsby, Alexandria, VA U.S.A. 22315-5285 URL http://www.awpa.org

.18 AWPA - 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 48hours 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 for 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 fitments, 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, fitments 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.

1.2 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 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.

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

1.4 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 As recommended by Manufacturer

.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.

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.

PART 3 EXECUTION

3.1 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.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 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 Perform 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.

3.4 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.

3.5 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 SUMMARY

.1 Section includes:

.1 The installation of drainage waste and vent piping – cast iron and copper.

1.2 RELATED SECTIONS

.1 Section 01 35 29.06 - Health and Safety Requirements.

.2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal

.3 Section 23 05 05 - Installation of Pipework.

1.3 REFERENCES

.1 American Iron and Steel Institute (AISI)

.1 AISI 304, Stainless Steel.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM B32, Specification for Solder Metal.
.2 ASTM B306, Specification for Copper Drainage Tube (DWV).
.3 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
.2 CAN/CSA- B125.3, Plumbing Fittings.

1.4 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.

1.5 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.

1.6 SUBMITTALS:

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 PRODUCTS

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary, storm and vent Type DWV to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.

.2 Wrought copper: to CAN/CSA-B125.

.2 Solder: tin-lead, 50:50, type 50A or tin-antimomy only 95:5, type TA to ASTM B32.

PART 3 EXECUTION

3.1 INSTALLATION

.1 In accordance with Section 23 05 05 – Installation of Pipework and by certified journeyperson.

.2 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.

3.2 TESTING

.1 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

.1 Cleanouts:

.1 Ensure accessible

.2 Verify that cleanout rods can probe as far as the next cleanout, at least.

.2 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.3 Affix applicable label (storm, sanitary, vent, pump discharge, etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

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 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.

.24 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.

.25 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.

.26 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 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 As recommended by Manufacturer

.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.

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 journeyperson.

.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 Pipework: 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.

3.13 FIELD PAINTING - Note: this is required

.1 Application Non Insulated HVAC and Hydronic piping.

.2 Clean, pretreat, prime, and paint new systems including, piping, supports, miscellaneous metalwork, and accessories.

.3 Galvanized steel to be left unpainted.

.4 Do not paint over equipment tags or other identification of equipment.

.5 Apply coatings to clean, dry surfaces, using clean brushes.

.6 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.7 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 mil, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 mil.

.8 Shield adjacent surfaces and equipment with protective covering while painting is in progress.

.9 Upon completion of painting, remove protective covering from adjacent surfaces.

.10 Provide primed surfaces with following:

.1 Piping in Finished Areas:

.1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.

.2 Do not paint valves and operating accessories.

.2 Piping in Unfinished Areas:

.1 Provide primed surfaces with one coat of white gloss enamel applied to minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section includes:

.1 Concrete housekeeping pads, 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.

.2 Design rooftop equipment attachments to withstand wind loads for location as per 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, nits, 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/m^3 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 HOUSE-KEEPING PADS

.1 For base-mounted equipment: Concrete, at least 100 mm high, 50 mm larger all around than equipment, and with chamfered edges.

.2 Concrete: to Section 03 30 00 - Cast-in-place Concrete by Division 3.

2.9 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)

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-24.3, Identification of Piping 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

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
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		
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS
Conduit for low voltage control wiring	To Section 25 05 54 – EMCS: Identification	

2.5 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.

2.6 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.

2.7 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 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 Calium 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-6: Flexible unicellular tubular elastomer.

.1 Insulation: with vapour retarder jacket to ASTM C534.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: 0.039 W/m – °C.

.4 To be certified by manufacturer to be free of potential stress corrosion cracking corrodants

.5 Flame spread index less than 25, and smoke developed index less than 50.

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 VAPOUR RETARDER LAP ADHESIVE

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

2.5 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.6 OUTDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m^2.

2.7 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 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.

2.8 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 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.5 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-6.

.1 Insulation securements: as per manufacturer's recommendation.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code: 1501-CA.

.3 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)					
			Run out	*to 1*	*1 1/4 to 2*	*2 1/2 to 4*	*5 to 6*	*8 & over*
Refrigerant hot gas, liquid, suction	4-13	A-6	25	25	25	25	25	25
Refrigerant hot gas, liquid, suction	below4	A-6	25	25	25	25	25	25
Heat traced Cooling Coil cond. Drain		A-6	32	32	32	32	32	32

.4 INSULATION NOTES:

.1 Cover all exposed piping and fittings with insulation. Exposed surfaces may result in localized freezing

.2 Heating trace used on drain piping must operate below 93°C.

.5 Finishes:

.1 Exposed indoors: PVC jacket.

.2 Exposed in cold rooms water proof Aluminium

.3 Outdoors: Water-proof Aluminium

.4 Finish attachments: SS screws or bands, at 150 mm oc. Seals: wing or closed.

.5 Installation: To appropriate TIAC code CPF/1 through CPF/5.

3.6 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 Specialities 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 11 13 – Facility Fuel-Oil Piping.

.6 Section 22 11 18 – Domestic Water Piping Copper.

.7 Section 23 21 13.02 – Hydronic Systems: Steel.

.8 Section 23 23 00 – Copper Tubing and Fittings Refrigerant.

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 circulating pumps as specified in relevant technical sections, recording system pressures, temperatures, fluctuations by simulating maximum design conditions and varying.

.1 Pump operation.

.2 Boiler and/or chiller operation.

.3 Pressure bypass open/closed.

.4 Control pressure failure.

.5 Maximum heating demand.

.6 Maximum cooling demand.

.7 Boiler and/or chiller failure.

.8 Cooling tower (and/or industrial fluid cooler) fan failure.

.9 Outdoor reset. Re-check heat exchanger output supply temperature at 100% and 50% reset, maximum water temperature.

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 Calculate system capacity at test conditions.

.3 Using manufacturer's published data and calculated capacity at test conditions, extrapolate system capacity at design conditions.

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

.5 Submit sample of system water to approved testing agency to determine if chemical treatment is correct. Include cost.

.6 Heating system capacity test:

.1 Perform capacity test when ambient temperature is within 10% of design conditions. Simulate design conditions by:

.1 Increasing OA flow rates through heating coils (in this case, monitor heating coil discharge temperatures at all times to ensure that coils are not subjected to freezing conditions) or

.2 Reducing space temperature by turning off heating system for sufficient period of time before starting testing.

.2 Test procedures:

.1 Open fully heat exchanger, heating coil and radiation control valves.

.2 With boilers on full firing and hot water heating supply temperature stabilized, record flow rates and supply and return temperatures simultaneously.

.3 Conduct flue gas analysis test on boilers at full load and at low fire conditions.

.7 Chilled water system capacity test:

.1 Perform capacity test when ambient temperature is within 10% of design conditions. Simulate design conditions by:

.1 Adding heat from building heating system or

.2 Raising space temperature by turning off cooling and air systems for sufficient period of time before starting testing and pre-heating building to summer design space temperature (occupied) or above. Set OAD and RAD for minimum outside

air if OAT is near outside design temperature or to maximum recirculation if RAT is greater that OAT. RAT to be at least 23^{0}C.

.2 Test procedures:

.1 Open fully cooling coil control valves.

.2 Set thermostats on associated AHU's for maximum cooling.

.3 Set AHU's for design maximum air flow rates.

.4 Set load or demand limiters on chillers to 100%

.5 After system has stabilized, record chilled water, condenser water, etc., flow rates and supply and return temperatures simultaneously.

1.6 CONDENSER WATER AND HUMIDIFICATION SYSTEMS

.1 In addition to procedures specified above, perform following:

.1 Add chemicals once or twice per week as required.

.2 Perform TAB as specified Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.3 Set up and adjust drip feeders, timer controls, and pump strokes as required to maintain required chemical feed rates.

.4 Inject inhibitor into cooling tower sump.

1.7 STEAM SYSTEMS

.1 Performance verification:

.1 When systems are operational, perform relevant tests of steam and condensate return piping systems as specified under hydronic systems.

.2 Verify operation of components of steam system including:

.1 Steam traps by:

.1 Measuring temperature of condensate return and/or using audio-sensing devices.

.2 Use of other approved methods.

.2 Flash tanks.

.3 Thermostatic vents.

.3 Verify performance of condensation units, including:

.1 Pump capacity at design temperature.

.2 Controls.

.4 Verify performance of condensate return system to ensure return of maximum quantity of condensate return water at with minimum temperature drop.

.5 Adjust piping system as required to eliminate water hammer.

.2 Monitor system continuously until acceptance for proper operation components including steam traps, thermostatic vents, flash tanks and condensate pumping units.

1.8 GLYCOL SYSTEMS

.1 Test to prove concentration will prevent freezing to minus 21^0C Test inhibitor strength and include in procedural report. Refer to ASTM E202.

.2 Water used to mix glycol and subsequent top up shall not exceed the following levels;

.1 Chlorides - 25 ppm MAX

.2 Sulfates - 25 Ppm Max

.3 Total hardness as $CaCO_3$ - 100 Max

.4 Water sampling and testing shall be conducted and record provided.

.3 Flush water in the system shall be accounted for in the system fill. Contractor shall produce any and all documentation requested by the Engineer to verify quality.

.4 Manufacturer shall of fluid provide a written summary of mixing procedure and water quality requirements. Should the water quality requirements exceed those listed here the more stringent shall apply.

.5 For 3 years after substantial inspection an annual chemical analysis shall be conducted to determine the glycol content, oxidative degradation, foaming agent concentration, inhibitor concentration, buffer concentration, freezing point, and pH, reserve alkalinity. This shall be conducted by a water treatment specialist company and shall indicate the current measurement and the recommended treatment which shall be administered and shall be retested at a recommended time after the additives has had time to mix.

1.9 POTABLE WATER SYSTEMS

.1 When cleaning is completed and system filled:

.1 Verify performance of equipment and systems as specified elsewhere in mechanical Division.

.2 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor. Repeat for each outlet and flush valve.

.3 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.

.1 Disinfection

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Owner's Representative.

.2 Coordinate with Section 33 11 16 – Site Water Utility Distribution Piping and Section 33 11 16.01 – Incoming Site Water Utility Distribution Piping.

.3 Upon completion, provide laboratory test reports on water quality to Owner's Representative.

.4 Disinfection Process Shall be in accordance with CSA Z317.1 Special Requirements for Pluming Installation in Health Care facilities

.1 The following method shall be used for hot water disinfection (superheating):

.2 The complete hot water system shall be offline and posted due to risk of scalding.

.3 Water shall be superheated to a minimum temperature of 71 °C for at least 30 min, during which time the system shall not be used.

.4 All mixing valves shall be set to 71 to 77 °C. The system temperature shall be held at 71 to 77 °C while each outlet is flushed for a minimum of 5 to 10 min.

.5 The system shall be brought back to normal operating temperatures.

.6 The system shall be flushed until it is free of turbidity.

.7 A minimum of 10 samples shall be taken at the most remote points of the system and tested for growth of micro-organisms.

1.10 WET AND DRY PIPE SPRINKLER SYSTEM, STANDPIPE AND HOSE SYSTEMS

.1 Cleaning, testing, start-up, performance verification of equipment, systems, components, and devices is specified elsewhere in other mechanical Divisions.

.2 Verification of controls, detection devices, alarm devices is specified other mechanical and electrical Divisions.

.3 Demonstrate that fire hose will reach to most remote location regardless of partitions, obstructions, etc.

.4 Verify operation of interlocks between HVAC systems and fire alarm systems.

1.11 SANITARY AND STORM DRAINAGE SYSTEMS

.1 Buried systems: Perform tests prior to back-filling. Perform hydraulic tests to verify grades and freedom from obstructions.

.2 Ensure that traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system.

.4 Operate flush valves, tank and operate each fixture to verify drainage and no leakage.

.5 Cleanouts: Refer to Section 22 42 01 - Plumbing Specialities and Accessories.

.6 Roof drains:

.1 Refer to Section 22 42 01 - Plumbing Specialities and Accessories.

.2 Remove caps as required.

1.12 REPORTS

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

1.13 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 Includes CONTROL AND COMMUNICATION wiring for division 23 refrigeration equipment for environmental room communication and control

.2 All control and communication wiring 50 V and less for equipment supplied by division 23 will be the responsibility of division 23. Conduit and wire associated with this is the responsibility of Division 23.

.3 Refer to refrigeration control detail diagrams

1.2 RELATED SECTIONS

.1 Section 01 11 00 – Summary of Work.

.2 Section 01 73 00 – Execution Requirements.

.3 Section 07 84 00 – Firestopping.

.4 Section 21 05 01 – Common Work Results-Mechanical.

.5 Section 21 07 19 – Thermal Insulation of Piping.

.6 Section 23 05 05 – Installation of Pipework.

.7 Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment.

.8 Section 23 23 00 – Copper Tubing and Fittings Refrigerant.

.9 Section 25 05 01 – EMCS: General Requirements.

.10 Section 26 05 00 – Common Work Results-Electrical.

.11 Section 23 69 00.01 Refrigeration Equipment For Environmental Room

1.3 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.2 ANSI C2, National Electrical Safety Code.

.3 ANSI/NFPA 70, National Electrical Code.

.2 Canadian Standards Association (CSA)

.1 CSA C22.1, Canadian Electrical Code, Part 1.

.2 CAN/CSA C22.3 No.1, Overhead Systems.

.3 CSA C22.3 No. 7, Underground Systems.

1.4 SYSTEM DESCRIPTION

.1 Electrical:

.1 Provide power wiring from emergency power panels where emergency power is provided to EMCS field panels. If no emergency power provided, install UPS Device. Circuits to be for exclusive use of EMCS equipment. Panel breakers to be identified on panel legends tagged and locks applied to breaker switches.

.2 Hard wiring between field control devices and EMCS field panels.

.3 Communication wiring between EMCS field panels and OWS's including main control centre BECC.

.4 Modify existing starters to provide for EMCS as indicated in I/O Summaries and as indicated.

.5 Refer to wiring diagrams included as part of flow diagrams. Trace existing control wiring installation and provide updated wiring schematics including additions and/or deletions to control circuits for approval by Owner's Representative before commencing work.

.6 All control wiring 50 V and less for equipment supplied by Division 25 will be the responsibility of Division 25- Integrated Automation Contractor. Conduit and wire associated with this is the responsibility of Division 25.

.2 Mechanical:

.1 Pipe taps required for EMCS equipment will be supplied and installed by Mechanical Division.

.2 Wells and control valves shall be supplied by EMCS Contractor and installed by Mechanical.

.3 Installation of air flow stations, dampers, and other devices requiring sheet metal trades to be mounted by Mechanical. Costs to be carried by designated trade.

.4 balancing trade.

.3 Structural:

.1 Special steelwork as required for installation of work.

1.5 PERSONNEL QUALIFICATIONS

.1 Qualified factory trained supervisory personnel to:

.1 Continuously direct and monitor all work.

.2 Attend site meetings.

1.6 EXISTING CONDITIONS

.1 Cutting and Patching: refer to Section 01 73 00 – Execution Requirements supplemented as specified herein.

.2 Repair all surfaces damaged during execution of work.

.3 Turn over to Owner's Representative existing materials removed from work not identified for re-use.

PART 2 PRODUCTS

.1 Refrigeration: refer to Section 23 23 00 - Refrigerant Piping.

.2 Sleeves, escutcheons: refer to Section 23 05 05 – Installation of Pipework.

.3 Hangers and supports: refer to Section 23 05 29– Hangers and Supports for HVAC Piping and Equipment.

.4 Insulation: refer to Section 21 07 19 – Thermal Insulation for Piping and 23 07 13 – Thermal Insulation for Ducting.

2.2 SPECIAL SUPPORTS

.1 Structural grade steel, primed and painted after construction and before installation.

2.3 WIRING

.1 As per requirements of Electrical Divisions.

.2 For 50V and above copper conductor with chemically cross-linked thermosetting polyethylene insulation rated RW90 and 600V. Colour code to CSA 22.1.

.3 For wiring under 50 volts use FT6 rated wiring where wiring is not run in conduit. All other cases use FT4 wiring.

.4 Sizes:

.1 120V Power supply: to match or exceed breaker, size #12 minimum.

.2 Wiring for safeties/interlocks for starters, motor control centres, to be stranded, #14 minimum.

.3 Field wiring to digital device: #18AWG or 20AWG stranded twisted pair.

.4 Analog input and output: shielded #18 minimum solid copper or #20 minimum stranded twisted pair. Wiring must be continuous without joints.

