ONTARIO NORTHLAND

TRANSPORTATION COMMISSION

Request for Proposals No. RFP 2024 013

For

New Hearst Mechanical Shop

REPLY BY DATE: 2:00:00 p.m. Monday, June 03, 2024

Primary Contact:

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Procurement Contracts Specialist
Ontario Northland Transportation Commission
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North Bay, Ontario, P1B 8L3
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PART 1

REQUEST FOR PROPOSALS

SECTION 1 - INTRODUCTION

1.1 General

(1) Ontario Northland Transportation Commission ("ONTC") is issuing this Request for Proposals ("**RFP**") to obtain proposals from a vendor/service provider(s) for the provision of the goods and/or services described in the RFP Specifications (the "**Goods and/or Services**").

(2) In this RFP:

"Applicable Laws" means the statutes, regulations, orders, by-laws and other laws of Ontario, Quebec, Manitoba, Canada and any municipal government relevant to the RFP and the subject matter of the RFP;

"Addendum" means the written supplementary information provided to potential Respondents prior to the Submission Deadline, which information becomes part of the RFP Documents;

"Business Day" means any day except Saturday, Sunday or a statutory holiday;

"Final Agreement" means the agreement for the supply of the Goods and/or Services entered into by ONTC and the Successful Respondent;

"Material" means a document or information that must be included in the Proposal including without limitation the information requested in the RFP Data Sheet, and is essential to allow ONTC to evaluate a Proposal and that if not included will result in the disqualification of the Proposal;

"Non-compliant" means the Proposal or the Respondent does not meet a requirement of the RFP Documents;

"Proposal" means the response to the RFP submitted by a Respondent to ONTC;

"Respondent(s)" means the entity submitting a Proposal and includes prospective respondents, whether or not that entity submits a Proposal. If the context requires it, "Respondent" includes any of the Respondent's respective shareholders, owners, officers, agents, consultants, partners, contractors, subcontractors, advisors, employees, or representatives;

"RFP Data Sheet" means the information and requirements contained in Schedule 2-A of Part 2;

"RFP Documents" means the documents listed in RFP Section 2.1 (1) and any additional documents issued through Addenda;

"Short-listed Respondent" means a Respondent selected to proceed to the next step in the evaluation process pursuant to section 6.2 (2) of the RFP;

"Substantially Compliant" means Proposal does not meet the requirements of the RFP Documents; however, the Proposal includes all of the Material items, as identified in the RFP Data Sheet;

"Successful Respondent" means the Respondent selected by ONTC to enter into the Final Agreement.

(3) The process to select the Short-listed Respondents for the supply of the Goods and/or Services (the "**RFP Process**") will commence with the issuance of these RFP Documents and will terminate at the earlier of:

(a) when ONTC and the Successful Respondent execute the Final Agreement; or,

(b) upon the termination of the RFP Process in accordance with the terms and conditions of this RFP.

1.2 Ontario Northland Transportation Commission

The Ontario Northland Transportation Commission (ONTC) is an agency of the Province of Ontario that provides reliable and efficient transportation services to northern and rural communities. For over 120 years, the company has provided integrated and impactful transportation services including rail freight, passenger rail, motor coach transportation, rail repair, and remanufacturing services.

ONTC's rail services are vital in maintaining a reliable supply chain in Northern Ontario by connecting freight customers to global economies. The forestry industry, mining operations, farming communities, and manufacturers count on ONTC's services to deliver large volumes across vast distances. The company's 675 miles of mainline track span throughout northeastern Ontario and northwestern Quebec.

ONTC motor coaches connect rural Ontario to major centres providing access to education, medical appointments, shopping, and seamless connections to other transportation providers. The Polar Bear Express passenger train connects Moosonee and Cochrane, Ontario, providing an all-season land link for Indigenous communities on the James Bay Coast.

Improving and repairing transportation equipment is also a large part of ONTC's service offering. We remanufacture and repair locomotives, passenger rail cars, freight cars, and more. ONTC's unique mechanical skillset attracts new business and secures skilled trades jobs in Northern Ontario.

ONTC makes provincial dollars reach further by creating innovative solutions that help drive economic growth sustainably, responsibly, and with future generations top of mind. Throughout the agency, modernization is underway with many exciting projects that will improve how we operate. ONTC employs over 900 people including Locomotive Engineers, Motor Coach Operators, skilled tradespeople, and business professionals. Employees work together to improve and deliver services that provide value to the regions served.

SECTION 2 - THE RFP DOCUMENTS

2.1 Request for Proposals Documents

(1) The Request for Proposals documents consist of:

Part 1 – Request for Proposals

Part 2 – Requests for Proposals Summary of Requirements
(a) Schedule 2-A – RFP Data Sheet
(b) Schedule 2-B – Participation Registration Form

Part 3 – RFP Specifications
(a) Schedule 3-A-1 – Scope of Work
(b) Schedule 3-A-2 – Specifications
(c) Schedule 3-A-3 – Reference Documents and Reports
(d) Schedule 3-A-4 – Technical Specifications and IFT Drawings
(e) Schedule 3-A-5 - Tender Drawings

Part 4 – Form of Proposal
(a) Proposal Form 1 – Proposal Submission Form
(b) Proposal Form 2 – Respondent's General Information
(c) Proposal Form 3 – Acknowledgment to Comply with Part 3 – Request for Proposals Specifications
(d) Proposal Form 4 – References
(e) Proposal Form 5 – Compliance with Contract Documents
(f) Proposal Form 6 – Respondents' Meeting Registration Form
(g) Proposal Form 7 – Health, Safety and Environment
(h) Proposal Form 8 - Schedule of Materials
(i) Proposal Form 9 – List of Equipment
(j) Proposal Form 10 – Schedule and Proposed Approach
(k) Proposal Form 11 – Schedule of Progress Payments
(l) Proposal Form 12 – List of Personnel and Resumes
(m) Proposal Form 13 – Current Labour Agreements
(n) Proposal Form 14 – Contractor's Qualification Statement
(o) Proposal Form 15 – Claims

Part 5 – CCDC 2 – 2020 - Ontario Northland's Supplementary Conditions

(2) The RFP Documents shall be read as a whole. The Schedules and Addenda, if any, constitute an integral part of this RFP and are incorporated by reference.

(3) Each Respondent shall verify the RFP Documents for completeness upon receipt and shall inform the Contact Person (identified in RFP Section 3.2(7)), immediately:

(a) should any documents be missing or incomplete; or,

(b) upon finding any discrepancies or omissions.

(4) Complete sets of the RFP Documents are available at our company website at www.ontarionorthland.ca and MERX.

(5) The RFP Documents are made available only for the purpose of Respondents submitting Proposals. Availability and/or use of the RFP Documents do not confer a license or grant for any other purpose.

2.2 Priority of Documents

(1) If there are any inconsistencies between the terms, conditions or other provisions of the RFP Documents, the order of priority of RFP Documents, from highest to lowest, shall be:

(a) Any Addenda modifying the RFP Documents issued during the RFP Process;
(b) The RFP Data Sheet;
(c) Part 1 –- Request for Proposals;
(d) Part 3 –- Specifications; and,
(e) Any other RFP Documents.

2.3 Distribution of Documents – Electronic Distribution

(1) ONTC will use an online electronic distribution system to distribute all RFP Documents.

(2) Each Respondent is solely responsible for making appropriate arrangements to receive and access the RFP Documents through that electronic distribution system.

2.4 Information Provided by ONTC

(1) Each Respondent is solely responsible for conducting its own independent research, due diligence, and any other work or investigations and seeking any other independent advice necessary for the preparation of its Proposal, negotiation or finalization of the Final Agreement and the subsequent delivery of all the Goods and/or Services to be provided by the Successful Respondent. Nothing in the RFP Documents is intended to relieve the Respondents from forming their own opinions and conclusions with respect to the matters addressed in this RFP.

(2) No guarantee, representation or warranty, express or implied, is made and no responsibility of any kind is accepted by ONTC or its representatives for the completeness or accuracy of any information presented in the RFP Documents, if any, during the RFP Process or during the term of the Final Agreement. By submitting a Proposal, each Respondent agrees that ONTC and its representatives shall not be liable to any person or entity as a result of the use of any information contained in the RFP Documents or otherwise provided by ONTC or its representatives during the RFP Process or during the term of the Final Agreement.

SECTION 3 – THE RFP PROCESS

3.1 RFP Process

(1) The deadline for the submission of Proposals (the "**Submission Deadline**") is set out in the RFP Data Sheet.

(2) ONTC may amend, extend or shorten any of the dates and/or times prescribed in this RFP, at any time, at its sole discretion, including without limitation the Submission Deadline. If ONTC extends the Submission Deadline, all requirements applicable to Respondents will thereafter be subject to the new, extended Submission Deadline.

3.2 Questions and Communications Related to the RFP Documents

(1) Respondents shall submit all questions, requests for clarifications, and other communications regarding the RFP Documents and the RFP Process by email to the Contact Person set out in section 3.2(7) no later than four (4) full Business Days before the Submission Deadline.

(2) ONTC will endeavor to provide the Respondents with written responses to questions that are submitted in accordance with this RFP Section 3.2, by no later than two (2) full Business Days before the Submission Deadline. Responses to any questions or requests for clarifications, will be collected and distributed with answers to be delivered to all Respondents who have submitted the Participation Registration Form by way of emailed addenda from ONTC in accordance with the timeline set out in this Section 3.2(2).

(3) The responses to questions form part of the RFP Documents.

(4) ONTC may, in its sole discretion:

(a) answer questions that ONTC deems to be similar from various Respondents only once;

(b) edit any question(s) for the purpose of clarity;

(c) respond to questions submitted after the deadline for submission of questions if ONTC believes that such responses would be of assistance to the Respondents generally; and,

(d) exclude any questions that, in the sole opinion of ONTC, are ambiguous, incomprehensible, or are deemed by ONTC to be immaterial to the RFP Process, the RFP Documents, or the Goods and/or Services.

(5) If Respondents find discrepancies, omissions, errors, departures from laws, by-laws, codes or good practice, or information considered to be ambiguous or conflicting, they shall bring them to the attention of the Contact Person in writing, and not less than four

(4) full Business Days before the Submission Deadline, so that ONTC may, if ONTC deems it necessary, issue instructions, clarifications or amendments by addendum to all Respondents prior to the Submission Deadline. ONTC will endeavor to, but is not required to, issue such Addenda at least two (2) full Business Days prior to the Submission Deadline. It is each Respondent's responsibility to seek clarification from ONTC of any matter it considers to be unclear in the RFP Documents or the description of the Goods and/or Services and the Respondent may seek clarification in accordance with this Section 3.2. Neither ONTC nor the Government of Ontario shall be responsible for any misunderstanding by a Respondent of the RFP Documents, the RFP Process or the Goods and/or Services.

(6) If ONTC gives oral answers to questions at any meeting (Section 3.4), these answers will not be considered final, and may not be relied upon by any of the Respondents, unless and until such answers are provided by way of an addendum in accordance with this Section 3.2.