.5 More than 4 conductors: #22 minimum solid copper.

.5 Terminations:

.1 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.

2.4 CONDUIT

.1 As per requirements of Electrical Division.

.2 Electrical metallic tubing to CSA C22.2 No. 03. Flexible and liquid tight flexible metal conduit to CSA C22.2 No.56. Rigid steel threaded conduit to CSA C22.2 No. 45.

.3 Junction and pull boxes: welded steel.

.1 Surface mounting cast FS: screw-on flat covers.

.2 Flush mounting: covers with 25 mm minimum extension all round.

.4 Cabinets: sheet steel, for surface mounting, with hinged door, latch lock, 2 keys, complete with perforated metal mounting backboard. Panels to be keyed alike for similar functions and or entire contract as approved.

.5 Outlet boxes: 100 mm minimum, square.

.6 Conduit boxes, fittings:

.1 Bushings and connectors: with nylon insulated throats.

.2 With push pennies to prevent entry of foreign materials.

.7 Fittings for rigid conduit:

.1 Couplings and fittings: threaded type steel.

.2 Double locknuts and insulated bushings: use on sheet metal boxes.

.3 Use factory "ells" where 90 degree bends required for 25 mm and larger conduits.

.8 Fittings for thin wall conduit:

.1 Connectors and couplings: steel, set screw type.

2.5 WIRING DEVICES, COVER PLATES

.1 Conform to CSA.

.2 Receptacles:

.1 Duplex: CSA type 5-15R.

.2 Single: CSA type 5-15R.

.3 Cover plates and blank plates: finish to match other plates in area.

2.6 SUPPORTS FOR CONDUIT, FASTENINGS, EQUIPMENT

.1 Solid masonry, tile and plastic surfaces: lead anchors or nylon shields.

.1 Hollow masonry walls, suspended drywall ceilings: toggle bolts.

.2 Exposed conduits or cables:

.1 50 mm diameter and smaller: one-hole steel straps.

.2 Larger than 50 mm diameter: two-hole steel straps.

.3 Suspended support systems:

.1 Individual cable or conduit runs: support with 6 mm diameter threaded rods and support clips.

.2 Two or more suspended cables or conduits: support channels supported by 6 mm diameter threaded rod hangers.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.

3.2 PIPING

.1 Refrigeration: refer to Section 23 23 00 - Copper Tubing and Fittings Refrigerant..

.2 Insulation: refer to Section 21 07 19 – Thermal Insulation for Piping and 23 07 13 – Thermal Insulation for Ducting.

3.3 MECHANICAL PIPING

.1 Install piping in accordance with Section 23 05 05 – Installation of Pipework.

3.4 SUPPORTS

.1 Install special supports as required and as indicated.

3.5 ELECTRICAL GENERAL

.1 Do complete installation in accordance with requirements of:

.1 Electrical Divisions, this specification.

.2 CSA 22.1 Canadian Electrical Code, latest edition.

.3 ANSI/NFPA 70.

.4 ANSI C2.

.2 Fully enclose or properly guard electrical wiring, terminal blocks, high voltage (above 50 V) contacts and mark to prevent accidental injury.

.3 Do underground installation to CAN/CSA C22.3 No.7, except where otherwise specified.

.4 Conform to manufacturer's recommendations for storage, handling and installation.

.5 Check factory connections and joints. Tighten where necessary to ensure continuity.

.6 Install electrical equipment between 1000 and 2000 mm above finished floor wherever possible and adjacent to related equipment.

.7 Protect exposed live equipment such as panel, mains, outlet wiring during construction for personnel safety.

.8 Shield and mark live parts "LIVE 120 VOLTS" or other appropriate voltage.

.9 Install conduits, and sleeves prior to pouring of concrete.

.10 Holes through exterior wall and roofs: flash and make weatherproof.

.11 Make necessary arrangements for cutting of chases, drilling holes and other structural work required to install electrical conduit, cable, pull boxes, outlet boxes.

.12 Install cables, conduits and fittings which are to be embedded or plastered over, neatly and closely to building structure to minimize furring.

3.6 CONDUIT SYSTEM

.1 Communication wiring shall be installed in conduit. Provide complete conduit system to link Building Controllers to BECC. Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems. Maximum conduit fills not to exceed 40%. Design drawings do not show conduit layout.

.2 Install conduits parallel or perpendicular to building lines, to conserve headroom and to minimize interference.

.3 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Obtain approval from Owner's Representative before starting such work. Provide complete conduit system to link field panels and devices with main control centre. Conduit size to match conductors plus future expansion capabilities as specified.

.4 Locate conduits at least 150 mm from parallel steam or hot water pipes and at least 50 mm at crossovers.

.5 Bend conduit so that diameter is reduced by less than 1/10th original diameter.

.6 Field thread on rigid conduit to be of sufficient length to draw conduits up tight.

.7 Limit conduit length between pull boxes to less than 30 m.

.8 Use conduit outlet boxes for conduit up to 32 mm diameter and pull boxes for larger sizes.

.9 Fastenings and supports for conduits, cables, and equipment:

.1 Provide metal brackets, frames, hangers, clamps and related types of support structures as indicated and as required to support cable and conduit runs.

.2 Provide adequate support for raceways and cables, sloped vertically to equipment.

.3 Use supports or equipment installed by other trades for conduit, cable and raceway supports only after written approval from Owner's Representative.

.10 Install polypropylene fish cord in empty conduits for future use.

.11 Where conduits become blocked, remove and replace blocked sections.

.12 Pass conduits through structural members only after receipt of Owner's Representative's written approval.

.13 Conduits may be run in flanged portion of structural steel.

.14 Group conduits wherever possible on suspended or surface channels.

.15 Pull boxes:

.1 Install in inconspicuous but accessible locations.

.2 Support boxes independently of connecting conduits.

.3 Fill boxes with paper or foam to prevent entry of construction material.

.4 Provide correct size of openings. Reducing washers not permitted.

.5 Mark location of pull boxes on record drawings.

.6 Identify AC power junction boxes, by panel and circuit breaker.

.16 Install terminal blocks or strips indicated in cabinets to Electrical Division.

.17 Install bonding conductor for 120 volt and above in conduit.

3.7 WIRING

.1 Install multiple wiring in ducts simultaneously.

.2 Do not pull spliced wiring inside conduits or ducts.

.3 Use CSA certified lubricants of type compatible with insulation to reduce pulling tension.

.4 Tests: use only qualified personnel. Demonstrate that:

.1 Circuits are continuous, free from shorts, unspecified grounds.

.2 Resistance to ground of all circuits is greater than 50 Megohms.

.5 Provide Owner’s Representative with test results showing locations, circuits, results of tests.

.6 Remove insulation carefully from ends of conductors and install to manufacturer's recommendations. Accommodate all strands in lugs. Where insulation is stripped in excess, neatly tape so that only lug remains exposed.

.7 Wiring in main junction boxes and pull boxes to terminate on terminal blocks only, clearly and permanently identified. Junctions or splices not permitted for sensing or control signal covering wiring.

.8 Do not allow wiring to come into direct physical contact with compression screw.

.9 Install ALL strands of conductor in lugs of components. Strip insulation only to extent necessary for installation.

3.8 WIRING DEVICES, COVER PLATES

.1 Receptacles:

.1 Install vertically in gang type outlet box when more than one receptacle is required in one location.

.2 Cover plates:

.1 Install suitable common cover plate where wiring devices are grouped.

.2 Use flush type cover plates only on flush type outlet boxes.

3.9 STARTERS, CONTROL DEVICES

.1 Install and make control connections as indicated. Power connections above 50V by Electrical Division.

.2 Install correct over-current devices.

.3 Identify each control wire, terminal for external connections with permanent number marking identical to diagram.

.4 Performance Verification:

.1 Operate switches and controls to verify functioning.

.2 Perform start and stop sequences of contactors and relays.

.3 Check that interlock sequences, with other separate related starters, equipment and auxiliary control devices, operate as specified.

3.10 GROUNDING

.1 Install complete, permanent, continuous grounding system for equipment, including conductors, connectors and accessories.

.2 Install separate grounding conductors in conduit within building.

.3 Install ground wire in all PVC ducts and in tunnel conduit systems.

.4 Tests: perform ground continuity and resistance tests, using approved method appropriate to site conditions.

3.11 TESTS

.1 General:

.1 Perform following tests in addition to tests specified Section 25 08 20 - EMCS: Warranty and Maintenance.

.2 Give 14 days written notice of intention to test.

.3 Conduct in presence of Owner’s Representative and authority having jurisdiction.

.4 Conceal work only after tests satisfactorily completed.

.5 Report results of tests to Owner's Representative in writing.

.6 Preliminary tests:

.1 Conduct as directed to verify compliance with specified requirements.

.2 Make needed changes, adjustments, replacements.

.3 Insulation resistance tests:

.1 Megger all circuits, feeders, equipment for 120 - 600V with 1000V instrument. Resistance to ground to be more than required by Code before energizing.

.2 Test insulation between conductors and ground, efficiency of grounding system to satisfaction of Owner's Representative and authority having jurisdiction.

3.12 IDENTIFICATION

.1 Refer to Section 25 05 54- EMCS: Identification.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for copper tubing and fittings for refrigerant.

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 69 00.00 20 Refrigeration Equipment For Cold Storage

.7 SECTION 23 69 00.01 Refrigeration Equipment For Environmental Room

1.3 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.22, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.

.2 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.3 ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.

.4 ASME B31.5, Refrigeration Piping and Heat Transfer Components.

.2 American Society for Testing and Materials(ASTM)

.1 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM B 280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.3 Canadian Standards Association (CSA)

.1 CSA B52, Mechanical Refrigeration Code.

.4 Environment Canada (EC)

.1 EPS1/RA/1, Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 Province of Newfoundland and Labrador Boiler, Pressure Vessel and Compressed Gas Regulations

1.4 SUBMITTALS

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

.2 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Instructions: submit manufacturer's installation instructions.

.5 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 Meeting:

.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.

.3 Trades people to be journeyperson and graduate from a recognized college refrigeration trade program.

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 (WMP).

.4 Separate for reuse and recycling and place in designated containers, steel, metal, 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 TUBING

.1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.

.1 Hard copper: to ASTM B280, type ACR B (nitrogenized).

.2 Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.

2.2 FITTINGS

.1 Service: design pressure 2070 kPa and temperature 121°C.

.2 Brazed:

.1 Fittings: wrought copper to ASME B16.22.

.2 Joints: silver solder, 45% Ag - 80% Cu - 5% P and non-corrosive flux for copper to steel or brass; Silfoss-15 for copper to copper.

.3 Flanged:

.1 Bronze or brass, to ASME B16.24, Class 150 and Class 300, tongue and groove type.

.2 Gaskets: suitable for service.

.3 Bolts, nuts and washers: to ASTM A307, heavy series.

.4 Flared:

.1 Bronze or brass, for refrigeration, to ASME B16.26.

2.3 PIPE SLEEVES

.1 Hard copper or steel, sized to provide 6 mm clearance between sleeve and uninsulated pipe or between sleeve and insulation.

2.4 VALVES

.1 7/8 ODS and under: Class 500, 3.5 MPa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moistureproof seal for below freezing applications, brazed connections.

.2 Over 7/8 ODS: Class 375, 3 MPa, globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and forged brass bonnet, moisture-proof seal for below freezing applications, brazed connections, non-rotating, self aligning swivel disc, Teflon seat, -40^0C - 163^0C.

.3 Ball valves 7 3/8 ODS to 3 1/8 ODS: maximum WP 4MPa, -40^{0}C to 149^{0}C, live loaded stem seal, double "O" ring hermetically sealed body, blowout proof stem, seal cap "O" ring sealed, valve position indicators, forged brass body bonnet, brass cap, triple sealed plated steel item, Teflon ball seals and gasket, extended copper connections, helium leak test to maximum 0.28 g/yr.

.4 Check valves 7/8 ODS to 3 1/8 ODS cast bronze body, brass bonnet, Teflon seat, internal parts removable minimum opening pressure 3.5 kPa, maximum WP 3.5 kPa - 29^{0}C to 149^{0}C, UL and CSA approved.

.5 Check valves 3/8 ODS to 7/8 ODS: brass construction, Teflon seal, removable piston, maximum WP 3.5 kPa, -40^{0}C to 149^{0}C, suitable for high side, low side and hot gas. UL and CSA approved, maximum opening pressure 3.5 kPa.

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 GENERAL

.1 In accordance with Section 23 05 05 – Installation of Pipework, supplemented as specified herein.

.2 Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5.

3.3 BRAZING PROCEDURES

.1 Bleed inert gas into pipe during brazing.

.2 Remove valve internal parts, solenoid valve coils, sight glass.

.3 Do not apply heat near expansion valve and bulb.

3.4 PIPING INSTALLATION

.1 General:

.1 Soft annealed copper tubing: bend without crimping or constriction, hard drawn copper tubing: do not bend. Minimize use of fittings.

.2 Hot gas lines:

.1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.

.2 Provide trap at base of risers greater than 1800 mm high and at each 6000 mm thereafter.

.3 Provide inverted deep trap at top of risers.

.4 Provide double risers for compressors having capacity modulation.

.1 Large riser: install traps as specified above.

.2 Small riser: size for 5.1 m/s at minimum load. Connect upstream of traps on large riser.

3.5 PRESSURE AND LEAK TESTING

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.

.2 Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.

.3 Test Procedure: Build pressure up to 35 kPa using nitrogen leave for 8 hours.

3.6 FIELD QUALITY CONTROL

.1 Site Tests/Inspection

.1 Close service valves on factory charged equipment.

.2 Ambient temperatures to be at least 13 degrees C for at least 12 hours before and during dehydration.

.3 Use copper lines for largest practical size to reduce evacuation time.

.4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5 Pa absolute and filled with dehydrated oil.

.5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.

.6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:

.1 Twice to 14 Pa absolute and hold for 4 h.
.2 Break vacuum with refrigerant to 14 KPa.
.3 Final to 5 Pa absolute and hold for at least 12 h.
.4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
.5 Submit test results to Owner's Representative.

.7 Charging:

.1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
.2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system in fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
.3 Re-purge charging line if refrigerant container is changed during charging process.

.8 Checks:

.1 Make checks and measurements as per manufacturer's operation and maintenance instructions.
.2 Record and report measurements to Owner's Representative.

.9 Manufacturer's Field Services:

.1 Have manufacturer 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 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.

3.7 DEMONSTRATION

.1 Instructions:

.1 Post instructions in frame with glass cover in accordance with Section 01 78 00 – Closeout Submittals and CSA B52.

.1 Perform cleaning operations as specified in Section 01 74 11 – Cleaning and in accordance with manufacturer's recommendations.

.2 On 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 This Section includes performance requirements for the manufactured and fabricated rooms including, but not limited to following:

- .1 Controlled environmental rooms precisely controlled walk-in freezer systems.
- .2 Start-up and field testing of rooms.

.2 Related Requirements: Specifications throughout the entirety of Divisions of this Project are directly applicable to this Section, and this Section is directly applicable to them.

.3 These systems will be installed in existing cold rooms. The owner intends to use these cold room systems over a large range of temperatures. Shop drawing submittals shall clearly identify the range limits that the systems can safely operate in. The included control system shall prevent operation outside of these ranges.

.4 Existing Room Summaries

- .1 Room 1
  - .1 100 mm freezer panel on all sides.
  - .2 Door 1854 mm x 2032 mm with 300 x 350 mm heated window
  - .3 Window 914mm x 914 mm heated window
  - .4 Client will want to shut this room off for extended periods and open the door to let it raise to room temperature.
  - .5 1016 x 2048 mm Interconnecting door with room 2
- .2 Room 2
  - .1 100 mm freezer panel on all sides.
  - .2 Door 1854 mm x 2032 mm with 300 x 350 mm heated window
  - .3 Window 914mm x 914 mm heated window
- .3 Room 3
  - .1 100 mm freezer panel on all sides.
  - .2 Door 1046mm m x 2032 mm with 300 x 350 mm heated window
  - .3 Window 914mm x 914 mm heated window
  - .4 1016 x 2048 mm Interconnecting door with room 2

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 23 00 – Refrigerant Piping

.7 Section 23 05 29 – Hangers and Supports for HVAC Piping

.8 Section 23 09 13 Wiring 50v And Less For Refrigeration Equipment

1.3 REFERENCES

.1 CSA B52 Mechanical refrigeration code

1.4 DEFINITIONS

.1 AEL (Average Effectiveness Level): ratio between total test period less any system downtime accumulated within that period and test period.