(7) The Contact Person designated by ONTC for this RFP is ***Brinda Ranpura, Procurement Contracts Specialist, 555 Oak Street East, North Bay, Ontario P1B 8L3 (705) 472-4500 ext. 548, brinda.ranpura@ontarionorthland.ca*** (the "Contact Person"). The above Contact Person is the sole contact for this RFP. A Respondent may be disqualified where contact is made with any person other than the Contact Person.

(8) ONTC will not be responsible for statements, instructions, clarifications, notices or amendments communicated orally by ONTC to one or more of the Respondents. Statements, instructions, clarifications, notices or amendments by ONTC, which affect the RFP Documents, may only be made by addendum.

3.3 Addenda/Changes to the RFP Documents

(1) ONTC may, in its sole discretion, amend, supplement, or change the RFP Documents prior to the Submission Deadline. ONTC shall issue amendments, supplements, or changes to the RFP Documents by Addendum only. No other statement or response(s) to questions, whether oral or written, made by ONTC or any ONTC advisors, employees or representatives, including, for clarity, the Contact Person, or any other person, shall amend, supplement or change the RFP Documents. Addenda will be distributed in the same manner as the RFP and shall become part of the RFP Documents.

(2) Each Respondent is solely responsible for ensuring that it has received all Addenda issued by ONTC. Respondents may, in writing by email to the Contact Person, seek confirmation of the number of Addenda, issued under this RFP.

3.4 Respondents' Meeting

(1) To assist Respondents in understanding the RFP Documents, and the RFP Process, ONTC may conduct an information meeting (the "**Respondents' Meeting**") for all Respondents. Whether or not ONTC will conduct a Respondents' Meeting is set out in the

RFP Data Sheet. If ONTC is conducting a Respondents' Meeting, the meeting will be held on the date and at the time and location set out in the RFP Data Sheet.

(2) Attendance by Respondents at a Respondents' Meeting may not be mandatory but, if one is held, Respondents are strongly encouraged to attend. Whether or not the Respondents' Meeting is mandatory will be identified on the RFP Data Sheet. When a Respondents' meeting is mandatory, all attending persons or entities will be required to sign the "Site Meeting Log" to confirm their attendance and provide a valid email address for purpose of receiving information.

(3) If ONTC gives oral answers to questions at the Respondents' Meeting, these answers will not be considered final, and may not be relied upon by any of the Respondents, unless and until such answers are provided by way of an Addendum in accordance with Section 3.2.

(4) If pre-registration for the Respondents' Meeting is necessary, the deadline for registration will be set out in the RFP Data Sheet and details regarding the registration process will be set out in the RFP Data Sheet.

3.5 Prohibited Contacts

(1) Respondents and their respective advisors, employees and representatives are prohibited from engaging in any form of political or other lobbying, of any kind whatsoever, to influence the outcome of the RFP Process.

(2) Without limiting the generality of Section 3.5(1) above, neither Respondents nor any of their respective advisors, employees or representatives shall contact or attempt to contact, either directly or indirectly, at any time during the RFP Process, any of the following persons or organizations on matters related to the RFP Process, the RFP Documents, or their Proposals:

(a) any member of the Evaluation Team (as defined in Section 6.1), except the Contact Person;

(b) any advisor to ONTC or the Evaluation Team, except the Contact Person; or,

(c) any directors, officers, employees, agents, representatives or consultants of:
  (i) ONTC, except the Contact Person;
  (ii) Ontario Ministry of Transportation;
  (iii) The Premier of Ontario's office or the Ontario Cabinet office;
  (iv) A Member of Provincial Parliament (including the Premier); or,
  (v) Any other person or entity listed in the RFP Data Sheet.

(3) If a Respondent or any of their respective shareholders, owners, officers, agents, consultants, partners, contractors, subcontractors, advisors, employees, representatives, or other third parties acting on behalf or with the knowledge of the Respondent; in the

opinion of ONTC, contravenes RFP Section 3.5(1) or 3.5(2), ONTC may, but is not obliged to, in its sole discretion:

(a) take any action in accordance with RFP Section 7.2; or

(b) impose conditions on the Respondent's continued participation in the RFP Process that ONTC considers, in its sole discretion, to be appropriate.

3.6 Media Releases, Public Disclosures, Public Announcements and Copyright

(1) A Respondent shall not, and shall ensure that its shareholders, owners, officers, agents, consultants, partners, contractors, subcontractors, advisors, employees, representatives, or other third parties acting on behalf or with the knowledge of the Respondent do not, issue or disseminate any media release, social media or Internet post, public announcement or public disclosure (whether for publication in the press, on the radio, television, internet or any other medium) that relates to the RFP Process, the RFP Documents or the Goods and/or Services or any matters related thereto, without the prior written consent of ONTC.

(2) Neither the Respondents or any of their respective shareholders, owners, officers, agents, consultants, partners, contractors, subcontractors, advisors, employees, representatives, or other third parties acting on behalf or with the knowledge of the Respondent shall make any public comment, respond to questions in a public forum, or carry out any activities to either criticize another Respondent or Proposal or to publicly promote or advertise their own qualifications, interest in or participation in the RFP Process without ONTC's prior written consent, which consent may be withheld, conditioned or delayed in ONTC's sole discretion. Respondents, and their respective advisors, employees and representatives are permitted to state publicly that they are participating in the RFP Process but shall not publicly identify other Respondents without the prior written consent of ONTC.

(3) Respondents shall not use the name of ONTC or any of ONTC's logos, designs, colours or registered trademarks and names used, owned or registered by ONTC, during the RFP Process, if selected as the Successful Respondent, or at any time prior to, during, or following the supply of the Goods and/or Services, except with the prior written consent of ONTC.

3.7 Confidentiality and Disclosure Issues – Respondent Information

(1) Respondents are advised that ONTC may be required to disclose the RFP Documents, any other documentation related to the RFP Process and a part or parts of any Proposal pursuant to the *Freedom of Information and Protection of Privacy Act* (Ontario) ("FIPPA"). Respondents are also advised that FIPPA does provide protection for confidential and proprietary business information. Respondents are strongly advised to consult their own legal advisors as to the appropriate way in which confidential or proprietary business information should be marked as such in their Proposals. Subject to the provisions of FIPPA, ONTC will use reasonable commercial efforts to safeguard the confidentiality of

any information identified by the Respondent as confidential but shall not be liable in any way whatsoever to any Respondent if such information is disclosed based on an order or decision of the Information and Privacy Commissioner or otherwise as required under the Applicable Laws.

(2) The Respondent agrees that ONTC may disclose Proposals, and all information submitted in or related to the Proposals, to the Government of Ontario.

(3) ONTC may provide the Proposals to any person involved in the review and/or evaluation of the Proposals on behalf of ONTC and ONTC may:

(a) make copies of the Proposal; and/or,

(b) retain the Proposal.

(4) ONTC may disclose any information with respect to the Respondents, the Proposals and the RFP Process as required by the Applicable Laws.

(5) The Respondent shall not require ONTC or any of its representatives to sign a non-disclosure agreement in respect of any step taken or information provided as part of this RFP Process, provided that if the nature of the subject matter of the RFP is such that, in the opinion of ONTC, it would be appropriate to enter into a non-disclosure agreement with a Respondent or Respondents, ONTC and/or the Respondent shall enter into such agreement in a form and with the content satisfactory to ONTC.

3.8 Confidential Information

(1) In this RFP, "**RFP Information**" shall mean all material, data, information or any item in any form, whether oral or written, including in electronic or hard-copy format, supplied by, obtained from or otherwise procured in any way, whether before or after the RFP Process, from ONTC or any Ministry or Agency of the Government of Ontario, in connection with the RFP Documents or the Goods and/or Services excluding any item which:

(a) is or becomes generally available to the public other than as a result of a disclosure resulting from a breach of this RFP Section 3.8;

(b) becomes available to the Respondent on a non-confidential basis from a source other than ONTC, so long as that source is not bound by a non-disclosure agreement with respect to the information or otherwise prohibited from transmitting the information to the Respondent by a contractual, legal or fiduciary obligation; or,

(c) The Respondent is able to demonstrate was known to it on a non-confidential basis before it was disclosed to the Respondent by ONTC.

(2) RFP Information:

(a) shall remain the sole property of ONTC or the Government of Ontario, as applicable, and the Respondent shall maintain the confidentiality of such information except as required by law;

(b) shall not be used by the Respondent for any other purpose other than submitting a Proposal or performing obligations under any subsequent agreement with ONTC relating to the Goods and/or Services;

(c) shall not be disclosed by the Respondent to any person who is not involved in the Respondent's preparation of its Proposal or in the performance of any subsequent agreement relating to ONTC, or the Government of Ontario, as applicable, without prior written authorization from ONTC;

(d) shall not be used in any way detrimental to ONTC or the Government of Ontario; and,

(e) if requested by ONTC, shall be returned to the Contact Person or destroyed by the Respondent no later than ten (10) calendar days after such request is received in writing by the Respondent.

(3) Each Respondent shall be responsible for any breach of the provisions of this RFP Section 3.8 by any person to whom it discloses the RFP Information.

(4) Each Respondent or Short-listed Respondent acknowledges and agrees that a breach of the provisions of this RFP Section 3.8 would cause ONTC, the Government of Ontario and/or their related entities to suffer loss which could not be adequately compensated by damages, and that ONTC, the Government of Ontario and/or any related entity may, in addition to any other remedy or relief, enforce any of the provisions of this RFP Section 3.8 upon application to a court of competent jurisdiction without proof of actual damage to ONTC, the Government of Ontario or any related entity.

(5) Notwithstanding RFP Section 9.3, the provisions of this RFP Section 3.8 shall be binding and shall survive any cancellation or termination of this RFP and the conclusion of the RFP Process.

(6) ONTC may, in its sole discretion, require that Respondents execute a legally binding non-disclosure agreement in a form and substance satisfactory to ONTC prior to receiving the RFP Information.

3.9 Governing Laws and Attornment

(1) This RFP Process and the Final Agreement entered into pursuant to this RFP Process shall be governed and construed in accordance with the laws of Ontario, the laws of

Quebec, the laws of Manitoba, if relevant to the subject matter of this RFP, and the applicable laws of Canada, excluding any conflict of laws principles.

(2) Each Respondent agrees that the courts of the Province of Ontario shall have exclusive jurisdiction to entertain any action or proceeding based on, relating to or arising from this RFP process.

3.10 Licenses and Permits

(1) If a Respondent is required by the Applicable Laws to hold or obtain a license, permit, consent or authorization to carry on an activity contemplated in its Proposal, neither acceptance of the Proposal nor execution of the Final Agreement shall be considered to be approval by ONTC of carrying on such activity without the requisite license, permit, consent or authorization.

3.11 Respondents' Costs

(1) The Respondent shall bear all costs and expenses incurred by the Respondent relating to any aspect of its participation in this RFP Process, including, without limitation, all costs and expenses related to the Respondent's involvement in:

(a) the preparation, presentation and submission of its Proposal;

(b) due diligence and information gathering processes;

(c) attendance at any Respondents' Meeting(s) or presentations;

(d) preparation of responses to questions or requests for clarification from ONTC;

(e) preparation of the Respondent's own questions during the clarification process;

(f) preparation of prototypes, proof of concept and/or demonstrations; and,

(g) any discussions or negotiations with ONTC regarding the Final Agreement.

(2) Without limiting the generality of Section 9.1(2) of this RFP, in no event shall ONTC or the Government of Ontario be liable to pay any costs or expenses or to reimburse or compensate a Respondent under any circumstances for the costs or expenses set out in Section 3.11(1), regardless of the conduct or outcome of the RFP Process.

3.12 Delay and Costs of Delay

(1) By submitting a Proposal, the Respondent waives all claims against ONTC and the Government of Ontario including any claims arising from any error or omission in any part of the RFP Documents or RFP Information or any delay, or costs associated with delays, in the RFP Process.

3.13 Clarification and Verification of Respondent's Proposal

(1) Following submission of a Proposal, ONTC may:

(a) request a Respondent to clarify or verify the contents of its Proposal, including by submitting supplementary documents; and/or,

(b) request a Respondent to confirm an ONTC interpretation of the Respondent's Proposal.

(2) Any information received by ONTC from a Respondent pursuant to a request for clarification or verification from ONTC as part of the RFP Process may, in ONTC's discretion, be considered as an integral part of the Proposal even if such information should have been submitted as part of the Respondent's Proposal and may, in ONTC's discretion, be considered in the evaluation of the Respondent's Proposal.

(3) ONTC may, in its sole discretion, verify or clarify any statement or claim contained in any Proposal or made subsequently in any interview, presentation, or discussion. That verification or clarification may be made by whatever means that ONTC deems appropriate which may include contacting the persons identified in the contact information provided by the Respondent and contacting persons or entities other than those identified by any Respondent.

(4) By submitting a Proposal, the Respondent is deemed to consent to ONTC verifying or clarifying any information and requesting additional information from third parties regarding the Respondent) and its directors, officers, shareholders or owners and any other person associated with the Respondent as ONTC may determine is appropriate.

(5) ONTC is not obliged to seek clarification or verification of any aspect of a Proposal, or any statement or claim made by a Respondent.

(6) Requests for clarifications shall not be construed as acceptance by ONTC of a Proposal.

3.14 Two-Envelope Process

(1) ONTC may elect to complete a Two-Envelope Process. Whether Respondents will be required to submit their Proposals using a Two-Envelope Process will be identified on the RFP Data Sheet.

(2) If ONTC elects to complete a Two-Envelope Process, the Proposal shall be broken down into two components; a technical submission and a financial submission.

(3) If ONTC elects to complete a Two-Envelope Process, ONTC will identify a minimum score that must be attained on the technical submission on the RFP Data Sheet. Proposals that do not meet the minimum score for the technical submission following evaluation of the technical submission, will not proceed further in the evaluation process, provided that ONTC may, in its sole discretion, based on the overall scores of all the technical

submissions, revise the minimum score required to proceed further in the evaluation process. Financial submissions will only be opened and evaluated for the Proposals that meet the minimum score for the technical submission.

SECTION 4 - PROPOSAL CONTENT AND FORMAT

4.1 Format and Content of Proposal

(1) Respondents shall submit their Proposal in one envelope or, if submitting electronically, one electronic folder. Where required by the RFP Data Sheet to follow the two-envelope process, Respondents shall submit the technical submission and the financial submission in two separate envelopes or, if submitting electronically, two separate electronic folders.

(2) Unless otherwise specified in the RFP Data Sheet, Respondents shall not submit pre-printed literature with their Proposals. Any unsolicited pre-printed literature submitted as part of a Proposal will not be reviewed by the Evaluation Team.

(3) Each Respondent will:

(a) in a clear, concise and legible manner, complete and submit all documentation and information required by Part 2, Part 3, and Part 4 to the RFP;

(b) for a hard copy submission, complete any handwritten portions of the proposal forms in ink;

(c) provide all information requested and ensure that an authorized person or persons sign all forms where indicated. Failure to provide all requested information on the proposal forms and failure to fill in all blank spaces may result in a Proposal being determined to be non-compliant; and,

(d) use only the proposal forms issued as part of the RFP documents unless otherwise indicated.

(4) Information provided by Respondents on hard copy proposal forms may be amended prior to the Proposal submission, provided the amendments are initialed by an authorized representative of the Respondent. Un-initialed pre-submission amendments may result in the Proposal being declared non-compliant.

(5) Proposals that are not originals (if hard copy), are unsigned, improperly signed, incomplete, conditional or illegible, may be declared non-compliant.

(6) The Harmonized Sales Tax (HST) shall not be included in the price. Any taxes or increases to taxes announced prior to the date of the issuance of the RFP Documents and scheduled to come into effect subsequent to it shall be taken into consideration at time of invoicing.

(7) Price:

(a) Price shall be an all-inclusive lump sum price (excluding HST), unless otherwise indicated in the RFP Documents; and,

(b) Where the RFP requires the Respondent to provide a breakdown of the price in Proposal Form 1-A, the price as stated in Proposal Form 1 shall govern in the case of conflict or ambiguity between the price and the sum of the breakdown of the price.

(8) Listing of Subcontractors

Each Respondent shall complete the "Subcontractors" section of Proposal Form 2 – Respondent's General Information, naming the Subcontractors which the Respondent will employ to perform an item of the work called for by the RFP Documents. Failure of the Respondent to list Subcontractors where required, may result in the Proposal being declared non-compliant.

4.2 Proposal Submission Form

(1) Each Respondent will complete and submit the forms included in Part 4 – Form of Proposal. Failure of the Respondent to complete and submit one or more of the forms included in Part 4 – Form of Proposal, may result in the Proposal being declared non-compliant.

(2) Respondents shall execute the Proposal Submission Form as follows:

(a) in the case of a sole proprietorship, the sole proprietor will sign the Proposal Submission Form and have the signature witnessed;

(b) in the case of a corporation, an authorized signing officer will sign the Proposal Submission Form; or,

(c) in the case of a partnership, a partner or partners authorized to bind the partnership will sign the Proposal Submission Form and have their signatures witnessed.

4.3 Bid Performance Security

(1) The Respondent shall provide with its Proposal, Bid Performance Security in one of the following forms:

(a) Irrevocable stand-by Letter of Credit ("**LOC**"); or,

(b) Bid bond.

(the "**Bid Performance Security**")

The Bid Performance Security shall be:

(a) in the Respondent's own name;

(b) if a bid bond, issued by a surety licensed to conduct surety and insurance business in Ontario;

(c) in a form satisfactory to ONTC;

(d) for a term of at least ninety (90) calendar days after the Submission Deadline; and

(e) in the amount of ten percent (10%) of the total bid price excluding HST.

The Bid Performance Security is for the benefit of ONTC and will be retained by ONTC to compensate ONTC for the damages it will suffer if the Successful Respondent fails to provide the Contract Securities (defined in Section 4.3(2), below) and evidence of insurance and other documents required by this RFP or by the Final Agreement, or fails to execute the Final Agreement within the time required by the RFP Documents.

The Bid Performance Security of the Successful Respondent will be returned after the Successful Respondent delivers to ONTC compliant Contract Securities and evidence of insurance and other documents required by this RFP or by the Final Agreement and the Successful Respondent has executed the Final Agreement, all within the time required by the RFP Documents.

The Bid Performance Security of all other Respondents shall be returned to the Respondents upon the occurrence of the earlier of:

(a) execution by both parties of the Final Agreement between ONTC and the Successful Respondent;

(b) the expiry of the 90-day period following the Submission Deadline;

(c) the cancelation of the RFP process without an award of the contract; or,

(d) the disqualification of all Proposals.

(2) Agreement to Bond

The Respondent shall provide with its Proposal an agreement to bond issued by a surety company undertaking to provide a fifty percent (50%) Performance Bond and a fifty percent (50%) Labour and Material Bond (the "**Contract Securities**") in the form prescribed by the *Construction Act*, both to be provided to ONTC by the Successful Respondent following award of the contract.

(3) Proposals not accompanied by the required Bid Performance Security and the required agreement to bond will be declared non-compliant.

(4) The Respondent shall include the actual cost of all bonds, with no mark-up, in the Proposal price.

4.4 References and Past Performance Issues

(1) If specified in the RFP Data Sheet, Respondents shall provide reference information. Unless otherwise set out in the RFP Data Sheet, all references shall be, where possible, with respect to similar goods and/or services, as applicable, during the five (5) years immediately prior to the Submission Deadline. Unless otherwise set out in the RFP Data Sheet, the Respondent shall provide a minimum of three (3) references.

(2) ONTC may, in its sole discretion, confirm the Respondent's experience and ability to provide the Goods and/or Services by contacting the Respondent's references. However, ONTC is under no obligation to contact references submitted by any Respondent. References and information received from references, if contacted, will be taken into account in the evaluation process as identified in the RFP Data Sheet.

(3) ONTC may take into account in the evaluation process reliable information received from the Government of Ontario or its Agencies regarding past performance of a Respondent, provided information evidencing past poor performance by a Respondent is provided to the Respondent (subject to any restrictions on disclosure imposed by applicable law) and the Respondent is afforded an opportunity to respond to the information.

(4) If ONTC receives information from referees of a Respondent's past poor performance, ONTC shall advise the Respondent (subject to any restrictions on disclosure imposed by applicable law) and afford the Respondent an opportunity to respond to the information prior to considering this information as part of the evaluation process.

4.5 Conflict of Interest

(1) For the purposes of this Section 4.5, the term "**Conflict of Interest**" includes, but is not limited to, any situation or circumstance where the interests, conduct, other commitments or relationships of a Respondent, a Respondent's family member or an officer, director or employee of the Respondent could or could be perceived to, directly or indirectly, compromise, impair or be in conflict with the integrity of the RFP Process, the subject matter of the RFP or ONTC.

(2) Each Respondent shall promptly disclose any potential, perceived or actual Conflict of Interest of the Respondent to the Contact Person in writing. If ONTC discovers a Respondent's failure to disclose a Conflict of Interest, ONTC may, in its sole and absolute discretion disqualify the Respondent or terminate the Final Agreement if such Respondent is the Successful Respondent.

(3) ONTC may, in its sole discretion, and in addition to any other remedy available at law or in equity:

(a) waive any Conflict of Interest;

(b) impose conditions on a Respondent that require the management, mitigation and/or minimization of the Conflict of Interest; or,

(c) disqualify the Respondent from the RFP Process if, in the sole and absolute opinion of ONTC, the Conflict of Interest cannot be managed, mitigated or minimized.

SECTION 5 - PROPOSAL SUBMISSION, WITHDRAWAL, MODIFICATION

5.1 Submission of Proposals and Late Proposals

(1) Each Respondent shall submit their proposal in the format prescribed in the RFP Data Sheet. ONTC will not accept any proposal submission that is not submitted in the format prescribed in the RFP Data Sheet.