.2 Downtime: results whenever EMCS is unable to fulfill required functions due to malfunction of equipment defined under responsibility of EMCS contractor. Downtime is measured by duration, in time, between time that Contractor is notified of failure and time system is restored to proper operating condition. Downtime not to include following:

.1 Outage of main power supply

.2 Functional failure resulting from individual sensor inputs or output devices, provided that:

.1 System recorded said fault.

.2 Equipment defaulted to fail-safe mode.

.3 AEL of total of all input sensors and output devices is at least 99 % during test period.

1.5 SUBMITTALS

.1 Provide submittals in scope and type as appropriate for the work covered by this Section including, but not limited to, product data, Shop Drawings, Samples, and test and evaluations reports, to illustrate material characteristics, details of construction, connections, and relationship with adjacent construction.

.1 Where required by Authorities Having Jurisdiction, or when the work covered by this Section requires structural performance, Shop drawings shall be prepared and stamped by a Professional Engineer licensed to practice in the Province of Newfoundland and carrying professional liability insurance.

.2 Complete engineering shop drawing and equipment cut sheets for approval.

.1 Indicate schematically on P&ID all elements of system including;

.1 Piping sizes, equipment connections

.2 Instrumentation

.3 Valves, equipment,

.4 Sensors

.5 Line voltage power,

.6 Low voltage power

.7 Field wiring

.8 Field assembly

.2 Detailed cooling load calculations for each room and equipment.

.3 Detailed pipe sizing on layout drawing for mechanical contractor fabrication.

1.6 QUALITY ASSURANCE

.1 Equipment manufacturer and installer: the company must have personnel skilled in the manufacturing and installing of prefabricated Environmental Rooms and having continuous proven experience within last five years. All design drawings must be reviewed and approved by on-staff Professional Engineer. Must be able to demonstrate local warranty and service support.

1.7 FACTORY TESTING

.1 Manufacturer shall provide factory test results for the complete refrigeration systems prior to shipping installation.

.2 Cold Test. The factory maximum cold test shall include a 4-hour run test of the complete refrigeration system on a test simulator to replicate actual field operating conditions. The test shall include the following:

.1 Run test of 4-hour duration at the desired setpoint of -20°C for freezer 1, -25°C for freezer 2, -30°C for freezer 3.

.2 Provide a temperature recording from a reliable calibrated source instrument of the actual temperature readings at 10-minute intervals over the full test period. Provide a hard copy recording of the actual test and include model and serial numbers of each unit tested on the chart.

.3 Provide evidence that the room refrigeration system maintained the temperature and tolerance to meet this specification. Test documents to be signed by a registered professional engineer. Provide a documented test report of unit amperage and operational checks. Include a copy of this quality control record in the operation and maintenance manuals.

.4 Owner will be given the option of witnessing and confirming test results. Notify Owner prior to test in writing.

.5 All test results must be presented to the Owner prior to installation and shall bear the stamp of a registered professional engineer employed directly by the environmental room supplier.

.6 Should the systems fail this test, then it will be the full responsibility of the environmental room manufacturer to correct the system design and resubmit for a new test to the owner.

.3 Warm Test. The warm test shall be a similar test to the cold test but where the refrigeration systems operate at their lowest reliable capacity and warmest temperature as indicated in the performance requirements in PART 2.

.1 Run test of 4-hour duration at the desired setpoint of 0°C for freezer 1, -5°C for freezer 2, -5°C for freezer 3.

.2 All durations, and documentation and other requirements of testing and retesting per the cold testing shall apply.

.4 Testing / Field Quality Control

.1 The supplier to complete testing of each room including:

.1 Control Setpoint: Verify temperature control of +/- 0.5C at the room sensor.

.2 Temperature Uniformity: Measure temperature uniformity using 12 sensing points within the chamber. Maximum allowable variation of +/-2C.

.3 Temperature Gradient: Verify that the maximum temperature gradient from floor to ceiling does not exceed 2C.

.4 Recovery test: All rooms shall recover to preset operating temperature within 5 minutes after door has been fully opened for a period of 1 full minute.

1.8 CONTROL AND COMMUNICATION WIRING

.1 All control and communication wiring 50 V and less for equipment supplied by division 23 will be the responsibility of division 23. Conduit and wire associated with this is the responsibility of Division 23.

.2 Refer to refrigeration control detail diagrams

.3 Provide a single point of connection to the control panel terminal blocks with a fused disconnect switch.

.4 The environmental room manufacturer shall make all 50V and less field terminations to their equipment from the control panel.

PART 2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

.1 To define the standard of quality and design desired, laboratory controlled environment room drawings and specifications have been based on the products of the following manufacturers whose products are acceptable:

.1	CANTROL International Inc.	Markham, ON
.2	Environmental Growth Chambers	Chagrin Falls, OH
.3	Harris Environmental Systems, Inc.	Andover, MA
.4	Bahnson Environmental Specialties	Raleigh, NC

2.2 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Major components must have applicable cUL, ULC, CSA, NEMA, and ANSI certifications for motors, compressors, evaporator fan and evaporator coils, condensers, humidification/dehumidification equipment, and control panel assemblies.

.2 Provide refrigeration piping, electrical power wiring, control wiring and connections to all devices which are an integral part of the controlled environment rooms.

.3 Controlled environment rooms equipment shall be furnished and installed as a complete self-contained unit and system, with all controls, balanced air circulation, and all other equipment necessary to reach and record the environmental conditions specified herein.

.4 Walk In Freezer

.1 Temperature Ranges:

.1 Walk-in Freezer 1: 0°C to -20°C +/- 0.5 °C

.2 Walk-in Freezer 2: -5°C to -25°C +/- 0.5 °C

.3 Walk-in Freezer 3: -5°C to -30°C +/- 0.5 °C

.2 Temperature control: +/- 0.5 ºC.

.3 Temperature Uniformity: +/-2 ºC measured at 12 points within room, 300 mm (12 inches) from walls and ceiling.

.4 Defrost excursion: allowable defrost excursion of 6 ºC from room temperature set point allowable during defrost to occur 4-6 times per 24 hours

.5 Humidity Control Operating range: None and not required.

.6 Digital temperature display for both set point and actual conditions. Recording of room temperature. Out of limit alarm system. Provision for remote alarms to the building automation system.

.7 Design conditions outside of environmental room: 28ºC dry bulb max and 22ºC max wet bulb

.8 Number of door openings per 24 hours: 12 times per 24 hours

.9 Average duration for each door opening and closing: 20 seconds

.10 Product load

.1 Freezer 1: 500lbs of steel equipment 12 hour pull down.

.2 Freezer 2: 750L of water entering at 15°C, 48 hour pull down.

.3 Freezer 3: 100L of at 15°C water spray per hour, 1 hour pull down.

.1 loads will vary greatly in the use of this room and this system is split into two evaporator/condenser systems under 1 controller to better manage the wide variation.

.11 Allow miscellaneous load of 750 watts.

.12 Provide an overall safety factor on loads and equipment selection of 20%.

.13 Lighting thermal load assume Lighting assume 10.78 w/m2 (1w/ft2)

.14 Support service:

.15 Type required: Standard response - within 4 hours. Environmental Room supplier to demonstrate local service response capability.

2.3 REFRIGERATION SYSTEM

.1 The environmental rooms are to have a refrigeration system located on the building roof.

.2 Cooling systems to be air cooled for operating on R448A with a Global Warming Potential of 1273. The condenser is built into the refrigeration system.

.3 Unit coolers for rooms 1 and 2 to be ceiling mounted inside the room with built-in TX valve with auxiliary port for hot gas bypass, defrost heaters and drain pan.

.4 Unit coolers for room 3 to be ceiling mounted inside the room with built-in TX valve with auxiliary port for hot gas bypass, defrost heaters and drain pan.

.1 Isolation valves factory mounted for all refrigeration fixture and pressure vessels.

.5 Refrigeration equipment: specifically designed, engineered, manufactured, and of adequate capacity to fulfill individual room operating temperature and performance. The equipment selection and sizing shall be the responsibility of the environmental (refrigeration system) room supplier. The supplier must provide evidence of all cooling or heating loads and equipment selections to the base building engineers.

.1 The refrigeration system shall be able to maintain the conditions of the room at all times.

.2 Cooling system requirements:

.1 Condensing units shall be outdoor air cooled, complete with scroll compressor, automatic high- and low-pressure controls, liquid receiver with 10% safety capacity, suction accumulator, crankcase pressure regulator, drier and sight glass mounted on common base with spring isolation for the compressor. Compressors shall be furnished to operate on 575V/3Ph/60Hz. Rubber isolation on the compressor to minimize noise transmission. Provide NEMA4X electrical disconnect switch. Provide liquid line, hot gas line and suction lines and insulate where required. System to be designed with halogen free low GWP R448A refrigerant. System breaker in the local control panel.

.2 Walk-in style unit coolers with: forced convection fans, drain pan and a factory mounted adjustable thermostatic expansion valve, with strainer, hot gas inlet tee and be externally equalized. Air circulation motors: shall be ball bearing, 40°C rated lifetime sealed and shall be designed to operate at schedule indicated voltages . Provide electronic liquid line and hot gas valves designed for 0% to 100% capacity control.

.3 Isolation valves factory mounted for all refrigeration fixture and pressure vessels

.4 System controlled by the temperature control system as listed in 2.4 Control Panel and Instrumentation.

.5 The system shall be capable of maintaining each room at a user selectable temperature within the ranges identified in the design and performance requirements.

2.4 CONTROL PANEL AND INSTRUMENTATION

.1 Control panel: Each control panel, incorporating lockable access doors to house the temperature controller and relays for the system operation. Provide keyed switch in the door panel for secured access to the stop and start switch.

.1 Electronic solid-state time proportioning temperature controller and recorder in a single controller. Temperature sensor to be a Class A PT 100-ohm sensor and wall mounted.

.2 Fully active 100mm minimum colour touch screen LCD display. All programming through active display.

.3 Set point shall be through digital control and readout shall be in degrees Celsius. Controller shall simultaneously display actual condition and user defined set-point.

.4 Indicating lights for cooling, heating, high temperature alarm and low temperature alarm and alarm silenced.

.5 Integral battery backup for control system with built in charger for battery. Audible and visual power failure alarm

.6 Door ajar alarm imbedded in controller.

.7 Audible, adjustable high and low temperature alarms with acknowledge button. Alarm set points to be adjustable as stated herein.

.8 Recording to be achieved through the colour display and scaled graphically with user definable set points.

.9 Control panels pre-wired and tested. Panels shall include Electrical Safety Authority certificate.

.2 User Interface

.1 Control package including a Temperature control system complete with HMI LCD touch screen windows-based interface, Ethernet communication, real time clock, and capacity for 100 programs, multilevel security access, and data logging capability.

.2 Alarm and emergency stop messages complete with alarm history tracing.

.3 Digital Timer for automatic programmed automatic start-up.

.4 Ethernet connection point at top of Control Panel

.3 Main Controller

.1 Micro-processer-based temperature controller with:

.1 Digital color displays of room temperature and set point temperature.

.2 PID Control.

.3 High and Low Temperature audible and visual alarms.

.4 Independent High and low temperature safety shut-off controls.

.5 Communications: Ethernet and 485 communications for remote monitoring.

.6 Provision for remote alarm contacts for BACnet IP.

.7 Controllers to be password protected.

.4 Communications:

.1 Ethernet using TCP/IP interface for remote access to run, reset or initialize a user defined program. Full read and write capability.

.2 RS232 and RS485 communications port.

.5 All wiring to be concealed in panduit and all circuit breakers, relays and electrical devices to be rail mounted.

.1 Conduits, wires and connections to control panel shall be concealed by control panel or accessory panels. Exposed conduits are not permitted.

.2 Control panel shall contain all DIN rail mounted circuit breakers for the refrigeration unit and evaporator, door heaters, lights, control panel control circuit, spares and built-in wall mounted GFI receptacles. All wiring shall be concealed in panduit with cover. Maintain separate sources of power and control wiring.

.3 Control panel shall measure no more than 460mm wide, 1070mm high and 150mm deep. Baked white paint over steel to match the white room panel finish. Located on the front of the freezer rooms.

.4 Locate sensor to detect average temperature within room and to be protected against damage.

.6 High/Low temperature safety alarms:

.1 High and low temperature safety alarm system: integrated in temperature controller and sensor, individually adjustable, microprocessor based, for providing activation for audible and visual alarms, and corrective action.

.2 High and low temperature controllers: complete with digital readouts and simultaneously display actual room condition, set point and differential. The independent controller shall be capable of measuring and controlling between –200°C to 850°C with a positive coefficient platinum type of 4.8 ohms per degree F and accurate to 0.90C. Provide digital LCD display indicating setpoint, differential, output and channel in operation. Provide minimum of 4 temperature channels with fully adjustable temperature setpoint in degrees F or C with adjustable differential and normally open or normally closed contacts per channel.

.1 Channel 1 – low temperature alarm – stage one level

.2 Channel 2- high temperature alarm - stage one level

.3 Channel 3 – extreme low temperature alarm – stage two level

.4 Channel 4 – extreme high temperature alarm – stage two level

.7 Safety alarms: adjustable within 0.1º C of desired operating temperature. Alarm system shall shut off heat producing equipment, except safety lighting in event of high temperature alarm, and shut off heat removing equipment in event of low temperature alarm.

.1 Provide two (2) extra dry contacts each (one normally closed, one normally open) for connection to central building alarm and/or monitoring system.

.2 Alarm system shall also include an adjustable silence feature for audible alarm. Provide a timed lockout function on the audible portion of the alarm only. A push button to alarm silence shall provide an adjustable timed silence with an automatic electronic latch to energize the audible horn upon time out of the latch. Timer must be adjustable between 1 and 10 hours.

.3 Provide dry contacts for high and low alarms to enable connection to the central building automation system by Division 16.

2.5 OPTIONS AND ACCESSORIES

.1 Include the following options and accessories and all labour for each system:

.1 Condenser

.1 Hot gas bypass Capacity control

.2 Adjustable high and low electronic head pressure control

.3 Oil separator with filter and solenoid

.4 Compressor time delay relay

.5 Receiver
.6 Liquid line filter and sight glass
.7 Crank case pressure regulator and suction line accumulator
.8 EC fan Motors
.9 Hot gas bypass tee and shutoff valve
.10 E coated condenser coils

.2 Evaporator
.1 TXV Evaporator control
.2 Solenoid valves on liquid and hot gas line
.3 Stainless casing
.4 E coated evaporator coils suitable for salt water spray
.5 Heated and insulated drain pan
.6 Defrost electronic controllers for freezer evaporators

2.6 REFRIGERATION PIPING

.1 The refrigeration piping indicated on the drawings shall be provided and installed by the division 23 mechanical contractor.

.2 Supplier to verify that the specified piping (size, quantity, routing) is suitable for their refrigeration equipment and refrigerant.

.3 Any changes required to the piping to accommodate the supplied equipment are the responsibility of the environmental room equipment supplier.

.4 Any adjustments to the piping such as changes in size, routing, quantity, inclusion of oil traps, etc to accommodate the supplied equipment shall be the responsibility of the environmental room equipment supplier. This is inclusive of insulation and jacketing.

.5 The environmental room equipment supplier shall bear all costs associated with modifying the piping to meet the requirements of their specific equipment.

2.7 DRAIN LINES AND HEATERS

.1 Provide drain lines from unit cooler located on the ceiling of the environmental room to adjacent floor drain. Heat tracing for the section of the drain inside the freezer by Division 26.

2.8 SERVICES

.1 Provide reinforcement for wall penetrations as recommended by wall system manufacturer. Other trades shall be responsible to seal their own penetrations.

.2 Electrical wiring and components: to CSA standards.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install materials and systems in accordance with manufacturer's instructions, CAN/CGSB 52.28. reviewed submittals, industry best practices. Install materials and systems in proper relation with adjacent construction. Coordinate with other work.

.2 Reuse penetrations where possible coordinate with General contractor. General contactor shall seal all penetrations and make watertight, with insulating foam, silicone, and 304 stainless steel escutcheon plates.

.3 Equipment shall be installed with manufacturer supervision. This supervision may be provided remotely using video calling/facetime. Communication and direction from the manufacturer on the installation shall be documented by the contractor and shared with the engineer within 7 days of the communication.

.4 Start up of and testing of the systems shall be undertaken with manufacturer personnel present on site, allow for 3 days on site for startup and testing.

3.2 TESTING AND COMMISSIONING FIELD QUALITY CONTROL

.1 48 hour Installation testing.

.1 After installation, the manufacturer shall provide commissioning reports similar to that of the factory testing but shall be for a duration of 48 hours.

.2 30 Day test to demonstrate that systems functions in accordance with contract requirements.

.1 Prior to beginning of 30 day test demonstrate that operating parameters (setpoints, alarm limits, operating control software, sequences of operation, trends, graphics) have been implemented to ensure proper operation and operator notification in event of off-normal operation.

.1 Repetitive alarm conditions to be resolved to minimize reporting of nuisance conditions.

.2 Test to last at least 30 consecutive 24 hour days.

.1 Temperatures to run as follows for the test

.1 10 days at the coldest then

.2 5 days at mid range then

.3 5 days at warmest then

.4 5 days at mid range then

.5 5 days at the coldest

.3 Tests to include:

.1 Demonstration of correct operation of monitored and controlled points.

.2 Operation and capabilities of sequences, reports, special control algorithms, diagnostics, software.

.4 System will be accepted when:

.1 Equipment operates to meet overall performance requirements. Downtime as defined in this specification must not exceed 7.5 hrs allowable time calculated for this site.

.2 Requirements of Contract have been met.

.3 In event of failure to attain specified AEL during test period, extend test period on day-to-day basis until specified AEL is attained for test period.

.4 Correct defects when they occur and before resuming tests.

.5 Contractors Commissioning Co-ordinator and Owner to verify reported results.

.5 At end of 30 day period provide summary report for each system

.1 Provide temperature trends for each system vs set point and a summary report of any down time or any issues.

3.3 CLOSEOUT ACTIVITIES

.1 Manufacturer shall instruct Owner in the complete operation of room, including controls, after completion of room start-up.

.1 Provide as built of system and O&M manuals at completion of testing.

.2 Provide a draft training outline 4 weeks prior to proposed training date for Owner comments. Owner shall return comments within 1 week.

.3 Provide training materials and O&M manual as part of the training two weeks prior to the training.

.4 Provide 4 hours of demonstration and instruction on each type of unit furnished, using manufacturer's representative.

.5 Provide Operation and Maintenance manual indicating sequential operation, start-up, and shut-down, and preventative maintenance, with all pertinent control data, schematics, test results, quality control documents and as built drawings.

.6 Provide a 2 hour refresher demonstration 6 months after substantial completion. This may be done with the contractor present on site and the manufacturer attending remotely.

3.4 WARRANTY

.1 Manufacturer shall provide written warranty to the Owner stating the product is free from defects in material or workmanship under normal use and service. Warranty shall become effective on the date of Substantial Completion. The warranty shall cover the following items for the noted duration:

.1 One (1) year parts warranty

.2 One (1) year labor warranty

.3 Five (5) years parts and labor on the compressor(s).

3.5 ISSUANCE OF FINAL CERTIFICATE OF COMPLETION

.1 Final Certificate of Completion will not be issued until receipt of written approval from the manufacturer indicating successful completion of specified testing/commissioning activities including receipt of testing/commissioning documentation.

Memorial University of Newfoundland

S.J. CAREW BUILDING
FACULTY OF ENGINEERING & APPLIED SCIENCE)
THERMAL LAB UPGRADES

MAY 17, 2024

ISSUED FOR REVIEW

LIST OF DRAWINGS

EN-189-21 - ISSUED FOR REVIEW

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

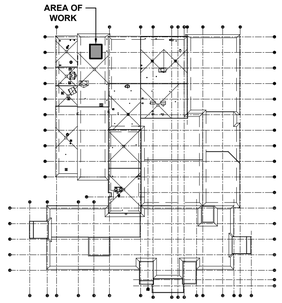
MEMORIAL
UNIVERSITY

GENERAL NOTES:

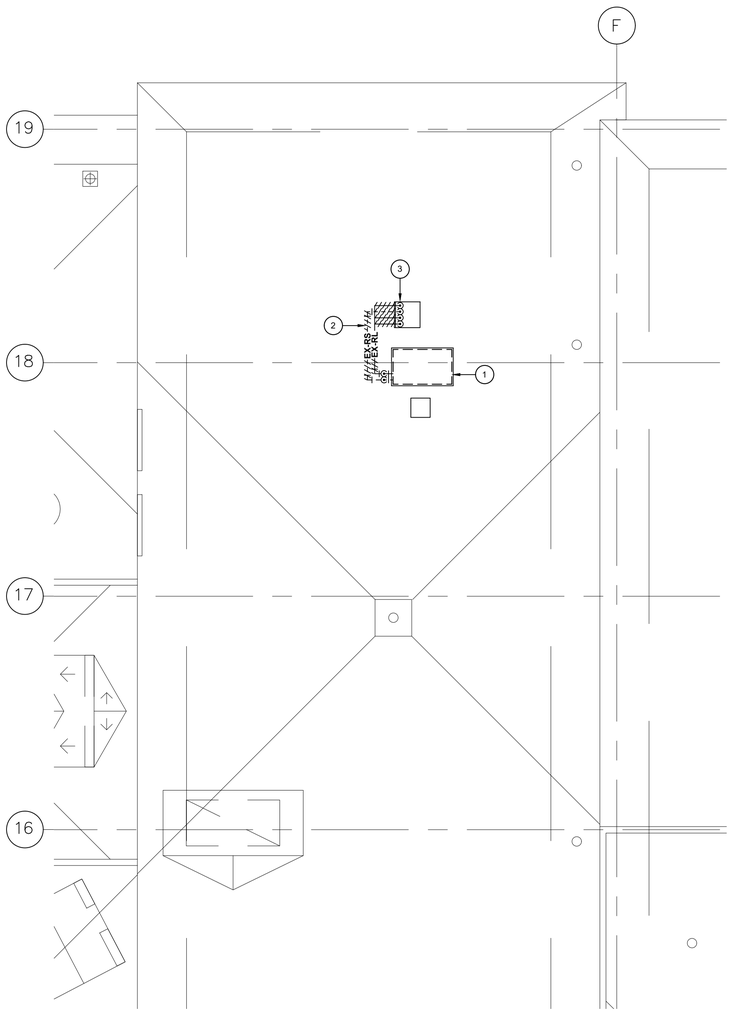
1. CONTRACTOR TO CONFIRM EXACT PIPING LAYOUTS AND EQUIPMENT LOCATIONS ON SITE BEFORE COMMENCING ANY DEMOLITION. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING ALL EXISTING SYSTEMS WHICH MAY BE AFFECTED BY THE WORK, AND REMOVE/MODIFY IN AN APPROVED MANNER TO ALLOW FOR A COMPLETE WORKING SYSTEM.
2. GENERAL CONTRACTOR SHALL COORDINATE SERVICES DISRUPTIONS AND SYSTEM SHUT DOWNS WITH OWNER.
3. CONTRACTOR TO REMOVE, RECOVER AND DISPOSE OF ALL REFRIGERANT IN ACCORDANCE WITH AUTHORITY HAVING JURISDICTION. PROVIDE DISPOSAL REPORT OUTLINING ALL PROCEDURES.
4. ALL EQUIPMENT BEING REMOVED SHALL BE TURNED OVER TO OWNER DURING DEMOLITION. IF OWNER DOES NOT WANT ANY EXISTING EQUIPMENT, CONTRACTOR WILL BE RESPONSIBLE FOR REMOVING ALL MATERIALS FROM SITE AND DISPOSE AS PER LOCAL CODES.
5. ALL PIPING AND INSULATION SHALL HAVE A SMOKE FLAME SPREAD RATING OF 50, 25.
6. CONTRACTOR TO BE RESPONSIBLE FOR ANY CUTTING AND PATCHING OF ANY EXISTING EQUIPMENT, WALLS, CEILINGS, AND PIPING DISTURBED AS PART OF THIS SCOPE. ANY REPAIRS SHALL BE MADE TO BE MATCH EXISTING BUILDING CONDITIONS.

DRAWING NOTES:

1. EXISTING ROOF MOUNTED CONDENSING UNIT TO BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH WITH AUTHORITY HAVING JURISDICTION.
2. REFRIGERATION LIQUID AND SUCTION PIPING C/W INSULATION TO BE REMOVED.
3. REFRIGERATION LIQUID AND SUCTION PIPING DOWN THROUGH ROOF TO BELOW TO BE REMOVED.



S.J. CAREW BUILDING - KEY PLAN (ROOF)



PARTIAL ROOF PLAN - MECHANICAL DEMOLITION LAYOUT

SCALE : 1:100

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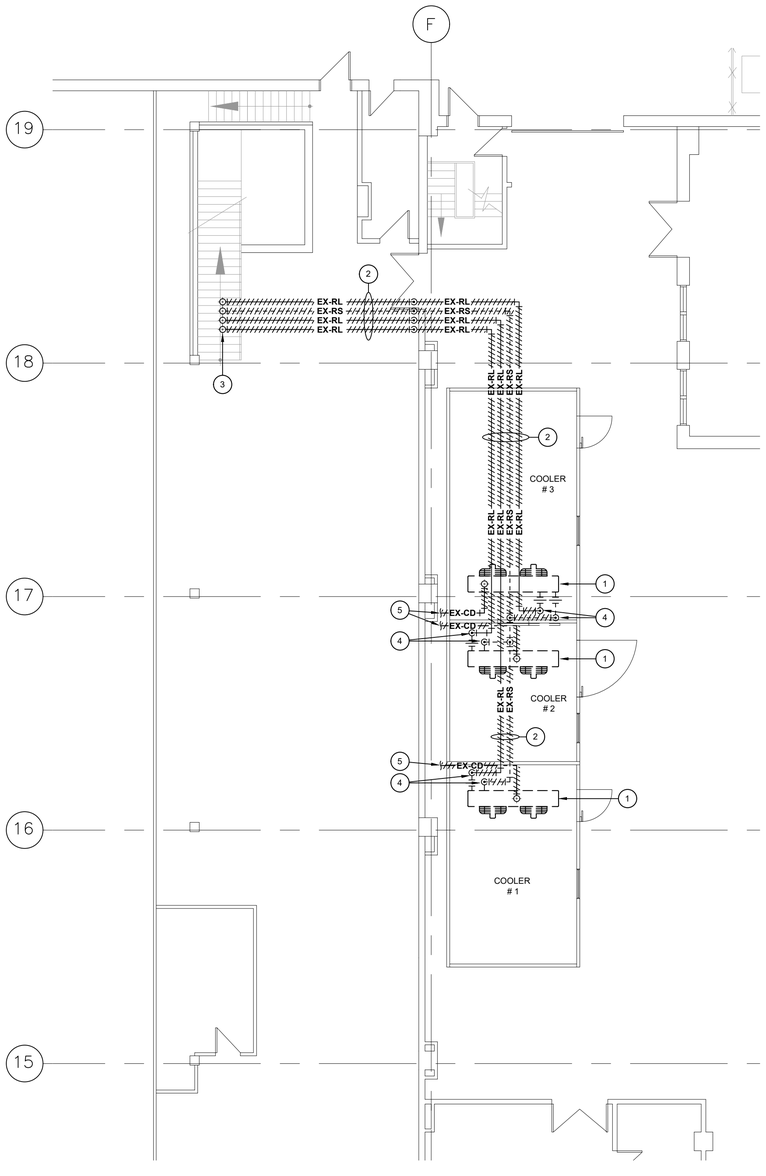

PARTIAL LEVEL 1 FLOOR PLAN - MECHANICAL DEMOLITION LAYOUT

SCALE : 1:100

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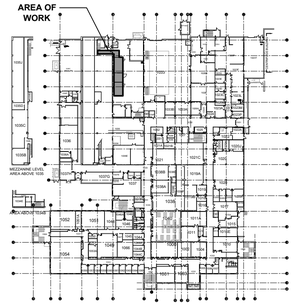

S.J. CAREW BUILDING - KEY PLAN (LEVEL 1)

GENERAL NOTES:

1. CONTRACTOR TO CONFIRM EXACT PIPING LAYOUTS AND EQUIPMENT LOCATIONS ON SITE BEFORE COMMENCING ANY DEMOLITION. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING ALL EXISTING SYSTEMS WHICH MAY BE AFFECTED BY THE WORK, AND REMOVE/MODIFY IN AN APPROVED MANNER TO ALLOW FOR A COMPLETE WORKING SYSTEM.
2. GENERAL CONTRACTOR SHALL COORDINATE SERVICES DISRUPTIONS AND SYSTEM SHUT DOWNS WITH OWNER.
3. CONTRACTOR TO REMOVE, RECOVER AND DISPOSE OF ALL REFRIGERANT IN ACCORDANCE WITH AUTHORITY HAVING JURISDICTION. PROVIDE DISPOSAL REPORT OUTLINING ALL PROCEDURES.
4. ALL EQUIPMENT BEING REMOVED SHALL BE TURNED OVER TO OWNER DURING DEMOLITION. IF OWNER DOES NOT WANT ANY EXISTING EQUIPMENT, CONTRACTOR WILL BE RESPONSIBLE FOR REMOVING ALL MATERIALS FROM SITE AND DISPOSE AS PER LOCAL CODES.
5. ALL PIPING AND INSULATION SHALL HAVE A SMOKE FLAME SPREAD RATING OF 50, 25.
6. CONTRACTOR TO BE RESPONSIBLE FOR ANY CUTTING AND PATCHING OF ANY EXISTING EQUIPMENT, WALLS, CEILINGS, AND PIPING DISTURBED AS PART OF THIS SCOPE. ANY REPAIRS SHALL BE MADE TO BE MATCH EXISTING BUILDING CONDITIONS.

DRAWING NOTES:

1. EXISTING EVAPORATOR UNIT LOCATED INSIDE OF COOLER TO BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH WITH AUTHORITY HAVING JURISDICTION.
2. REFRIGERATION LIQUID AND SUCTION PIPING C/W INSULATION & PIPE HANGERS RUNNING AT HIGH LEVEL JUST BELOW ROOF TO BE REMOVED.
3. REFRIGERATION LIQUID AND SUCTION PIPING UP THROUGH ROOF TO CONDENSING UNIT TO BE REMOVED.
4. REFRIGERATION LIQUID AND SUCTION PIPING DOWN THROUGH CEILING OF COOLER TO EVAPORATOR UNIT TO BE REMOVED.
5. EXISTING CONDENSATE DRAIN PIPING FROM EVAPORATOR TO DRAIN TO BE REMOVED.

A / B — A - DETAIL
B - LOCATION/DRAWING No.
C - DRAWING No.

A / B C

No.	REVISION	DATE (Y/M/D/)
B	ISSUED FOR REVIEW	24/05/17
RA	ISSUED FOR CONCEPT REPORT	23/10/20

GENERAL NOTES

1. DRAWINGS TO BE READ AS A SET.
2. DO NOT SCALE FROM DRAWINGS.
3. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO SUBMISSION OF TENDERS.
4. 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.

PROVINCE OF NEWFOUNDLAND
pegnl — PERMIT HOLDER
This Permit Allows
CORE ENGINEERING INC.
MIRC: 03823
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEGNL D0209
which is valid for the year 2023.