ONTC may elect to accept Electronic Bid Submissions, Physical Bid Submissions or a combination of both.

(a) If ONTC elects to use Electronic Bid Submissions, submissions shall be submitted on, and in accordance with, forms supplied by ONTC. **All responses are to be submitted to ONTC through the use of MERX Electronic Bid Submission (EBS).** Respondents shall be solely responsible for the delivery of their Proposals in the manner and time prescribed in the RFP Data Sheet.

Questions concerning submitting through MERX should be addressed to:

- MERX Customer Support
- Phone 1-800-964-6379
- Email merx@merx.com

Any Proposal from a Respondent whose name does not appear on the official MERX document request list (i.e., who has not downloaded the documents themselves) will be declared invalid, and the Proposal will not be considered.

MERX EBS does not allow submissions to be uploaded after the bid submission deadline; therefore, the Respondent should ensure they allow plenty of time to upload the documents.

Where required by the RFP Data Sheet to use a two-envelope process, Respondents shall include two separate and clearly identifiable attachments: 1) Technical and, 2) Financial. The file names for the technical and financial attachments should be sufficiently distinguishable such that ONTC does not need to open the attachments to differentiate between them.

(b) If ONTC elects to use Physical Bid Submissions, Respondents shall submit one original and the number of copies of its Proposal (in hard copy) specified in the RFP Data Sheet and the number of electronic copies of its Proposal (on a properly labelled CD or USB key in PDF format) specified in the RFP Data Sheet, at the

correct location for submission and on or before the Submission Deadline. If there is any difference whatsoever between the electronic copy of the Proposal and the original hard copy, the original hard copy of the Proposal, as submitted, will govern. The electronic copy of the Proposal is solely for the convenience of ONTC.

Respondents shall submit their Proposals to the attention of the Senior Manager of Strategic Procurement by prepaid courier or personal delivery at the following address:

Jason Baker
Senior Manager, Strategic Procurement
Ontario Northland Transportation Commission
555 Oak Street East
North Bay, Ontario P1B 8E3

The Respondent shall place their Proposal Submission in a sealed envelope or package with the Respondent's full legal name and return address, the RFP Number, the Submission Deadline and the label "Proposal Submission" clearly displayed on the outside of the envelope.

Where required by the RFP Data Sheet to use a two-envelope process, Respondents shall have one sealed envelope as prescribed above that contains two individual sealed envelopes inside that are clearly marked "Technical Submission" and "Financial Submission".

(c) For the convenience of the Respondents, and only when identified in the RFP Data Sheet, ONTC may allow either an Electronic Bid Submission through MERX or a Physical Bid Submission. The Respondent shall only use one method and follow the same procedure prescribed above.

(2) Proposals must be received before the time noted in the RFP Data Sheet.

(3) Proposals will be date and time stamped at the place receiving the Proposals. Late Proposals will be returned unopened.

(4) Proposals which are submitted by facsimile transmission, email, or by electronic means other than MERX will NOT be considered.

(5) Respondents are solely responsible for the method and timing of delivery of their Proposals.

(6) ONTC reserves the right to make copies of the Respondent's Proposals as it may be required for the purpose of conducting a full evaluation of the Proposal submitted.

(7) The Respondent should identify and mark any trade secret or proprietary intellectual property in its Proposal.

5.2 Late Proposals

(1) ONTC will reject Proposals that are received after the Submission Deadline.

5.3 Withdrawal of Proposals

(1) When submitting a Physical Bid Submission, a Respondent may withdraw its Proposal at any time before the Submission Deadline by notifying the Contact Person in writing. ONTC shall return, unopened, a Proposal that has been withdrawn.

(2) When submitting an Electronic Bid Submission, MERX will allow withdrawal of Proposals up to the Submission Deadline.

5.4 Amendment of Proposals

(1) When submitting a Physical Bid Submission, Respondents may amend their Proposals after submission but only if the original Proposal is withdrawn and the amended Proposal is submitted before the Submission Deadline.

(2) Electronic Bid Submissions through MERX will allow amendments up to the closing date and time; however, **Respondents are responsible for ensuring they allow sufficient time to upload the amended documents**.

(3) If more than one Proposal is received from the same Respondent before the Submission Deadline, only the last Proposal received before the Submission Deadline will be considered.

5.5 Proposal Irrevocability

(1) Subject to the Respondent's right to withdraw or amend the Proposal before the Submission Deadline, the Respondent's Proposal is irrevocable and shall remain in effect and open for acceptance for ninety (90) days after the Submission Deadline.

5.6 One Proposal per Person or Entity

(1) Except as set out in the RFP Data Sheet or with ONTC's approval:

(a) a person or entity shall submit or participate in only one Proposal either individually or as a Respondent team member; and,

(b) a person or entity shall not be a subcontractor of a Respondent and also submit a Proposal individually or as a Respondent team member in the same RFP Process.

(2) If a person or entity submits or participates in more than one Proposal in contravention of RFP Section 5.6(1), ONTC may, in its sole discretion, disqualify any or all of the Proposals submitted by that person or entity or in which that person or entity is a participant.

SECTION 6 - PROPOSAL EVALUATION

6.1 Evaluation Team

(1) ONTC will establish an evaluation team for the purpose of evaluating Proposals (the "**Evaluation Team**").

(2) The Evaluation Team may, in its sole discretion, delegate certain administrative functions related to the evaluation of Proposals to a separate team of individuals who are not members of the Evaluation Team, who will be supervised by the Evaluation Team. Without limiting the generality of the foregoing, but for greater particularity, the Evaluation Team may seek the advice and assistance of third-party consultants and the Government of Ontario. Each Respondent acknowledges that the RFP documents may have been prepared with the assistance of a third-party consultant and that the consultant may participate in the evaluation of the Proposals.

6.2 Evaluation of Proposals

(1) The Respondents' Proposals will be reviewed and evaluated by the Evaluation Team on the basis of the evaluation criteria set out in the RFP Data Sheet (the "**Evaluation Criteria**").

(2) After selection of the Short-listed Respondent(s), ONTC may, in its sole discretion, negotiate changes, amendments or modifications to the Short-listed Respondent's Proposal or the Final Agreement.

(3) If ONTC is of the opinion that any of the following apply, then ONTC may, in ONTC's sole discretion, decline to select that Respondent to be a Short-listed Respondent:

(a) a Respondent has submitted a price that is clearly insufficient to perform the supply of Goods and/or Services;

(b) a Respondent has previously provided poor performance to ONTC or a subsidiary of ONTC;

(c) a Respondent is disqualified from participating in the RFP Process per RFP Section 7.2 (1)(i);

(d) ONTC cannot, to ONTC's satisfaction, prior to the conclusion of the RFP Process, verify independently or through a third party or parties any and/or all information, statements, representations and/or warranties contained in the Proposal;

(e) a Respondent or any subcontractor of the Respondent is not financially sound, or ONTC is unable to obtain from the Respondent or third-party sources reasonable assurances of the financial position of the Respondent or any of its subcontractors;

(f) the overall cost to ONTC would be significantly increased with that Respondent;

(g) the Respondent failed to meet the mandatory requirements specified in the RFP Data Sheet; or,

(h) the Respondent failed to attain the minimum score required for the Technical Submission, where the RFP Data Sheet called for a two-envelope process.

6.3 Short-Listing

(1) The Evaluation Team will establish the list of Short-listed Respondents based on the Evaluation Criteria.

(2) The number of Respondents short-listed is in the sole discretion of ONTC.

6.4 Interviews, Site Visits, Demonstrations and Presentations

(1) ONTC may, in its sole discretion, conduct interviews, demonstrations, site visits or presentations as part of the evaluation process if set out in the RFP Data Sheet.

(2) The evaluation of any interviews, demonstrations, site visits or presentations will be conducted in accordance with the process set out in the RFP Data Sheet.

(3) ONTC may conduct interviews, demonstrations, site visits or presentations with some or all Respondents, or may restrict participation to only the Short-listed Respondent(s).

SECTION 7 - GENERAL EVALUATION AND DISQUALIFICATION PROVISIONS

7.1 ONTC's Discretion

(1) ONTC may determine, in its sole discretion:

(a) the membership of the Evaluation Team;

(b) if a Proposal is compliant with the RFP Documents;

(c) if a failure to comply is material;

(d) if a Proposal or a Respondent is disqualified;

(e) the evaluation results and ranking for each Respondent; and,

(f) which Respondent, if any, and how many Respondents, based on the evaluation process, will be Short-listed Respondents.

7.2 Disqualification

(1) ONTC may, in its sole discretion, disqualify a Respondent or a Respondent's Proposal or cancel its decision to identify a Respondent as a Short-listed Respondent or a Successful Respondent, at any time prior to the execution of the Final Agreement by ONTC, if:

(a) The Respondent fails to cooperate in any attempt by ONTC to clarify or verify any information provided by the Respondent in its Proposal;

(b) The Respondent contravenes RFP Section 3.5, RFP Section 3.6 or RFP Section 5.6(2);

(c) The Respondent fails to comply with the Applicable Laws;

(d) The Proposal contains false or misleading information, or the Respondent provides false or misleading information in any part of the RFP Process;

(e) The Proposal, in the sole discretion of ONTC, reveals a Conflict of Interest that cannot be managed, mitigated or minimized;

(f) There is evidence that the Respondent colluded with one or more other Respondents in the preparation or submission of Proposals;

(g) The Respondent has previously breached or been in default of compliance with any term of any agreement with ONTC and such breach or default has not been waived by ONTC or the Respondent has not cured the default;

(h) The Respondent has been convicted of an offence in connection with any services rendered by the Respondent to ONTC, or to any Ministry, Agency, Board or Commission of the Government of Ontario or the Government of Canada;

(i) The Respondent, at the time of issuance of this RFP or any time during the RFP Process, has an outstanding claim or is engaged in an ongoing legal dispute with ONTC, other than an adjudication under the Construction Act;

(j) The Proposal is not Substantially Compliant;

(k) The Respondent has failed to notify ONTC of, or ONTC has not approved, a post-submission change in the control of the Respondent or in the circumstances of the Respondent that may materially negatively impact the Respondent's ability to perform its obligations if selected as the Successful Respondent; and,

(l) The Respondent has received a Vendor Performance Evaluation as part of ONTC's Vendor Performance Policy, and received a total rating on the Final Performance Form that disqualifies the Respondent from participating in the RFP Process.

(2) Notwithstanding Section 7.2 (1), ONTC shall retain the right to select as the Successful Respondent, any Respondent(s) which, in ONTC's sole and absolute discretion, has submitted a substantially compliant Proposal(s).

7.3 General Rights of ONTC

(1) ONTC may, in its sole discretion and at any time during the RFP process:

(a) reject any or all of the Proposals;

(b) accept any Proposal or any portions of any Proposals for any reason whatsoever;

(c) reject any Proposals or any portions of Proposals for any reason whatsoever;

(d) if only one Proposal is received, elect to either accept it, reject it, or enter into negotiations with the applicable Respondent;

(e) elect not to proceed with, cancel, or terminate the RFP;

(f) alter the Submission Deadline or any other deadlines associated with the RFP Process;

(g) change the RFP Process or any other aspect of the RFP Documents; or,

(h) cancel this RFP Process and subsequently conduct another competitive process for the same Goods and/or Services that are the subject matter of this RFP or subsequently enter into negotiations with any person or persons with respect to the Goods and/or Services that are the subject matter of this RFP.

(2) If ONTC, in its sole discretion, is of the opinion that all of Proposals submitted are not substantially compliant, ONTC may:

(a) take any action in accordance with Section 7.3. (1);

(b) carry out a process whereby all Respondents are directed to correct the deficiencies in their Proposals for re-submission; or,

(c) negotiate an agreement for the whole or any part of the Goods and/or Services with a Respondent which has submitted a Non-compliant Proposal.

SECTION 8 – AGREEMENT FINALIZATION AND DEBRIEFING AND SUCCESSFUL RESPONDENT

8.1 Finalization of the Agreement

(1) ONTC may, in its sole discretion, retain more than one Respondent to provide the Goods and/or Services.

(2) ONTC reserves the right in its sole discretion to sub-divide and/or bundle the Goods and/or Services which are the subject of this RFP and award one or any number of separate contracts for the Goods and/or Services.

(3) ONTC may, in its sole discretion, enter into negotiations with one or more Respondent(s) for the purpose of selecting a Successful Respondent(s) and finalizing an agreement.

(4) Either ONTC or a Respondent may withdraw from negotiations at any time prior to the Successful Respondent(s) being identified.

(5) The Successful Respondent is expected to enter into the relevant CCDC form of agreement which shall include the Supplementary Conditions in Part 5. Proposal Form 5 – Compliance with Contract Documents allows a Respondent to submit suggested changes to the Supplementary Conditions. ONTC does not have any obligation to accept any proposed changes to the Supplementary Conditions and will do so in its sole discretion. ONTC may, in ONTC's sole discretion; (i) consider only a minimal number of changes to the Supplementary Conditions; (ii) consider significant material proposed changes to negatively impact the evaluation of the Respondent's proposal; or (ii) disqualify any Respondent where the changes or the number of changes made by the Respondent to the Supplementary Conditions would be, in ONTC's sole discretion, too onerous to successfully negotiate within the timeframe set out in Section 8.1 (6) below or are unacceptable to ONTC.

In any event, ONTC will not accept any material changes to the clauses in the Supplementary Conditions relating to the Confidentiality, Personal Information, Intellectual Property ownership and infringement, Indemnification, Limitation of Liability or rights of ONTC on termination. ONTC, as an Ontario Crown corporation, is unable to provide indemnities pursuant to s.28 of the *Financial Administration Act* (Ontario).

If a Respondent does not submit any proposed amendments in Proposal Form 5, it will be deemed to have accepted and will be required to execute the Final Agreement in the form attached to this RFP. If a Respondent has submitted proposed amendments to the Final Agreement, negotiations respecting those amendments shall be conducted within the timeframe set out in Section 8.1(6).

(6) If a Successful Respondent fails or refuses to enter into and execute the Final Agreement within ten (10) Business Days of being notified they are the Successful Respondent

(ONTC may extend such period of time in ONTC's sole discretion), or a Successful Respondent fails or refuses to provide the documentation in accordance with Section 8.1(7), ONTC may, in its sole discretion, take any one of the following actions:

(a) terminate all negotiations and cancel its identification of that Respondent as a Successful Respondent;

(b) select another Respondent or Short-Listed Respondent as the Successful Respondent;

(c) retain the bid security described in Section 4.3 to compensate for any damages suffered by ONTC as a result of the Successful Respondent's failure or refusal to enter into the Final Agreement;

(d) take any other action in accordance with Section 7.3; or,

(e) pursue any other remedy available to ONTC at law.

(7) Prior to supplying any Goods and/or Services pursuant to the Contract, the Successful Respondent shall deliver to ONTC:

(a) The performance bond and the labour and material bond described in the RFP Documents. The form of such bonds shall comply with the requirements prescribed in the *Construction Act*. Refer to the link below for the appropriate forms (Form 31 and 32).

http://ontariocourtforms.on.ca/en/construction-lien-act-forms/

(b) Certificates of insurance as specified in the CCDC 2-2020;

(c) Executed Contractors Health and Safety Responsibility Agreement;

(d) Respondent's Health and Safety, and Environmental Policies; and,

(e) A current Clearance Certificate issued by the Workplace Safety and Insurance Board, if applicable.

8.2 Notification If Successful or Not

(1) The Successful Respondent and unsuccessful Respondents will be notified by ONTC in writing regarding their success or failure in the RFP Process.

8.3 Debriefing

(1) Respondents may request a debriefing after receipt of a notification pursuant to RFP Section 8.2. All Respondent requests should be in writing to the Contact Person no later

than 60 calendar days after receipt of the notification. ONTC will conduct debriefings in the format prescribed by the OPS Procurement Directive.

SECTION 9 - LEGAL MATTERS AND RIGHTS OF ONTC

9.1 Limit on Liability

(1) The total liability of the Respondent to ONTC for loss and damage arising from the Respondent who is selected as the Successful Respondent but then fails to deliver the Contract Security, evidence of insurance or other documents required under Section 8.1(7) within the time period specified in Section 8.1(6) or fails to execute the Final Agreement shall be limited to the value of the Bid Performance Security provided by the Respondent pursuant to Section 4.3. The liability of the Respondents for any other loss or damage suffered by ONTC as part of this RFP Process shall be without limit.

(2) By submitting a Proposal,

(a) each Respondent acknowledges ONTC's rights as stated herein and absolutely waives any right of action against ONTC for ONTC's failure to accept the Respondent's Proposal whether such right of action arises in contract, negligence, bad faith, or any other cause of action;

(b) each Respondent covenants and agrees that, under no circumstances, shall ONTC, or any of its employees, officers, representatives, agents or advisors, be liable to any Respondent, whether in contract, tort, restitution, or pursuant to any other legal theory, for any claim, action, loss, damage, cost, expense or liability whatsoever and howsoever arising from this RFP Process, a Respondent's Proposal in response to this RFP Process, or due to the acceptance or non-acceptance of any Proposal, or as a result of any act or omission by ONTC and/or its employees, officers, representatives, agents or advisors, including any information or advice or any errors or omissions that may be contained in the RFP Documents, or any other documents or information provided to a Respondent, or arising with respect to the rejection or evaluation of any or all of the Proposals, any negotiations with any of the Respondents, or the selection of any Respondent as a Short-listed Respondent or the Successful Respondent; and,

(c) each Respondent shall indemnify and hold harmless ONTC, its employees, officers, representatives, agents and advisors, from and against any and all claims, demands, actions or proceedings brought by third parties, including but not limited to the Respondent's subcontractors or suppliers, in relation to this RFP Process.

9.2 Power of Legislative Assembly

(1) No provision of the RFP Documents (including a provision stating the intention of ONTC) is intended to operate, nor shall any such provision have the effect of operating, in any

way, that would interfere with or otherwise fetter the discretion of the Legislative Assembly of Ontario in the exercise of its legislative powers.

9.3 RFP Not a "Bidding Contract" or a Tender

(1) Notwithstanding any other provision of this RFP, this RFP is not a tender call, ONTC does not intend to create any contractual relations or obligations with any of the Respondents by virtue of issuing this RFP, and this RFP is not an offer to enter into a contract (often referred to as "Contract A"). Except as provided in RFP Section 3.8, 4.3 and 9.1, neither this RFP nor the submission of a Proposal by a Respondent shall create any legal or contractual rights or obligations whatsoever on any of the Respondent, ONTC, the Government of Ontario or any Ministry of the Government of Ontario.

SECTION 10 – VENDOR PERFORMANCE

10.1 General

(1) ONTC has established a Vendor Performance Policy, which provides a framework for ONTC to maximize the value for money of its Vendors by:

(a) proactively managing the performance of Vendors in accordance with ONTC's Purchasing Policy; and,

(b) creating a record of past performance for use by ONTC when selecting Vendors for the supply of goods and services.

10.2 Vendor Performance Evaluation

(1) Successful Respondents who enter into a Final Agreement with ONTC may be required to participate in the Vendor Performance Evaluation process.

10.3 Vendor Ratings for Proposal Evaluation Purposes

(1) ONTC may access a Respondent's Vendor Performance Evaluations for previous contracts as part of the Evaluation Process. The manner in which the Respondent's ratings will be used will be identified in the Evaluation Criteria of the RFP Data Sheet.

SECTION 11 – TRANSPARENCY AND FAIRNESS

11.1 General

(1) ONTC is committed to procuring goods and services through a process that is conducted in a fair and transparent manner, providing equal opportunity to vendors.

(2) ONTC endeavors to provide specifications that meet the requirements of the procurement without naming specific brands. However, there may be instances where a third-party consultant prepares a specification on behalf of ONTC, and a specific brand is named. In these instances, alternate materials or products may be used if ONTC determines the proposed materials or products are equivalent to the materials or products in the

specifications. Respondents shall submit proposed alternate materials or products with their Proposal submission to be considered.

SECTION 12 – INTERPRETATION

12.1 General

(1) In this RFP, the singular shall include the plural and the plural shall include the singular, except where the context otherwise requires.

(2) All references in this RFP to “discretion” or “sole discretion” means in the sole and absolute discretion of the party exercising the discretion.

(3) For clarity, where the expression “Government of Ontario” is used in this RFP, it includes all Ministries and Agencies of the Government of Ontario.

Ontario Northland

PART 2

REQUEST FOR PROPOSALS

SUMMARY OF REQUIREMENTS

PART 2 – REQUEST FOR PROPOSALS
SUMMARY OF REQUIREMENTS
SCHEDULE 2-A
RFP DATA SHEET

RFP 2024 013 New Hearst Mechanical Shop	
Contact Details	
Contact Person	Brinda Ranpura, Procurement Contracts Specialist
Contact Information	555 Oak Street East North Bay, Ontario, P1B 8L3 brinda.ranpura@ontarionorthland.ca (705) 472-4500 ext. 548
Proposal Detail	
Respondents' Meeting	A mandatory Respondents' Meeting carried out by Teams conference call will take place on Thursday, May 16, 2024 at 1:00 p.m. Respondents must complete the Respondents' Meeting Registration Form and return it via email by Wednesday, May 15, 2024 at 4:00 p.m. to Brinda Ranpura at brinda.ranpura@ontarionorthland.ca. Registered respondents will receive an email to the Teams call.
Validity of Proposals	90 days following the Submission Deadline
Format of Submission	Respondents shall submit their Proposal through MERX Electronic Bid Submissions (EBS). Refer to Part 1, Request for Proposals, Section 5.1 (1) (a). **MERX EBS does not allow Proposals to be uploaded after the Submission Deadline; therefore, Respondents shall ensure they allow sufficient time to upload the documents.** Proposals which are submitted by facsimile transmission, by email or by electronic means other than MERX will NOT be considered.
Two-Envelope Process	This procurement will not be a two-envelope process.
Distribution Method	The RFP Documents will be posted on the ONTC website and MERX. Any addenda to the RFP will be shared with those Respondents who attended the Mandatory Respondents' Meeting.