MECHANICAL & ELECTRICAL CONSULTANT:
CORE ENGINEERING INC.
57 Pippy Place
ST. John's, NL, Canada A1B 4H8
Tel (709)722-8613
Fax (709)722-0910

NORTH

MEMORIAL UNIVERSITY

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:

S.J. CAREW BUILDING (FACULTY OF ENGINEERING & APPLIED SCIENCE) THERMAL LAB MECHANICAL UPGRADES
Project #: EN-189-21

DRAWING TITLE:

MECHANICAL DEMOLITION

DESIGNED:	DRAWN:
DE	JS
REVIEWED:	APPROVED:
DE	DE
SCALE:	DATE:
AS NOTED	2023/10/20
PROJECT No.	DRAWING No.
EN-189-21	M-1.0

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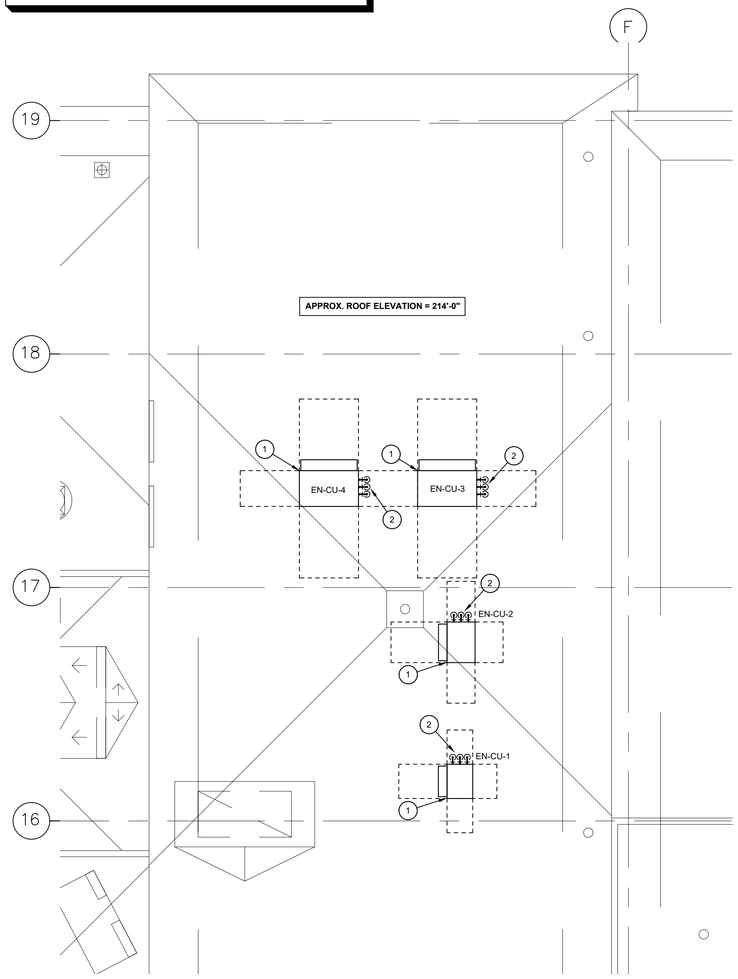
7. ALL REFRIGERANT LINE SIZING AND TRAPPING SHALL BE THE RESPONSIBILITY OF THE MANUFACTURER TO ENSURE ALL VELOCITIES AND OIL RETURN IS OPTIMAL FOR THEIR SYSTEM INCLUDING THAT OF THE HOT GAS BYPASS. LINE SIZES SHOWN ON DRAWINGS ARE CONNECTION SIZE ONLY.

DRAWING NOTES:

1. NEW CONDENSING UNIT MOUNTED ON ROOF. SEE DETAIL 3/3.0
2. REFERIGERATION PIPING DOWN THROUGH ROOF CURB TO LEVEL 1 BELOW. SEE LEVEL 1 FLOOR PLAN FOR CONTINUATION. SEE DETAIL 2/3.0



PARTIAL ROOF PLAN - NEW MECHANICAL LAYOUT

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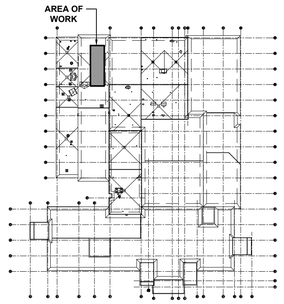
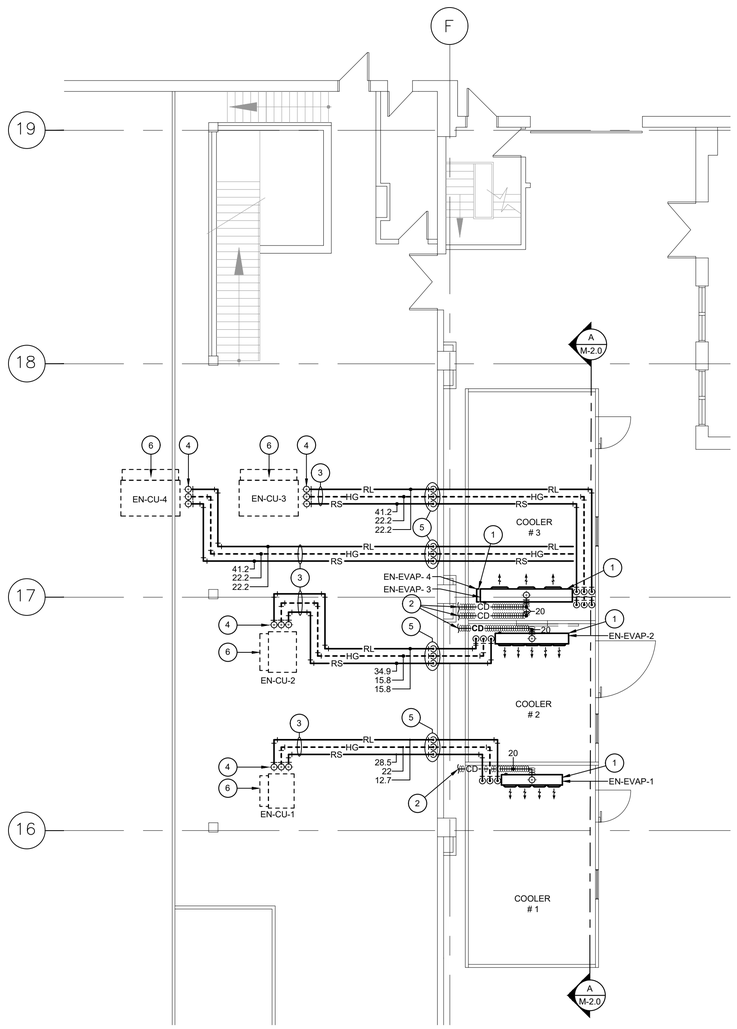


S.J. CAREW BUILDING - KEY PLAN (ROOF)



PARTIAL LEVEL 1 FLOOR PLAN - NEW MECHANICAL LAYOUT

SCALE : 1:100

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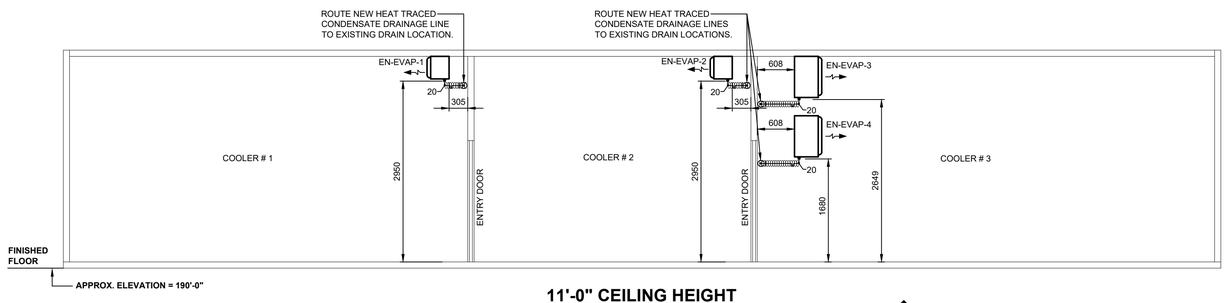

11'-0" CEILING HEIGHT

COOLER SECTIONS - MECHANICAL LAYOUT

SCALE: 1:50

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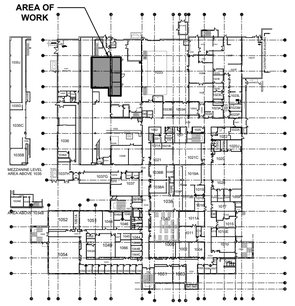
A / M-2.0



S.J. CAREW BUILDING - KEY PLAN (LEVEL 1)

GENERAL NOTES:

1. CONTRACTOR TO CONFIRM EXACT PIPING LAYOUTS AND EQUIPMENT LOCATIONS ON SITE BEFORE COMMENCING ANY DEMOLITION. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING ALL EXISTING SYSTEMS WHICH MAY BE AFFECTED BY THE WORK, AND REMOVE/MODIFY IN AN APPROVED MANNER TO ALLOW FOR A COMPLETE WORKING SYSTEM.
2. GENERAL CONTRACTOR SHALL COORDINATE SERVICES DISRUPTIONS AND SYSTEM SHUT DOWNS WITH OWNER.
3. CONTRACTOR TO REMOVE, RECOVER AND DISPOSE OF ALL REFRIGERANT IN ACCORDANCE WITH AUTHORITY HAVING JURISDICTION. PROVIDE DISPOSAL REPORT OUTLINING ALL PROCEDURES.
4. ALL EQUIPMENT BEING REMOVED SHALL BE TURNED OVER TO OWNER DURING DEMOLITION. IF OWNER DOES NOT WANT ANY EXISTING EQUIPMENT, CONTRACTOR WILL BE RESPONSIBLE FOR REMOVING ALL MATERIALS FROM SITE AND DISPOSE AS PER LOCAL CODES.
5. ALL PIPING AND INSULATION SHALL HAVE A SMOKE FLAME SPREAD RATING OF 50, 25.
6. CONTRACTOR TO BE RESPONSIBLE FOR ANY CUTTING AND PATCHING OF ANY EXISTING EQUIPMENT, WALLS, CEILINGS, AND PIPING DISTURBED AS PART OF THIS SCOPE. ANY REPAIRS SHALL BE MADE TO MATCH EXISTING BUILDING CONDITIONS.

DRAWING NOTES:

1. NEW EVAPORATOR TO BE INSTALLED INSIDE OF EXISTING COOLER. EVAPORATOR TO BE INSTALLED AS HIGH AS POSSIBLE. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2. ROUTE CONDENSATE DRAIN FROM NEW EVAPORATOR TO EXISTING DRAIN LOCATIONS. PROVIDE HEAT TRACE ON CONDENSATE PIPING.
3. REFRIGERATION PIPING RUNNING UP HIGH IN SPACE SUSPENDED FROM BUILDING STRUCTURE. SEE DETAIL 1/3.0
4. REFRIGERATION PIPING RUNNING UP THROUGH ROOF CURB TO CONDENSING UNITS LOCATED ON ROOF. SEE DETAIL 2/3.0
5. REFRIGERANT PIPING TO DROP DOWN FROM HIGH ROOF AREA AND ROUTE TO EVAPORATOR UNITS AS INDICATED.
6. OUTLINE OF CONDENSING UNIT ON ROOF ABOVE.

A - DETAIL
B - LOCATION/DRAWING No.
C - DRAWING No.

A / B / C

No.	REVISION	DATE (Y/M/D/)
B	ISSUED FOR REVIEW	24/05/17
RA	ISSUED FOR CONCEPT REPORT	23/10/20

GENERAL NOTES

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4. 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.

PROVINCE OF NEWFOUNDLAND
pegnl
PERMIT HOLDER
This Permit Allows
CORE ENGINEERING INC.
MIRC: 03823
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEGNL D0209 which is valid for the year 2023.

MECHANICAL & ELECTRICAL CONSULTANT:
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57 Pippy Place
ST. John's, NL, Canada A1B 4H8
Tel (709)722-8613
Fax (709)722-0910

NORTH

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Department of Facilities Management

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

PROJECT NAME:

S.J. CAREW BUILDING (FACULTY OF ENGINEERING & APPLIED SCIENCE) THERMAL LAB MECHANICAL UPGRADES
Project #: EN-189-21

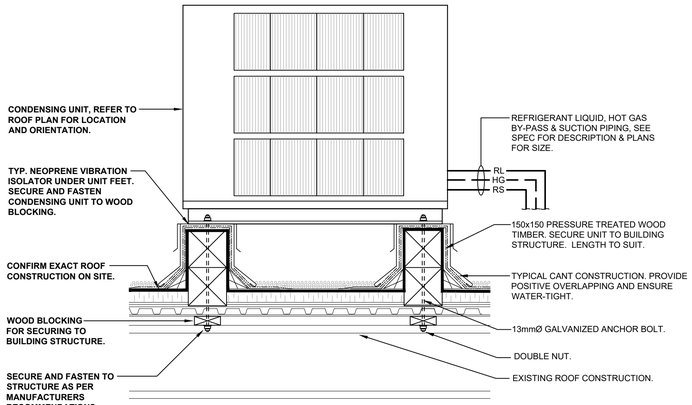
DRAWING TITLE:

NEW MECHANICAL LAYOUT

DESIGNED:	DRAWN:
DE	JS
REVIEWED:	APPROVED:
DE	DE
SCALE:	DATE:
AS NOTED	2023/10/20
PROJECT No.	DRAWING No.
EN-189-21	M-2.0

MECHANICAL LEGEND

PIPING TO BE REMOVED	
EX-RS	EXISTING REFRIGERATION SUCTION PIPING
EX-RL	EXISTING REFRIGERATION LIQUID PIPING
EX-CD	EXISTING CONDENSATE DRAIN PIPING
HG	NEW HOT GAS BYPASS PIPING
RL	NEW REFRIGERATION LIQUID PIPING
RS	NEW REFRIGERATION SUCTION PIPING
CD	NEW CONDENSATE DRAIN PIPING
NEW PIPE HEAT TRACING	
PIPE DROP	
PIPE RISE	
EXISTING EQUIPMENT TO BE REMOVED	



NOTES:
1. THIS CONTRACTOR TO INSTALL AS PER MANUFACTURERS RECOMMENDATIONS.
2. REFER TO SHOP DRAWINGS FOR EXACT CONNECTION LOCATION, JUNCTION BOXES & PIPE SIZES.
3. REFER TO SHOP DRAWINGS FOR UNIT DIMENSIONS.
4. ALL REFRIGERANT PIPING TO BE INSULATED AND EXPOSED PIPING TO HAVE ALUMINUM JACKETING.

CONDENSING UNIT MOUNTING DETAIL

SCALE: N.T.S.

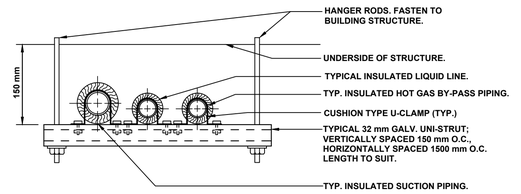
3 / 3.0

PIPING ROOF SUPPORT DETAIL

SCALE: N.T.S.

4 / 3.0

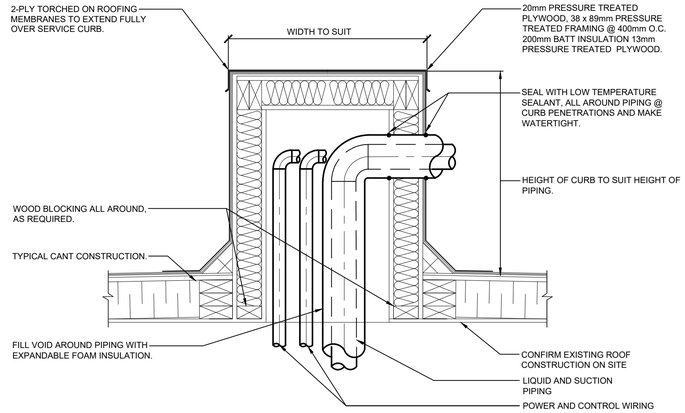
NOTE
1. CONTRACTOR TO SUPPLY & INSTALL COPPER PIPE CLAMPS ON SUCTION & LIQUID LINES TO FASTEN PIPES TO UNI-STRUT. INSTALL RUBBER BAND AROUND PIPES AT THE HANGERS
2. CONFIRM NUMBER OF PIPES WITH FLOOR PLAN LAYOUT.



TYPICAL REFRIGERANT PIPING SUPPORT DETAIL

SCALE: N.T.S.

1 / 3.0



PIPE CURB DETAIL

SCALE: N.T.S.

2 / 3.0

CONDENSING UNIT SCHEDULE

TAG	SERVING	MANUFACTURER	MODEL No.	RATING CAPACITY (kW)	SPACE TEMP (°C)	REFRIGERANT	UNIT WEIGHT (kg)	POWER V/PH/CYC	MCA	MOCP	NOTES
EN-CU-1	COOLER #1	TRENTON REFRIGERATION PRODUCTS	TEZA055L8-HT5D	5.87	-20	R448A	199.5	575/3/60	8.9	15	C/W WEATHERPROOF FUSED DISC. SWITCH, WIND GUARD, LOW NOISE OPTION, E-COAT COILS.
EN-CU-2	COOLER #2	TRENTON REFRIGERATION PRODUCTS	TEZA075L8-HT5D	6.99	-25	R448A	224.5	575/3/60	12.3	20	C/W WEATHERPROOF FUSED DISC. SWITCH, WIND GUARD, LOW NOISE OPTION, E-COAT COILS.
EN-CU-3	COOLER #3	TRENTON REFRIGERATION PRODUCTS	TEZA170L8-HT5D	12.25	-30	R448A	433.1	575/3/60	31.4	50	C/W WEATHERPROOF FUSED DISC. SWITCH, WIND GUARD, LOW NOISE OPTION, E-COAT COILS.
EN-CU-4	COOLER #3	TRENTON REFRIGERATION PRODUCTS	TEZA170L8-HT5D	12.25	-30	R448A	433.1	575/3/60	31.4	50	C/W WEATHERPROOF FUSED DISC. SWITCH, WIND GUARD, LOW NOISE OPTION, E-COAT COILS.

NOTES:
1. COOLING CAPACITY BASED ON 35 °C EXT. AMBIENT TEMPERATURE.
2. UNITS TO HAVE HEAVY PRE-PAINTED STEEL ENCLOSURE
3. UNITS TO HAVE SCROLL HERMETIC COMPRESSOR WITH SOUND INSULATION.
4. UNITS TO HAVE EXTENDED 4YR WARRANTY
5. UNITS TO HAVE HEATED RECEIVER
6. UNITS C/W HOT GAS CAPACITY CONTROL.
7. UNITS C/W ADJUSTABLE HEAD PRESSURE CONTROL.
8. UNITS C/W OIL SEPARATOR.
9. UNITS C/W TIME DELAY RELAY.
10. UNITS C/W RECEIVER.
11. UNITS C/W SIGHT GLASS.
12. UNITS C/W DRIER.
13. UNITS C/W EXPANSION VALVE.
14. UNITS C/W LIQUID LINE SOLENOID.
15. UNITS C/W HOT GAS VALVES.
16. UNITS C/W CRANK CASE PRESSURE REGULATOR.

EVAPORATOR SCHEDULE

TAG	SERVING	MANUFACTURER	MODEL No.	NET COOLING CAPACITY (kW)	SPACE TEMP (°C)	REFRIGERANT	AIRFLOW (L/s)	UNIT WEIGHT (kg)	POWER V/PH/CYC	MCA	MOCP	ELECTRIC DEFROST POWER V/PH/CYC	MCA	MOCP	NOTES
EN-EVAP-1	COOLER #1	TRENTON REFRIGERATION PRODUCTS	TLP421LE-T3D	6.33	-20°C	R448A	1284	65.77	208/1/60	2.6	15	208/1/60	12.5	15	CEILING MOUNTED EVAPORATOR COIL WITH THERMAL EXPANSION VALVE, HEATED AND INSULATED DRAIN PAN, AUXILIARY SIDE PORT CONNECTION AND ELECTRIC DEFROST HEATERS.
EN-EVAP-2	COOLER #2	TRENTON REFRIGERATION PRODUCTS	TLP526LE-S2D	7.52	-25°C	R448A	1605	79.8	208/1/60	3.2	15	208/1/60	23.9	25	CEILING MOUNTED EVAPORATOR COIL WITH THERMAL EXPANSION VALVE, HEATED AND INSULATED DRAIN PAN, AUXILIARY SIDE PORT CONNECTION AND ELECTRIC DEFROST HEATERS.
EN-EVAP-3	COOLER #3	TRENTON REFRIGERATION PRODUCTS	TMP347LE-I3D	12.35	-30°C	R448A	4295	159.6	208/3/60	7.2	15	208/3/60	33	35	CEILING MOUNTED EVAPORATOR COIL WITH THERMAL EXPANSION VALVE, HEATED AND INSULATED DRAIN PAN, AUXILIARY SIDE PORT CONNECTION AND ELECTRIC DEFROST HEATERS.
EN-EVAP-4	COOLER #3	TRENTON REFRIGERATION PRODUCTS	TMP347LE-I3D	12.35	-30°C	R448A	4295	159.6	208/3/60	7.2	15	208/3/60	33	35	CEILING MOUNTED EVAPORATOR COIL WITH THERMAL EXPANSION VALVE, HEATED AND INSULATED DRAIN PAN, AUXILIARY SIDE PORT CONNECTION AND ELECTRIC DEFROST HEATERS.

NOTES:
1. PROVIDE DEFROST ELECTRONIC CONTROLLER FOR FREEZER EVAPORATOR.
2. PROVIDE SPACE THERMOSTAT WITH ADJUSTABLE SETPOINT AND LCD DISPLAY
3. PROVIDE LIQUID LINE SOLENOID VALVES
4. TO HAVE ECM MOTORS WITH SMART SPEED
5. UNITS C/W E COATED COILS.
6. UNITS C/W STAINLESS STEEL CABINET FOR ANTI CORROSION APPLICATION (SEA WATER).
7. UNITS C/W HEATED DRAIN LINE.

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PROJECT NAME:

S.J. CAREW BUILDING (FACULTY OF ENGINEERING & APPLIED SCIENCE) THERMAL LAB MECHANICAL UPGRADES
Project #: EN-189-21

DRAWING TITLE:

MECHANICAL SCHEDULES, DETAILS & LEGEND

DESIGNED:	DRAWN:
DE	JS
REVIEWED:	APPROVED:
DE	DE
SCALE:	DATE:
AS NOTED	2023/10/20
PROJECT No.	DRAWING No.
EN-189-21	M-3.0

ELECTRICAL SPECIFICATION

1.0 GENERAL:

1.1 COMPLETE ELECTRICAL INSTALLATION SHALL CONFORM TO THE CANADIAN ELECTRICAL CODE C22.1–21 AND LOCAL BYLAWS CURRENTLY IN FORCE IN THE PROVINCE AND MUNICIPALITY.

1.2 ALL WORK SHALL BE PERFORMED BY PERSONNEL HAVING QUALIFICATIONS AS REQUIRED BY AN AUTHORITY HAVING JURISDICTION WHO ARE COMPETENT IN THEIR TRADE.

1.3 BEFORE SUBMITTING A PROPOSAL FOR THE WORK COVERED BY THE SPECIFICATIONS, EACH BIDDER SHALL VISIT AND INSPECT THE SITE OF THE PROPOSED WORK IN ORDER THAT THEY MAY BE THOROUGHLY FAMILIAR WITH THE SITE AND LOCAL CONDITIONS, WITH THE CHARACTER AND DETAIL OF THE BUILDING CONSTRUCTION AND WITH ALL MATTERS WHICH CAN, IN ANY WAY, AFFECT THE WORK COVERED BY THE SPECIFICATIONS. MAKE ALLOWANCE FOR REMOVAL OF EXISTING POWER/LIGHTING AND SYSTEMS THAT INTERFERES WITH NEW WORK. NO CLAIM WILL BE ENTERTAINED FOR ANY LABOR, MATERIALS OR OTHER EXTRAS THAT MAY BE REQUIRED FOR THE PROPER EXECUTION AND COMPLETION OF THE CONTRACT WHICH COULD HAVE BEEN DETERMINED BY SITE EXAMINATION.

1.4 PAYMENT FOR PERMITS AND DEPOSITS FOR THE WORK SHALL BE INCLUDED IN THE TENDER PRICE.

1.5 USE ONLY NEW CSA APPROVED MATERIALS EXCEPT WHERE SPECIFICALLY NOTED.

1.6 THE CONTRACTOR SHALL GUARANTEE ALL NEW MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM DATE OF COMPLETION OF THE WORK AND FINAL ACCEPTANCE BY THE OWNER.

1.7 SHOP DRAWINGS SHOWING THE DESIGN AND CONSTRUCTION OF ALL APPARATUS SHALL BE PROVIDED. ELECTRONIC COPIES OF DRAWINGS SHALL BE SUBMITTED FOR EXAMINATION. ALL SHOP DRAWINGS TO INCLUDE ELECTRICAL SUBCONTRACTORS REVIEW STAMP, NAME OF PROJECT AND SIGNATURE INDICATING ITEM HAS BEEN REVIEWED BY ELECTRICAL SUBCONTRACTOR PRIOR TO SUBMISSION. IF CORRECTIONS ARE REQUIRED, COPIES WILL BE RETURNED WITH CORRECTIONS NOTED. INCLUDE SHOP DRAWINGS FOR THE FOLLOWING:

.1 PANEL BOARDS
.2 TRANSFORMERS
.3 DISCONNECTS
.4 CIRCUIT BREAKERS

1.8 PROVIDE "AS–BUILT" DRAWINGS TO INDICATE ACTUAL CIRCUIT NUMBERS TO ALL ELECTRICAL EQUIPMENT SHOWN ON THE DRAWINGS AND ALL EXISTING REMAINING EQUIPMENT.

1.9 THIS CONTRACTOR SHALL PROVIDE PROPER PROTECTION FOR ALL EQUIPMENT, FIXTURES, MATERIALS, ETC. DURING THE CONSTRUCTION PERIOD. UPON COMPLETION OF THE WORK ALL PROTECTIVE MATERIALS, DIRT, RUBBISH AND DEBRIS DUE TO THE WORK SHALL BE REMOVED FROM THE SITE.

1.10 CONTRACTOR SHALL SUPPLY AND INSTALL ALL MATERIALS EXCEPT AS OTHERWISE SPECIFIED.

1.11 IDENTIFY ELECTRICAL EQUIPMENT WITH LAMACOID NAMEPLATES 3mm THICK PLASTIC ENGRAVING SHEET, BLACK FACE, WHITE CORE, MECHANICALLY ATTACHED WITH SELF TAPPING SCREWS. WORDING ON NAMEPLATES AND LABELS TO BE APPROVED BY ENGINEER BEFORE MANUFACTURE.

1.12 CSA AND MANUFACTURERS LABELS MUST BE VISIBLE AND LEGIBLE AFTER EQUIPMENT IS INSTALLED.

2.0 COORDINATION

2.1 COORDINATE WORK WITH WORK OF OTHER DIVISIONS TO AVOID CONFLICT.

2.2 LOCATE DISTRIBUTION SYSTEMS, EQUIPMENT AND MATERIALS TO PROVIDE MINIMUM INTERFERENCE AND MAXIMUM USABLE SPACE.

2.3 WHERE INTERFERENCE OCCURS, OWNER MUST APPROVE RELOCATION OF EQUIPMENT AND MATERIALS REGARDLESS OF INSTALLATION ORDERS.

2.4 NOTWITHSTANDING THE REVIEW OF SHOP DRAWINGS, THIS DIVISION MAY BE REQUIRED TO RELOCATE ELECTRICAL EQUIPMENT WHICH INTERFERES WITH THE EQUIPMENT OF OTHER TRADES, DUE TO LACK OF COORDINATION BY THIS DIVISION. THE COST OF THIS RELOCATION SHALL BE THE RESPONSIBILITY OF THIS DIVISION. THE OWNER SHALL DECIDE THE EXTENT OF THE RELOCATION REQUIRED.

3.0 SAFETY

3.1 NO WORK SHALL BE CARRIED OUT ON ANY LIVE EQUIPMENT. DISCONNECT POWER COMPLETELY TO ALL EQUIPMENT BEFORE PROCEEDING WITH WORK ON THAT EQUIPMENT. UTILIZE LOCK–OUTS & TAG–OUTS ON ALL EQUIPMENT WHICH IS BEING WORKED ON.

4.0 WORK IN EXISTING AREAS:

4.1 THE CONTRACTOR SHALL DISCONNECT AND REMOVE ALL ELECTRICAL DEVICES NOT BEING REUSED, AND TURN OVER TO OWNER'S REPRESENTATIVE ON SITE.

4.2 IN AREAS WHERE EXISTING DEVICES ARE BEING REMOVED, THE CONTRACTOR SHALL ENSURE THAT A SAFE AND WORKING SYSTEM IS MAINTAINED TO ALL REMAINING DEVICES.

4.3 THE ELECTRICAL CONTRACTOR SHALL CLEAN AND REFURBISH ALL EXISTING DEVICES THAT ARE TO REMAIN AND/OR BE RELOCATED. EXTEND CONDUIT AND WIRE TO SUIT.

4.4 IF ANY CIRCUITS ARE DAMAGED OR INTERRUPTED DURING CONSTRUCTION, CIRCUITS SHALL BE EXTENDED AND RECONNECTED AS REQUIRED TO MAINTAIN EXISTING DEVICES AND EQUIPMENT IN SERVICE.

4.5 RELOCATE ALL EXISTING JUNCTION BOXES, CONDUITS, DEVICES, ETC. AS REQUIRED TO ACCOMMODATE DEMOLITION OF EXISTING AND CONSTRUCTION OF NEW WALL & CEILING ASSEMBLIES.

GENERAL CONTROL NOTES:

1. ALL CONTROL WIRING 50 VOLTS & LESS TO BE SUPPLIED AND INSTALLED BY MECHANICAL.
2. MECHANICAL CONTRACTOR TO PROVIDE ALL CONTROL TRANSFORMERS AND RELAYS AS REQUIRED TO COMPLETE ALL CONTROLS.

5.0 DEMOLITION:

5.1 PERFORM ALL REQUIRED DEMOLITION. DO NOT LEAVE POWERED WIRING EXPOSED IN DEMOLISHED AREAS.

5.2 VISIT SITE TO DETERMINE FULL EXTENT OF DEMOLITION WORK.

5.3 REMOVE ALL ELECTRICAL EQUIPMENT DEEMED OBSOLETE BY RENOVATION.

5.4 OWNER TO HAVE FIRST RIGHT OF REFUSAL FOR ALL EQUIPMENT BEING REMOVED. ALL OTHER OBSOLETE ELECTRICAL EQUIPMENT TO BE REMOVED FROM SITE BY DIVISION 26.

5.5 REMOVE WIRING ASSOCIATED WITH OBSOLETE ELECTRICAL EQUIPMENT BACK TO SOURCE.

6.0 FIRE RATING PENETRATIONS:

6.1 MAINTAIN FIRE RATING AROUND CONDUITS PASSING THROUGH WALLS AND CEILINGS.

6.2 USE 3M BRAND, OR EQUAL, FIRE BARRIER PRODUCTS AT EACH PENETRATION.

6.3 STANDARD OF ACCEPTANCE FOR FIRE BARRIER PRODUCTS SHALL BE 3M #CP25 FIRE BARRIER CAULK, #303 PUTTY, #FS195 WRAP AND #CS195 SHEET.

7.0 WIRING METHODS:

7.1 FOR GENERAL PURPOSE WIRING: RW90 COPPER CONDUCTORS IN EMT CONDUIT FOR FEEDERS.

7.2 UTILIZE CONCRETE OR MASONRY BOXES AS APPROPRIATE.

7.3 USE TYPE TW INSULATED GREEN GROUND/BOND CONDUCTOR IN ALL CONDUITS FOR CIRCUITS OPERATING AT OVER 30 VOLTS.

7.4 THE ELECTRICAL WIRING SYSTEM AND VARIOUS ELECTRICAL EQUIPMENT TO BE GROUNDED IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE C22.1–21. PROVIDE GROUND WIRE IN ALL CONDUITS.

7.5 EXCEPT AS NOTED RUN ALL CONDUIT PARALLEL AND PERPENDICULAR TO BUILDING LINES. SUPPORT ALL CONDUIT USING APPROVED STRAPS AND HANGARS. TIE WIRE IS NOT ACCEPTABLE FOR SUPPORTING CONDUIT.

7.6 WIRE AND CABLES TO BE RUN CONCEALED AT ALL TIMES, UNLESS OTHERWISE STATED.

7.7 MINIMUM WIRE SIZE: #12 AWG. MINIMUM CONDUIT SIZE: 21mm.

7.8 PERFORM SPLICES ON #8 AWG AND SMALLER WIRES USING 3M–SCOTHLOC OR IDEAL–WIRENUT CONNECTORS.

7.9 LUGS, TERMINALS AND SCREWS USED FOR TERMINATION OF WIRING TO BE SUITABLE FOR EITHER COPPER OR ALUMINUM CONDUCTORS.

8.0 WIRING DEVICES:

8.1 120V RECEPTACLES: SPEC GRADE 15 AND 20 AMP DUPLEX U–GROUND TYPE. STANDARD OF ACCEPTANCE: HUBBELL BR SERIES.