PART 2 – REQUEST FOR PROPOSALS
SUMMARY OF REQUIREMENTS
SCHEDULE 2-A
RFP DATA SHEET *continued*

RFP 2024 013 **New Hearst Mechanical Shop**			
Proposal Detail *continued* – *Note the requirements below are new to ONTC*			
Submission Requirements	Respondents are required to submit **all** of the documents listed below as part of their Proposal. Respondents shall confirm they have included the documents listed below with their Proposal by placing a checkmark in the column "Included in Proposal". If the Respondent fails to include a document listed below as being "Material", the respondent may be disqualified in accordance with section 6.2 (3) of the RFP.		
	Item	**Included in Proposal (indicate with ✓)**	**Item is classified as Material**
	This checklist		
	Proposal Form 1 - Proposal Submission Form		Material
	Proposal Form 2 - Respondent's General Information		Material
	Proposal Form 3 - Acknowledgment to Comply with Part 3 – Request for Proposals Specifications		Material
	Proposal Form 4 - References		Material
	Proposal Form 5 - Compliance with Contract Documents		
	Proposal Form 6 – Respondents' Meeting Registration Form		Material
	Proposal Form 7 - Health, Safety and Environment		Material
	Proposal Form 8 - Schedule of Materials		
	Proposal Form 9 - List of Equipment		
	Proposal Form 10 - Schedule and Proposed Approach		Material
	Proposal Form 11 - Schedule of Progress Payments		
	Proposal Form 12 - List of Personnel and Resumes		Material
	Proposal Form 13 - Current Labour Agreements		
	Proposal Form 14 - Contractor's Qualification Statement		Material
	Proposal Form 15 - Claims		
	Bid Performance Security as prescribed in Part 1, Request for Proposals, Section 4.3.		Material

PART 2 – REQUEST FOR PROPOSALS

SUMMARY OF REQUIREMENTS
SCHEDULE 2-A *continued*
RFP DATA SHEET

RFP 2024 013 New Hearst Mechanical Shop			
Important Dates			
Publication Date	Thursday, May 02, 2024		
Participation Registration Form	Complete and submit to the Contact Person as soon as possible		
Deadline for Additional Information Request	Four (4) full Business Days prior to the Submission Deadline		
Submission Deadline Date and Time	Monday, June 03, 2024, at 2:00:00 p.m. (EST)		
Target Completion Date	December 31, 2024		
Notes Pertaining to Final Agreement			
Liquidated Damages	The per diem rate calculated in relation to Section 10.4 of the Supplementary Conditions $500 for each calendar day of the delay beyond the prescribed date for Substantial Performance of the Work until Substantial Performance of the Work is achieved and certified, pursuant to the terms of the Contract.		
Procedure of Selection			
Mandatory Requirements	Respondents must first satisfy that all of the Mandatory Requirements listed below have been met. Respondents will receive a pass/fail for each Mandatory Requirement. Respondents who fail any of the Mandatory Requirements will be disqualified from the RFP Process.		
	Mandatory Submission Requirement	**Pass**	**Fail**
	Respondent has participated in the Mandatory Respondents' Meeting		
	Respondent has submitted all of the documents as specified in the Submission Requirements listed in Part 2, Request for Proposals, Summary of Requirements, RFP Data Sheet		
	Respondent has provided sufficient evidence to pass the Contractor Safety Pre-Qualification (Part 4 – Form of Proposal, Proposal Form 7, Health, Safety and Environment)		
	Bid Bond and Agreement to Bond included in Proposal Submission (scanned copy acceptable)		

PART 2 – REQUEST FOR PROPOSALS
SUMMARY OF REQUIREMENTS
SCHEDULE 2-A *continued*
RFP DATA SHEET

RFP 2024 013 **New Hearst Mechanical Shop**		
Procedure of Selection *continued*		
Evaluation General Procedure	Respondents must score a minimum of 60% for both Experience and Qualifications and Schedule and Proposed Approach to qualify for shortlist consideration. Respondents who fail to score a minimum of 60% in these categories will be disqualified from the RFP Process.	
Evaluation Criteria	**Description**	**Weight**
	Price ONTC will use the following to calculate the initial score for price: Lowest price of all Proposals / price of Respondent x 45 = Score *ONTC reserves the right in its sole discretion to consider the best overall value when evaluating price and adjust the score accordingly. If ONTC, in its sole discretion, is of the opinion that the Respondent has submitted a price that is too low to adequately complete the scope of work, then ONTC reserves the right not to use that price as the "Lowers price of all Proposals".*	45
	Experience and Qualifications ONTC will assess Respondents' experience and qualifications using the information supplied as part of Part 4 of this RFP. The following sub-weights will apply: Resumes of Key Personnel – **3 points** Company Profile – **2 points** Project Profile 1, 2 and 3 – **10 points** (ONTC may or may not contact references as part of the evaluation and may use this information as part of this score)	15
	Schedule and Proposed Approach ONTC will assess the Respondent's Schedule and Proposed Approach based on the following: Is the Schedule in the format requested and are the milestone dates in conjunction with the ONTC deadline? **3 points** Has the critical path been identified? **2 points** Is the schedule and proposed approach logical and does it have sufficient detail with durations for each task? **10 points**	15

PART 2 – REQUEST FOR PROPOSALS
SUMMARY OF REQUIREMENTS
SCHEDULE 2-A *continued*
RFP DATA SHEET

RFP 2024 013 **New Hearst Mechanical Shop**		
Procedure of Selection *continued*		
Evaluation Criteria	**Local Knowledge** Describe your experience with the climatic and environmental requirements in Northern Ontario – **10 points**	10
	Local Benefit Describe how and when you will use local workforce, local vendors, local manufacturers, local contractors, and local apprentices/trainees to achieve the project goals and provide the requested services – **5 points** Describe your organization's diversity programs – **5 points**	10
	Environmental and Sustainability Provide evidence of compliance to Ontario's environmental requirements (e.g. recycling, waste management, etc.) – **5 points**	5
	Total	**100**

PART 2 – REQUEST FOR PROPOSALS
SUMMARY OF REQUIREMENTS
SCHEDULE 2-B
PARTICIPATION REGISTRATION FORM

Required in order to register and receive any communications in relation to the requirement referenced below.

Date:
Reference Number: RFP 2024 013
Description of Requirement: New Hearst Mechanical Shop

I, the undersigned, am registering to participate in the above referenced requirement and will be the primary contact for any communications in relation to this process and project until further advised.

Company Name: _____
Address: _____
_____

Name of person registering to represent company referenced above (please print): _____
Email Address: _____
Phone Number: (Main Office Number) _____
Cell Number: _____

Signature of Primary Contact: _____

Return form to the Contact Person as referenced below via email as an attachment:

Thank you.

Brinda Ranpura
Procurement Contracts Specialist
Ontario Northland Transportation Commission
Phone: 705-472-4500 Ext. 548
Email: brinda.ranpura@ontarionorthland.ca
Website: www.ontarionorthland.ca

Ontario Northland

PART 3

REQUEST FOR PROPOSALS

SPECIFICATIONS

PART 3 – RFP SPECIFICATIONS
SCHEDULE 3-A-1
SCOPE OF WORK

Summary

The NEW Mechanical Shop will measure 37’ W x 57’ L x 16’ H and will be built on a reinforced concrete slab on grade.

The following is a general description of the work to be done by **December 31, 2024**. The work to be done is detailed in the drawings and documents attached to this RFP.

Respondent will supply:

- Storm water management plan for all construction required for the installation of the new building.
- All construction must meet the National Building Code of Canada, the National Fire Code of Canada, the Ontario Building Code and Ontario Fire Code.
- The Respondent will be required to supply all labor, material, equipment, travel, living expenses, permits, fees, and all others to complete the project.

Project NEW Hearst Mechanical Shop Location Map

Canada, ON, Hearst, 49.691154, -83.665733

PART 3 – RFQ SPECIFICATIONS

SCHEDULE 3-A-2
SPECIFICATIONS

Specifications

Division 00	
00 31 00	Available Project Information
Division 01	
01 11 00	Summary Of Work
01 14 00	Work Restrictions
01 31 19	Project Meetings
01 32 00	Construction Progress Documentation
01 32 16.16	Construction Progress Schedule – Critical Path Method (CRM)
01 32 33	Photographic Documentation
01 33 00	Submittal Procedures
01 35 29.06	Health and Safety Requirements
01 35 35	Fire Safety Requirements
01 35 43	Environmental Procedure
01 41 00	Regulatory Requirements
01 43 00	Quality Assurance
01 45 00	Quality Control
01 51 00	Temporary Utilities
01 52 00	Construction Facilities
01 55 26	Traffic Controls
01 56 00	Temporary Barriers and Enclosures
01 57 00	Temporary Controls
01 61 00	Common Products Requirements
01 71 00	Examination and Preparation
01 73 00	Execution
01 74 00	Cleaning
01 74 19	Waste Management and Disposal
01 77 00	Closeout Procedures
01 78 00	Closeout Submittals
01 79 00	Demonstration and Training
01 91 13	General Commissioning Requirements
01 91 13.13	Commissioning Plans
01 91 13.16	Commissioning Forms

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 DEFINITIONS

.1 Available Project Information: information identified in this section, of any type, and in any form, and identified as Reference Documents. Available Project Information, or any part thereof, does not form part of the Contract Documents unless specifically incorporated into Contract Documents by means of copying, transcribing, or referencing, or is listed in the Agreement as a Contract Document.

.2 Contractor: synonymous with Respondent

1.03 USE AND RELIANCE UPON AVAILABLE PROJECT INFORMATION

.1 Available Project Information is made available to Respondents for the purpose of disclosing information that is available to the Consultant and Owner.

.2 Per CCDC, Available Project information is made available to Respondents to fulfill the Owner's duty to disclose all relevant Project information to Respondents.

.3 Do not consider the Available Project Information as a representation or warranty that the information is necessarily accurate, complete, or appropriate.

.4 Respondents are responsible for interpreting and forming their own conclusions about the Available Project Information, including consideration of the time the document was created. Respondents are encouraged to obtain specialist advice if necessary. The Owner and Consultant assume no responsibility for interpretations or conclusions made.

.5 In the event there is a conflict between the Contract Documents and the recommendations contained in the Available Project Information, the Contract Documents shall govern.