8.2 COVER PLATE: WHITE NYLON OR AS INDICATED.

9.0 OUTLET BOXES

9.1 BOXES ARE TO BE FLUSH MOUNTED.

9.2 WHERE DEVICES ARE SHOWN GROUPED, MOUNT BOXES WITH MAXIMUM 50mm SPACING. PROVIDE ADDITIONAL BLOCKING AS REQUIRED.

9.3 DO NOT INSTALL OUTLETS BACK TO BACK IN WALL. ALLOW MINIMUM 150mm HORIZONTAL CLEARANCE BETWEEN BOXES.

10.0 DISCONNECT SWITCHES

101.1 HEAVY DUTY DISCONNECT SWITCHES ABLE TO BE PADLOCKED INTO ON OR OFF POSITION WITH 3 LOCKS, LEVER HANDLE.

10.2 ENCLOSURE: NEMA 1 FOR INTERIOR, NEMA 3R FOR EXTERIOR.

10.3 FUSIBLE OR NON–FUSIBLE AS INDICATED.

10.4 IDENTIFICATION AS PER 1.11.

10.5 MECHANICALLY INTERLOCKED DOOR.

11.0 PANEL BOARDS – BREAKER TYPE

11.1 PANEL BOARDS

.1 ALL PANEL BOARDS MUST BE AS PER CSA C22.2 NO.29, AND PRODUCT OF ONE MANUFACTURER.

.2 ALL NEW PANEL BOARDS IN THE WORK AREA TO BE PAINTED AS FOLLOWS. PROVIDE NEW LAMACOID LABELS FOR ALL PANEL BOARDS:

EQUIPMENT SYSTEM	COLOR	PANTONE
12500+ V NORMAL	BRIGHT YELLOW	12–0752 BUTTERCUP
4160V ESSENTIAL	DARK ORANGE	17–1461 ORANGEADE
480 TO 600V NORMAL	LIGHT BLUE	13–5410 ICED AQUA
480 TO 600V ESSENTIAL	DARK BLUE	17–4530 BARRIER REEF
120 TO 240V NORMAL	LIGHT GREEN	14–0425 BEACHNUT
120 TO 240V ESSENTIAL	DARK GREEN	18–0430 AVOCADO
FIRE ALARM	BRIGHT RED	–

.3 SEQUENCE THE PHASE BUSSING WITH THE ODD NUMBERED BREAKERS ON THE LEFT AND THE EVEN NUMBERED BREAKERS ON THE RIGHT, WITH EACH BREAKER BEING IDENTIFIED BY A PERMANENT NUMBER IDENTIFICATION AS TO THE CIRCUIT NUMBER AND PHASE.

.4 PROVIDE THE PANEL BOARDS WITH THE MAINS RATINGS, THE NUMBER OF CIRCUITS, AND THE NUMBER AND SIZE OF THE BRANCH CIRCUIT BREAKERS AS INDICATED.

.5 PROVIDE TWO (2) KEYS FOR EACH PANELBOARD WITH A DOOR.

.6 PROVIDE A COPPER MAIN BUS OF THE VOLTAGE AND AMPERE RATINGS AS INDICATED.

.7 PROVIDE A FULL SIZE NEUTRAL FOR 600V BOARDS WHERE IT IS REQUIRED ON THE DRAWING.

.8 PROVIDE BOLT–ON BRANCH BREAKERS AS INDICATED.

.9 PROVIDE COPPER GROUND BUS.

.10 HOT–DIP GALVANIZE THE PANELBOARD TUBS AFTER FABRICATION OR ACID ETCH, PRIME AND APPLY TWO (2) FINISH COATS OF AIR DRIED ASA 61 GREY ENAMEL TO THEM.

.11 ACID ETCH, PRIME AND APPLY TOW (2) FINISH COATS OF AIR DRIED ASA 61 GREY ENAMEL TO THE PANELBOARD TRIMS AND DOORS EXCEPT AS OTHERWISE INDICATED.

.12 PROVIDE DOORS WITH CONCEALED HINGES, LOCKS AND HARDWARE FOR ALL PANEL BOARDS, EXCEPT FOR DISTRIBUTION PANEL BOARDS UNLESS OTHERWISE INDICATED. FOR RECESSED PANEL BOARDS, PROVIDE CHROME PLATED HARDWARE WHERE EXPOSED.

11.2 BREAKERS

.1 PROVIDE MOLDED CASE CIRCUIT BREAKER (BOLT–ON OR PLUG–ON CONNECTION AS INDICATED), QUICK–MAKE–QUICK–BREAK TYPE, FOR MANUAL AND AUTOMATIC OPERATION WITH TEMPERATURE COMPENSATION FOR 40 DEGREE CELSIUS AMBIENT AS INDICATED.

.2 PROVIDE MULTI–POLE BREAKERS WITH A COMMON–TRIP DEVICE AND SINGLE HANDLE.

.3 PROVIDE A SEPARATELY MOUNTED MAIN BREAKER, WHERE INDICATED, AT THE TOP OR THE BOTTOM OF THE PANELBOARD TO SUIT THE CABLE ENTRY. WHEN MOUNTED VERTICALLY, THE HANDLE'DOWN' POSITION SHOULD BE THE 'OPEN' POSITION.

.4 PROVIDE PADLOCKING DEVICES ON CIRCUIT BREAKERS WHERE NOTED TO LOCK THE HANDLE OF A BREAKER IN THE 'ON' OR 'OFF' POSITION WITH THE TRIP UNITS TO REMAIN FREE TO FUNCTION AND PROTECT THE CIRCUIT FROM BOTH OVERLOAD AND SHORT CIRCUIT CONDITIONS.

.5 PROVIDE LOCK–ON DEVICES FOR BRANCH BREAKERS CONTROLLING FIRE ALARM, CLOCK OUTLET, EMERGENCY, DOOR SUPERVISORY, INTERCOM, STAIRWAY, EXIT, SHUNT TRIP AND NIGHT LIGHT CIRCUITS AND AS INDICATED.

.6 PROVIDE MOLDED CASE CIRCUIT BREAKERS TO OPERATE AUTOMATICALLY BY MEANS OF THERMAL AND MAGNETIC TRIPPING DEVICES TO PROVIDE AN INVERSE TIME VS. CURRENT TRIPPING CHARACTERISTICS.

.7 WHERE A 15A OR 20A CIRCUIT BREAKER IS USED AS THE ONLY SWITCHING DEVICE FOR LUMINARIES, THE CIRCUIT BREAKER SHALL BE SUITABLE FOR SWITCHING DUTY AND SHALL BE MARKED "SWD".

11.3 EQUIPMENT IDENTIFICATION

.1 PROVIDE A SIZE 8 NAMEPLATE FOR EACH PANELBOARD ENGRAVED AS INDICATED.

.2 PROVIDE A SIZE 8 NAMEPLATE FOR EACH CIRCUIT IN DISTRIBUTION PANEL BOARDS ENGRAVED AS INDICATED. PROVIDE A COMPLETE TYPEWRITTEN CIRCUIT DIRECTORY WITH A CLEAR PLASTIC COVER SHOWING THE LOCATION AND LOAD OF EACH CIRCUIT FOR ALL OTHER PANEL BOARDS.

.3 FOR DISTRIBUTION PANEL BOARDS, PROVIDE LAMACOID NAMEPLATES NEXT TO EACH CIRCUIT BREAKER, ENGRAVED WITH THE NAME OF THE LOADS SUPPLIED BY THE CIRCUIT BREAKER.

11.4 INSTALLATION

.1 LOCATE PANEL BOARDS AS INDICATED AND MOUNT SECURELY, PLUMB, TRUE AND SQUARE, TO ADJOINING SURFACES.

.2 INSTALL SURFACE MOUNTED PANEL BOARDS ON PLYWOOD BACKBOARDS. WHERE PRACTICAL, GROUP PANEL BOARDS, AND OTHER ELECTRICAL EQUIPMENT IF PRESENT ON COMMON BACKBOARD

.3 MOUNT THE PANEL BOARDS 60" (1500MM) ABOVE THE FINISHED FLOOR LEVEL TO THE PANELBOARD CENTERLINE UNLESS OTHERWISE INDICATED. WHERE TWO (2) OR MORE DIFFERENT SIZE PANEL BOARDS ARE INSTALLED ADJACENT TO EACH OTHER, ALIGN THE TOPS OF THE PANEL BOARDS TO SUIT THE TALLEST PANELBOARD.

.4 CONNECT THE LOADS TO THE BRANCH BREAKERS AS INDICATED.

.5 CONNECT THE NEUTRAL CONDUCTORS TO THE COMMON NEUTRAL BUS.

.6 CONNECT THE ISOLATED GROUND CONDUCTORS TO THE ISOLATED GROUND BUS, IF PROVIDED.

.7 CONNECT THE MAIN FEEDER TO THE MAIN LUGS OR TO THE MAIN BREAKER AND TO THE NEUTRAL BUS AND THE ISOLATED GROUND BUS, IF PROVIDED

12.0 DRY TYPE TRANSFORMERS:

12.1 DRY TYPE TRANSFORMERS TO BE ALUMINUM WINDING, THREE–CORE DESIGN TO CSA C802.2–06, TYPE ANN.

12.2 RATING: KVA AS INDICATED; 3 PHASE; 600Vac DELTA PRIMARY; 120/208Vac WYE SECONDARY C/W STANDARD TAPS.

12.3 ENCLOSURE: SPRINKLER PROOF.

12.4 INSULATION: CLASS H, 150°C TEMPERATURE RISE.

12.5 COLOR TO BE AS PER 11.1.2, BASED ON PRIMARY VOLTAGE.

13.0 EXECUTION

13.1 INSTALL MATERIALS IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

13.2 PROVIDE INSPECTION CERTIFICATE UPON COMPLETION OF THIS WORK.

13.3 FIELD QUALITY CONTROL:

.1 CONDUCT THE FOLLOWING TESTS:

.1 POWER DISTRIBUTION SYSTEM INCLUDING PHASING, VOLTAGE GROUNDING AND LOAD BALANCE.

.2 CIRCUITS ORIGINATING FROM BRANCH DISTRIBUTION PANELS.

.3 MOTORS AND ASSOCIATED CONTROLS EQUIPMENT. INCLUDE SEQUENCED OPERATION OF SYSTEMS WHERE APPLICABLE.

.2 FURNISH MANUFACTURERS CERTIFICATE OR LETTER CONFIRMING THAT THE INSTALLATION, AS IT PERTAINS TO EACH SYSTEM, HAS BEEN INSTALLED TO MANUFACTURERS INSTRUCTIONS.

.3 INSTALLATION RESISTANCE TESTING:

.1 MEGGER CIRCUITS, FEEDERS AND EQUIPMENT UP TO 350V WITH 500V INSTRUMENT, UP TO 600V WITH 1000V INSTRUMENT.

.2 CHECK RESISTANCE TO GROUND BEFORE TESTING.

.3 CARRY OUT CHECK IN PRESENCE OF ENGINEER.

.4 PROVIDE INSTRUMENTS, METERS, EQUIPMENT AND PERSONAL REQUIRED TO CONDUCT TESTS.

.5 SUBMIT TEST RESULTS FOR ENGINEER'S REVIEW.

14.0 STANDARD OF ACCEPTANCE

14.1 THE ITEMS NAMED MEET IN ALL RESPECT PERFORMANCE, QUALITY AND WORKMANSHIP AND ARE ACCEPTABLE TO THE OWNER WITHOUT QUALIFICATIONS.

14.2 EQUIPMENT PROPOSED SHALL MEET THE SAME STANDARDS OF PERFORMANCE, QUALITY AND WORKMANSHIP.

A - DETAIL
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C - DRAWING No.

No.	REVISION	DATE (Y/M/D/)
A	ISSUED FOR REVIEW	2024.05.17

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MECHANICAL & ELECTRICAL CONSULTANT:

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

CORE PROJECT #: 22-3392

NORTH

MEMORIAL UNIVERSITY

Department of Facilities Management

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PROJECT NAME:

S.J. CAREW BUILDING (FACULTY OF ENGINEERING & APPLIED SCIENCE) THERMAL LAB MECHANICAL UPGRADES
Project #: EN-189-21

DRAWING TITLE:

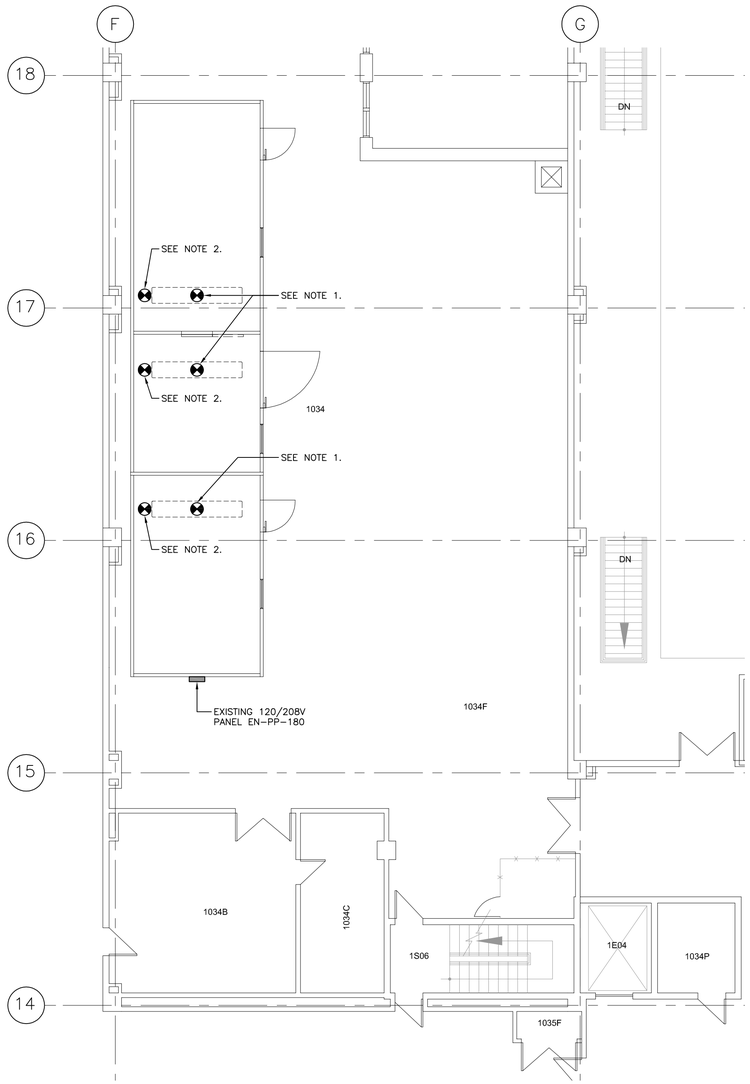
ELECTRICAL SPECIFICATIONS

DESIGNED:	DRAWN:
GT	RG
REVIEWED:	APPROVED:
GT	GT
SCALE:	DATE:
AS NOTED	2023/10/20
PROJECT No.	DRAWING No.
EN-189-21	E-0.1

ELECTRICAL LEGEND

- – ELECTRICAL CONNECTION TO EQUIPMENT.
- – DISCONNECT SWITCH SUPPLIED AND INSTALLED BY ELECTRICAL.
- – 20A, 120V GFCI DUPLEX CONVENIENCE RECEPTACLE.
- – ELECTRICAL PANEL BOARD.