1.04 AVAILABLE PROJECT INFORMATION

.1 The following Available Project Information is not incorporated into the Contract Documents, but is made available to Respondents:

.1 Geotechnical: 02311183 - GI, New Mechanical Building (ONTC) - Final

.2 Locates: Hearst Mechanical Private Locate 1-2 and 2-2

.3 Topo: NL2024-002_TOPO_v1

.4 DSS Report: ONR - Hearst Maintenance Buildings - DSS Report

.2 The following Available Project Information is incorporated into the Contract Documents:

.1 canadian-rail-operating-rules-may-9-2022

.2 ONTC Electrical Safety Policy and Program

.3 ONTC Hot-work-program

.4 ONTC Policy - Contractor Subcontractor

.5 Railway Flagging Protection Policy

1.05 RELATED INSTRUCTIONS

.1 Report any irregularities or changed surface conditions at the Place of the Work to the Owner a minimum of 7 days before RFP close.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

1. Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Refer to Specification Index for Sections applicable to this work.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract includes the following:

.1 Demolition of existing old building and the construction of a new building.

a. Site Work:

i. Create a construction island including perimeter fencing. Coordinate with location ONTC.
ii. Arrange and pay for all onsite locates before starting any excavations
iii. Complete all excavation and backfill to install new mechanical building
iv. Complete all excavation and back fill to install all new services/utilities. See M/E
v. Install new receiving slab at new overhead/man doors as shown on architectural drawings
vi. Regrade area affected by construction to provide positive drainage away from new building drain toward existing ditches / catch basins.
vii. Backfill & compact with approved material as per geotechnical report & noted on drawing
viii. Cap all affected area with 6” of compacted granular “A”
ix. make themselves aware of the complexity and existing site condition.

b. Demolition:

i. Supply all equipment, labour and materials as required for demolition and off-site removal of both existing mechanical buildings. Contractor to coordinate with ONTC regarding possible hazardous substances and take all necessary precautions to maintain safe working conditions. Contractor to allow for removal of existing building foundations as required at location of new building foundation to be installed. Demolition to be reviewed at pre-tender meeting to determine any additional demolition that may be required.

c. New Building

i. Foundation Work (Supply and Install)

1. New foundation system for new mechanical building as shown on design drawings

ii. Steel work (Supply and Install)
    1. All structural steel as shown on the design drawings
iii. Roof Deck (Supply and Install)
    1. Deck including all required closures as shown on the drawings
iv. Building Envelope
    1. Building walls, roofing, insulation, vapour barriers, cladding, flashings, windows, doors, caulking and all other items to make the work complete.
v. Finishes and Paint
    1. Provide all interior room finishes to match those shown on the design drawings. Any additional required finishes not shown on design drawings should be brought the consultant and owners attention immediately.
    2. Paint all interior and exterior surface as required (one coat primer 2 finish coats colour by ONTC)
vi. Misc. metals
    1. Bollards, canopy framing,
vii. Mechanical Electrical items
    1. Refer to M&E drawings and specification for all required items
viii. Additional items
    1. Patch and repair all items affected by construction back to existing condition. To the approval of the ONTC
ix. Special items
    1. Provide Consultant with “issued for review” shop drawings as per general note requirements. See note sheet for items requiring shop drawings.
    2. Provide as built drawings showing any and all changes to the original design.
    3. Obtain/purchase all permits & ministry notifications as required
    4. Coordinate all site visits with ONTC local supervisor
    5. Coordinate construction island/ramp usage with ONTC local supervision
    6. Coordinate required site inspections with independent test firms & Northshore Engineering

.2 The Summary of Work provided above is for reference only:

.1 The contractor shall undertake the Work during the summer of 2024, with all Work to be completed by March 15, 2025.

1.04 SUBMITTALS

.1 Submit for review and Acceptance in accordance with Section 01 33 00 - Submittal Procedures.

.2 In addition to Submittals identified throughout the Specifications, submit the following:

.1 Submit Project Construction Schedule in accordance with Section 01 32 16.16 - Construction Progress Schedule.

.2 Submit Construction Waste Management Plan highlighting recycling and salvage requirements in accordance with Section 01 74 19 - Waste Management and Disposal.

.3 Submit site-specific Health and Safety Plan in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.4 Submit a Construction Project Management Plan, including communication, risk, and Quality Management Plans.

1.05 WORK BY OTHERS

.1 The Work under this Contract shall be performed by the Contractor.

.2 Contractor shall co-operate with other contractors retained by the Owner in carrying out their respective works and carry out instructions from the Owner and the Consultant. Refer to Contract Documents for additional requirements.

1.06 WORK SEQUENCE

.1 Construct Work in a manner that accommodates Owner's and public continued and/or intermittent use of premises during construction. Refer to Section 01 14 00 - Work Restrictions.

.2 Co-ordinate Construction Schedule and Owners use of premises during construction.

.3 Do not close off Owner or public usage of premises until use of one stage of Work will provide alternate usage.

.4 Maintain fire access/control.

.5 Protect workers and public safety.

.6 Work near rail tracks shall be preapproved by the Owner and completed as per Owner's procedures and policies.

1.07 CONTRACTOR USE OF PREMISES

.1 Contractor shall establish a Construction Area where the Contractor assumes the role of Constructor and will be responsible for the Construction Area until Ready for Takeover. The Contractor will be required to secure the Construction Area for the duration of the Project. The Contractor will be responsible for all activities inside the Construction Area, including health and safety. The Contractor shall coordinate the Work with the Owner to ensure that work being done by the Owner in the areas outside of the Construction Area is not interrupted. Access by the Contractor shall be restricted to the Construction Area only.

.2 In some circumstances, Contractor shall coordinate and limit its access to Construction Area to allow:

.1 Owner occupancy.

.2 Partial owner occupancy.

.3 Work by other contractors or utilities providers.

.4 Public usage.

.5 Third Party Property Owner occupancy and use.

.3 Co-ordinate use of premises under the direction of the Owner.

.4 Refer to Section 01 51 00 - Temporary Utilities, Section 01 52 00 - Construction Facilities and Section 01 56 00 - Temporary Barriers and Enclosures, for temporary facilities, access roads and parking areas, traffic regulations, and utilities.

1.08 OWNER OCCUPANCY

.1 Owner may occupy premises (adjacent buildings, railway tracks) during the entire construction period for execution of normal operations.

.2 Co-operate with the Owner in scheduling of the Work to minimize conflict and to facilitate Owner occupancy and usage of the premises.

1.09 Products Supplied by Others

.1 Contractor is responsible for receiving, unloading, if required, and handling Products Supplied by Others at the project site; setting or installing the Products in place; making any required connections to the mechanical, plumbing, electrical systems, and any other systems; and disposal of shipping or packing materials. Owner and/or Consultant and Contractor shall jointly inspect the Products for damage upon delivery to the Place of the Work. If this inspection determines that the furnished Products are damaged or defective, the Owner will arrange for the necessary replacement or repairs. Contractor is responsible for protecting the Products Supplied by Others from damage during storage and handling and is responsible for damage caused to those Products during storage and handling.

.2 Contractor to install all Products Supplied by Others in accordance with the manufacturer's installation instructions and the design Drawings, Specifications and Contract Documents.

.3 Contractor to review manufacturer's installation instructions and advise the Consultant of any discrepancies or issues in a timely manner to avoid any potential delays.

.4 Contractor to obtain manufacturer and Consultant approval before making any modification to Products Supplied by Others.

.5 Upon completion of the installation of the Products Supplied by Others, the Contractor, the Consultant and/or the Owner will inspect the Work. Manufacturers and or Suppliers may participate in the inspection as required by their contract obligations. Upon Acceptance, the Contractor will provide a workmanship warranty in accordance with the Contract Documents.

1.10 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING AND STRUCTURES

.1 Execute Work with least possible interference or disturbance to premises, site, Owner operations, occupants, public and normal use of premises. Arrange with the Consultant and Owner to facilitate execution of Work.

.2 Use only elevators existing in the building for moving workers and material.

1. Investigate the status of existing elevators in building(s) to determine if they are functional and safe for moving workers and materials before the Work starts.

2. Provide the required protection for passenger elevators walls and obtain the Owner approval before using these elevators.

3. Accept liability for damage, safety of equipment and overloading of existing equipment.

1.11 EXISTING SERVICES

.1 Notify the Owner, the Consultant, Third Party Property Owners when applicable, and utility companies of intended interruption of existing services and obtain required permissions when applicable.

.2 Where Work involves breaking into or connecting to existing services, provide the Owner at least five (5) Working Days' notice of necessary interruptions of mechanical or electrical service during the Work. Minimize the duration of interruptions. Carry out Work at times as directed by Authorities Having Jurisdiction and the Owner to ensure minimum disturbance to pedestrian and vehicular traffic and the Owner operations.

.3 Provide alternative safe and protected routes for personnel, pedestrian and vehicular traffic.

.4 Establish location and extent of service lines in the Place of the Work before starting Work. Notify the Consultant of findings.

.5 Submit schedule for Acceptance by the Consultant ten (10) Working Days before any scheduled work for any shut-down or closure of active service or facility including power and communications services. Adhere to Accepted schedule and provide notice to affected parties. Refer to Section 01 14 00 - Work Restrictions.

.6 Provide temporary services when directed by the Owner to maintain critical operations, building and tenant services. Refer to Section 01 14 00 - Work Restrictions.

.7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.8 Where unknown services are encountered, immediately advise the Consultant and confirm findings in writing.

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in a manner approved by Authorities Having Jurisdiction and the Consultant.

.10 Record locations of maintained, re-routed and abandoned service lines.

.11 Construct barriers, as required, in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.12 Locate and trace existing underground services before any excavation.

.13 Any damage to existing services during the Work will be the responsibility of the Contractor.

1.12 DOCUMENTS REQUIRED

.1 Maintain at the Place of the Work, one copy of each document as follows:

.1 Contract Documents.

.2 Contract Drawings.

.3 Technical Specifications.

.4 Accepted Shop Drawings, Product data and samples.

.5 List of Outstanding Shop Drawings.

.6 Change Orders.

.7 Other Contract Amendments.

.8 Field Test Reports.

.9 Copy of Accepted Construction Schedule.

.10 Health and Safety Plan and Other safety related documents.

.11 As-Built Drawings.

.12 Other documents as specified.

2 EXECUTION

2.01 General Requirements:

.1 Contractor will be required to complete the Work in accordance with applicable federal, provincial, and municipal laws.

.2 The Contractor shall designate a Project Manager with overall responsibility for the Work. The Contractor will also designate a site supervisor who will be responsible for managing the Work at each site and be responsible for on-site safety, including all Sub-contractors and Suppliers. The site supervisor will be the single point of contact at each site. This site supervisor will be required to communicate with the Consultant and Owner as required to ensure the Work is completed safely with no impact on Owner operations.

.3 The Contractor will be required to coordinate their hours of work with the Owner.

.4 The Contractor’s employees, Subcontractors, and Suppliers will be required to sign in and sign out every time they enter or leave the Place of the Work using a sign-in/sign-out log book which will be held by the site supervisor in charge of that site.

.5 Contractor shall supply all necessary tools, machinery, and equipment to perform the Work including, but not limited to, forklifts, mobile cranes, hoisting equipment, scaffolding, ladders, man lifts, temporary lighting, heating, welding machines, ventilation, consumables, and any other material or equipment required to complete the Work. The Contractor shall provide all necessary vehicles and qualified personnel to transport people and materials.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

1. Canadian Construction Documents Committee (CCDC)

    .1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Canadian Rail Operating Rules.