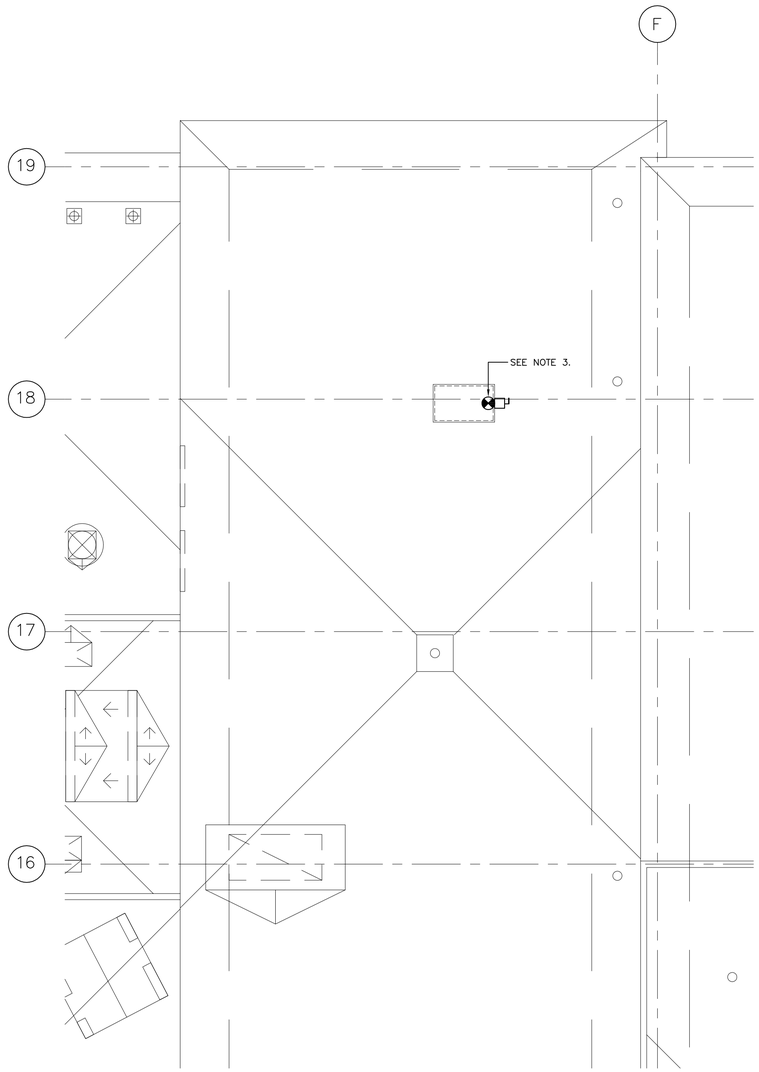
NOTES:
1. EXISTING EVAPORATOR TO BE REMOVED. REMOVE ASSOCIATED WIRE AND CONDUIT BACK TO SOURCE. TURN BREAKER TO "OFF" POSITION AND LABEL AS SPARE.
2. EXISTING DRAIN LINE HEAT TRACE CIRCUIT TO BE DISCONNECT FROM EXISTING HEAT TRACE BEING REMOVED AND RECONNECTED TO NEW HEAT TRACING. EXTEND/REROUTE AS REQUIRED.
3. EXISTING ROOFTOP CONDENSING UNIT TO BE REMOVED. REMOVE ASSOCIATED WIRE AND CONDUIT BACK TO SOURCE. TURN BREAKER TO "OFF" POSITION AND LABEL AS SPARE.



PART PLAN – LEVEL 1 ELECTRICAL DEMOLITION LAYOUT

SCALE : 1:100

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



PART PLAN – ROOF ELECTRICAL DEMOLITION LAYOUT

SCALE : 1:100

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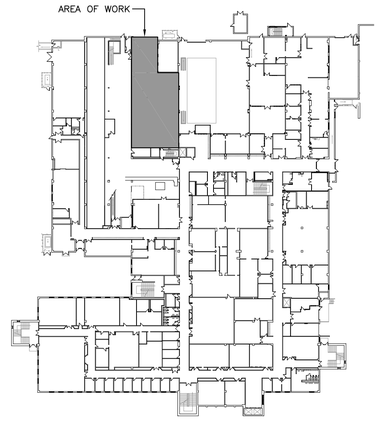
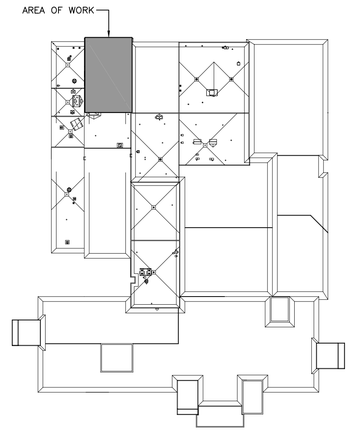


KEY PLAN – LEVEL 1

SCALE : 1:1000

0m 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m



KEY PLAN – ROOF

SCALE : 1:1000

0m 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m

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No.	REVISION	DATE (Y/M/D/)
A	ISSUED FOR REVIEW	2024.05.17

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CORE PROJECT #: 22-3392

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PROJECT NAME:

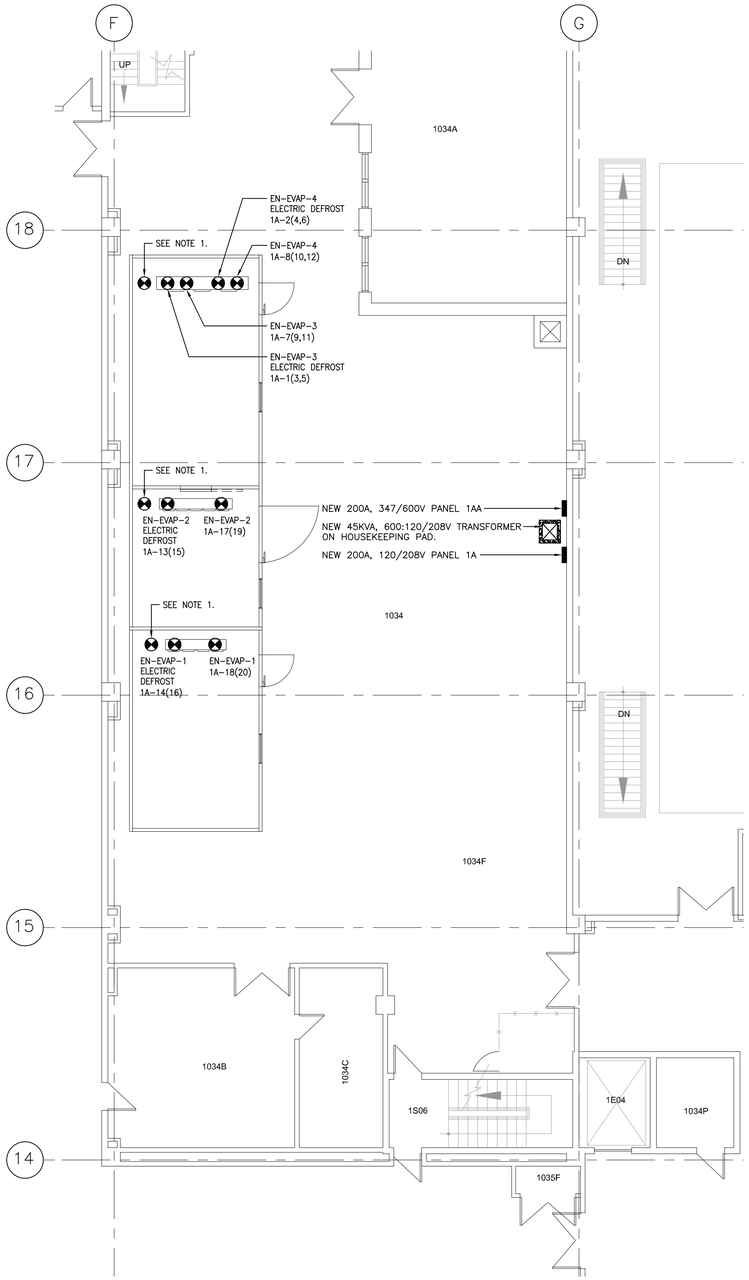
S.J. CAREW BUILDING (FACULTY OF ENGINEERING & APPLIED SCIENCE) THERMAL LAB MECHANICAL UPGRADES
Project #: EN-189-21

DRAWING TITLE:

ELECTRICAL LEGEND AND DEMOLITION FLOOR PLANS

DESIGNED:	DRAWN:
GT	RG
REVIEWED:	APPROVED:
GT	GT
SCALE:	DATE:
AS NOTED	2023/10/20
PROJECT No.	DRAWING No.
EN-189-21	E-0.2

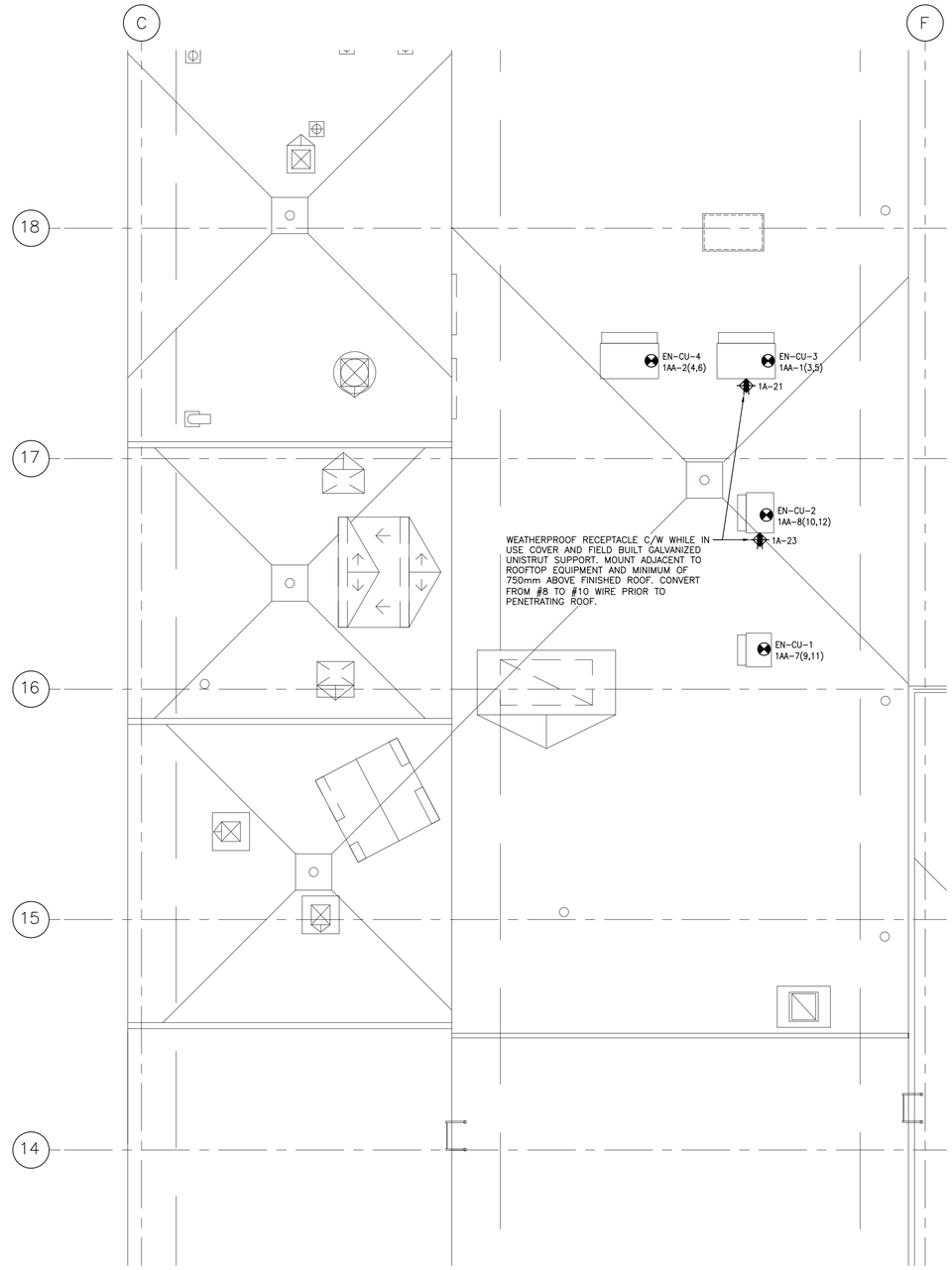
NOTES:
1. EXISTING DRAIN LINE HEAT TRACE CIRCUIT TO BE DISCONNECT FROM EXISTING HEAT TRACE BEING REMOVED AND RECONNECTED TO NEW HEAT TRACING. EXTEND/REROUTE AS REQUIRED.



PART PLAN – LEVEL 1 ELECTRICAL LAYOUT

SCALE : 1:100

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



PART ELECTRICAL ROOF PLAN

SCALE : 1:100

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

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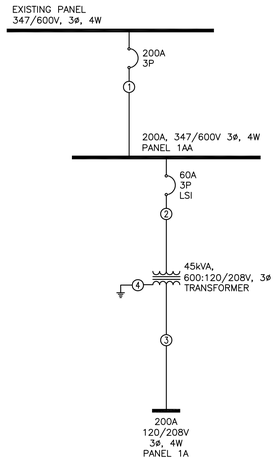
PROJECT NAME:

S.J. CAREW BUILDING (FACULTY OF ENGINEERING & APPLIED SCIENCE) THERMAL LAB MECHANICAL UPGRADES Project #: EN-189-21

DRAWING TITLE:

REVISED ELECTRICAL FLOOR PLANS

DESIGNED:	DRAWN:
GT	RG
REVIEWED:	APPROVED:
GT	GT
SCALE:	DATE:
AS NOTED	2023/10/20
PROJECT No.	DRAWING No.
EN-189-21	E-1.1



FEEDER SCHEDULE

① 4–#3/0 RW90 COPPER CONDUCTORS & 1–#6 TW BOND IN 63mm CONDUIT.
② 3–#6 RW90 COPPER CONDUCTORS & 1–#10 TW BOND IN 27mm CONDUIT.
③ 4–#2/0 RW90 COPPER CONDUCTORS & 1–#6 TW BOND IN 53mm CONDUIT.
④ 1–#6 BONDING JUMPER CONNECTED TO BONDING CONDUCTOR INI THE PRIMARY SUPPLY.

PANEL 1AA — PANEL SCHEDULE

TYPE CIRCUIT BREAKER TYPE
RATING 225A, 347/600V, 3ø, 4W, SURFACE
MANUFACTURER EATON POW-R-LINE 2
MINIMUM INTERRUPTING CAPACITY –KA

CIRCUIT DESCRIPTION	LOAD	WIRE SIZE	BRKR. SIZE	CIRCUIT NO.		BRKR. SIZE	WIRE SIZE	LOAD	CIRCUIT DESCRIPTION
CONDENSING UNIT EN–CU–3	9861	8	50 A 3P	1	2	50 A 3P	8	9861	CONDENSING UNIT EN–CU–4
	9861			3	4			9861	
	9861			5	6			9861	
CONDENSING UNIT EN–CU–1	2526	12	15 A 3P	7	8	20 A 3P	12	3460	CONDENSING UNIT EN–CU–2
	2526			9	10			3460	
	2526			11	12			3460	
45KVA TRANSFORMER	11637	6	60 A 3P	13	14				SPACE
	11637			15	16				
	11637			17	18				
SPACE				19	20				
				21	22				
				23	24				
				25	26				
				27	28				
				29	30				
				31	32				
				33	34				
				35	36				
				37	38				
				39	40				
				41	42				

CONNECTED LOAD: 112035 W

REMARKS:

PANEL 1A — PANEL SCHEDULE

TYPE CIRCUIT BREAKER TYPE
RATING 225A, 120/208V, 3ø, 4W, RECESSED
MANUFACTURER EATON POW-R-LINE 2
MINIMUM INTERRUPTING CAPACITY –KA

CIRCUIT DESCRIPTION	LOAD	WIRE SIZE	BRKR. SIZE	CIRCUIT NO.		BRKR. SIZE	WIRE SIZE	LOAD	CIRCUIT DESCRIPTION
EVAPORATOR EN–EVAP–3 ELECTRIC DEFROST	3203	8	40 A 3P	1	2	40 A 3P	8	3600	EVAPORATOR EN–EVAP–4 ELECTRIC DEFROST
	3203			3	4			3600	
	3203			5	6			3600	
EVAPORATOR EN–EVAP–3	792	12	15 A 3P	7	8	15 A 3P	12	1350	EVAPORATOR EN–EVAP–4
	792			9	10			1350	
	792			11	12			1350	
EVAPORATOR EN–EVAP–2 ELECTRIC DEFROST	1986	10	30A 2P	13	14	15A 2P	12	1040	EVAPORATOR EN–EVAP–1 ELECTRIC DEFROST
	1986			15	16			1040	
EVAPORATOR EN–EVAP–2	312	12	15A 2P	17	18	15A 2P	12	250	EVAPORATOR EN–EVAP–1
	312			19	20			250	
ROOFTOP RECEPTACLE	300	8	20	21	22	15	12	200	CONTROL POWER
ROOFTOP RECEPTACLE	300	8	20	23	24	15	12	200	CONTROL POWER
SPARE			20	25	26	15	12	200	CONTROL POWER
SPARE			20	27	28	15			SPARE
SPARE			15	29	30	15			SPARE
SPACE				31	32				SPACE
				33	34				
				35	36				
				37	38				
				39	40				
				41	42				

CONNECTED LOAD: 34911 W

REMARKS:

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S.J. CAREW BUILDING (FACULTY OF ENGINEERING & APPLIED SCIENCE) THERMAL LAB MECHANICAL UPGRADES Project #: EN-189-21

DRAWING TITLE:

ELECTRICAL SINGLE LINE DIAGRAM AND PANEL SCHEDULES

DESIGNED:	DRAWN:
GT	RG
REVIEWED:	APPROVED:
GT	GT
SCALE:	DATE:
AS NOTED	2023/10/20
PROJECT No.	DRAWING No.
EN-189-21	E-2.1