.2 ONTC Contractor/Subcontractor Policy.

.3 Contractors Working On ONTC Property Near Railway Tracks.

.4 Railway Flagging Protection Policy

.5 Section 01 73 00 - Execution

1.03 ACCESS AND EGRESS

.1 Design, construct and maintain temporary “access to” and “egress from” Construction Areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with the applicable laws of Authorities Having Jurisdiction.

1.04 USE OF SITE AND FACILITIES

.1 Execute Work with least possible interference or disturbance to normal use of premises. Make arrangements with Consultant to facilitate Work as stated.

.2 Where premises are not owned by the Owner or are leased to Third Party Property Owners, provide written notification of access and planned Work to the Consultant (10) Working Days prior to the Work commencing.

.3 Maintain existing services to building and provide for safe and protected access for people and vehicles.

.4 Where security is reduced by the Work provide temporary means to maintain security.

.5 Closures: protect the Place of the Work temporarily until permanent enclosures are completed.

.6 Carry out Work Monday to Friday during hours of 7:00 am to 5:00 pm. Work outside of these hours, including on weekends, shall be pre-approved. Submit a request to the Consultant for review and approval to work outside these hours a minimum of five (5) Working Days prior to the work commencing.

1.05 SPECIAL REQUIREMENTS

.1 Protect rail infrastructure as directed by the Owner and obtain approval before working near live tracks. Submit a request to the Consultant in accordance with the Contractors Working On ONTC Property Near Railway Tracks and Railway Flagging Policies for any scheduled work near rail tracks. Requests should be submitted seven (7) Working Days prior to the Work commencing. Include in the request the scope of Work, proposed schedule (duration) and names of workers who will perform the Work. Follow the ONTC policies while working near tracks. Work near tracks will be supervised by the Owner. The Owner will provide a qualified person for flagging protection. Upon completion of the Work, clean the area and return the area and affected adjacent areas to their original or better conditions. Adhere to direction of the person providing flagging protection to ensure the site is safe and ready to resume rail operations.

.2 Ensure Contractor's personnel on site are familiar with and obey the policies and safety, fire, traffic and security regulations and have completed the ONTC site orientation training.

.3 Keep within limits of Work and avenues of ingress and egress.

.4 Contractor may apply for Line Closures if required. Line Closures will not be granted within the times outlined in Section 1.09 Train Timetable for Station Work Near Mainline Track. Submit a request to the Consultant for review and approval a minimum of five (5) Working Days prior to the work commencing for any planned Line Closures.

.5 **Additional requirements**:

.2 Construct Work in stages and in a manner that accommodates the Owner's continued and/or intermittent use of premises during construction.

.3 ONTC operations shall not be interrupted. Coordinate with Consultant to facilitate the execution of the work with minimal disruption.

.4 Arrange and obtain Consultant approval for any temporary utility outages a minimum of seven (7) Working Days prior to the commencement date of the Work, including details about the Work to be completed and the schedule for the Work. Provide temporary power services to ensure no outages to maintain critical operations, building and tenant services.

.5 Limit access to the Construction Area.

.6 Employ just-in-time delivery methods to minimize required storage and laydown space.

.7 Arrange and obtain Owner approval to access ONTC building to complete Work under this Contract. Submit a request to Owner and the Consultant a minimum of seven (7) Working Days prior to the proposed commencement date for the Work, including details about the Work to be completed, the schedule for the Work and a list of Contractor employees and Subcontractors and Suppliers involved in the Work.

.8 Do not move Products and Construction Equipment through the building, unless authorized by the Owner.

.9 Park vehicles in locations approved by Consultant.

.10 Where the excavation, cutting and/or patching is required closely or immediately adjacent to,

and/or drilling into, the existing building foundation assess impact and provide for Acceptance a site plan which demonstrates structure is not affected and specifies reinstatement prior to undertaking the Work.

.11 Contractor shall not access Third Party leased land without prior approval by the Owner. Submit a request to Owner and the Consultant a minimum of seven (7) Working Days prior to the proposed commencement date for the Work, including details about the Work to be completed, the schedule for the Work and a list of Contractor employees and Subcontractors and Suppliers involved in the Work.

.12 Park vehicles in locations approved by the Consultant and Third-Party Property Owner.

.13 Where the excavation, cutting and/or patching is required closely or immediately adjacent to, and/or drilling into, the existing building foundation assess impact and provide for Acceptance a site plan which demonstrates structure is not affected and specifies reinstatement prior to undertaking the Work.

.14 Inform Owner and the Consultant of large deliveries and arrange the delivery in a manner that will not affect ONTC operations or the safety of public.

.15 Obey site traffic rules and speed limits.

1.06 SMOKING ENVIRONMENT

.1 Comply with smoking and vaping restrictions. Smoking and vaping are not permitted.

1.07 VIDEO SURVEILLANCE:

.1 Video surveillance cameras are installed on Ontario Northland-owned and leased property to ensure the safety and security of passengers, employees, visitors, assets, infrastructure and the public. In accordance with the Freedom of Information and Protection of Privacy Act (FIPPA), the use of video surveillance cameras is carried out in a manner that respects and minimizes privacy intrusion. Recorded video footage only is protected, used or disclosed for investigative purposes related to a health and safety matter, a railway occurrence or for an incident of suspected crime, property damage, motor vehicle damage or personal injury.

1.08 COMMUNICATION PROHIBITION:

.1 Owner will lead and make any announcements relating to the Work. The Contractor shall not make any announcement of any kind, including press releases, social media posts, public declarations, or any form of publication or announcement, in relation to the Work unless prior written consent is given by Owner. If the Contractor is contacted by any media outlet or other person or entity wishing to make any form of publication or announcement or seeking any information in relation to the Work, the Contractor shall not provide any information and shall refer the person to Owner and immediately notify Owner.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.03 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the Work in accordance with the Specifications and at the call of the Owner or the Consultant.

.2 Prepare agenda for meetings.

.3 Unless otherwise specified in Specification sections, distribute written notice of each meeting five (05) Working Days in advance of meeting date to the Owner, the Consultant and any other meeting participants.

.4 Provide physical space at one of the Places of Work and make arrangements for meetings.

.5 The Consultant will chair the meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three (03) Working Days after meetings and transmit to meeting participants and, affected parties not in attendance, the Owner and the Consultant.

.8 Representatives of the Contractor, Subcontractor and suppliers attending meetings shall be qualified and authorized to act on behalf of the party each represents.

1.04 PRECONSTRUCTION MEETING

.1 Within (10) Working Days after award of Contract and before Contractor mobilization to the Place of the Work, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities related to the Work.

.2 The Owner, Consultant, Contractor, major Subcontractors, field inspectors and supervisors and other parties, as applicable and at their discretion, will be in attendance.

.3 Arrange with the Consultant the time and location of meeting and notify parties concerned minimum five (5) Working Days before meeting.

.4 Agenda to include, but not limited to:

.1 Appointment of official representative of participants in the Work.

.2 Construction Schedule: in accordance with Section 01 32 00 – Construction Progress Documentation.

.3 Schedule of submission of Shop Drawings, samples, colour chips. Submit Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site signage, offices, storage sheds, utilities, site set-up/Utility connections, laydown areas, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of specified equipment in accordance with Specifications.

.6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.7 Proposed changes, Change Orders, procedures, Acceptance required, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.

.8 Products Supplied by Others

.9 Record As-Built Drawings in accordance with Section 01 33 00 - Submittal Procedures.

.10 Operations and Maintenance manuals in accordance with Section 1 78 00 - Closeout Submittals.

.11 Take-over procedures, Acceptance, and warranties in accordance with Section 01 78 00 - Closeout Submittals.

.12 Monthly progress, claims, administrative procedures, photographs, holdbacks, commissioning, and training.

.13 Appointment of inspection and testing agencies or firms.

.14 Insurances, transcript of policies.

.15 Site Safety and Fire protection in accordance with section 01 35 29.06 Health And Safety Requirements.

.16 Existing conditions and ONTC site use/operations.

.17 Cleaning and Waste Management

.18 Invoicing and payment procedures

.19 Lines of Communication, use of Social Media and distribution List.

1.05 PROGRESS MEETINGS

.1 During course of Work and up to the completion date, schedule regular monthly progress meetings.

.2 Contractor, major Subcontractors involved in Work, the Owner, and the Consultant are to be in attendance. Other parties may attend subject to the agreement of the Consultant.

.3 Agenda to include, but not limited to, the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede Construction Schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain baselined Construction Schedule.

.7 Proposed revisions to Construction Schedule.

.8 Progress against Construction Schedule, during succeeding work period.

.9 Review Submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on Construction Schedule and on completion date.

.12 Safety concerns and issues.

.13 Open items, Request For Information (RFI) and Supplemental Instructions (SI).

.14 Other business.

1.06 COMMISSIONING MEETINGS

.1 Arrange pre-commissioning meetings for the commissioning of equipment and systems in accordance with 01 91 13 – General Commissioning Requirements. The Owner, the Consultant and Contractor commissioning team shall be in attendance.

.2 The meeting's intent is to ensure all parties are fully aware of the Commissioning expectations and requirements.

.3 Meeting Agenda to include, but not limited to:

.1 Review Commissioning plan, Specification, and process.

.2 Review Commissioning documentation.

.3 Review all factory testing that will be required.

.4 Review training requirement/schedule.

.5 Discuss future Commissioning meetings.

.6 Issues/risks.

1.07 SUBSTANTIAL COMPLETION MEETINGS:

.1 Arrange pre-Substantial Completion meetings. The Contractor, the Owner and the Consultant shall be in attendance.

1.08 OTHER MEETINGS:

.1 The Contractor shall, as directed by the Consultant, attend Project coordination meetings, which may be required in addition to the specific meetings listed herein. Meetings may include topics related to site and railway safety, orientation and training, design compliance, Work progress and issues, installation of Products Supplied by Others, coordination of Subcontractors, quality, delivery and Acceptance activities, warranty, dispute resolution, and environmental issues.

.2 Arrange meetings with the Consultant to coordinate large deliveries and in advance of complex installation.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 This Section specifies Contractor's responsibilities for the preparation and submission of Construction Schedule updates, progress reports and other documentation related to tracking progress of the Work.

.2 The purpose of submitting construction progress documentation is to:

.1 Inform the Owner and the Consultant of actual progress versus planned progress, and;

.2 Provide assurance that scheduling issues are being proactively identified and addressed in a timely manner, and that planned progress is being maintained as closely as possible.

1.02 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.03 RELATED SECTIONS

.1 Section 01 31 19 - Project Meetings.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 77 00 - Closeout Procedures.

.4 Section 01 32 00.16 - Construction Progress Schedule – Critical Path Method (CPM).

1.04 SUBMISSION

.1 Submit, for review and Acceptance a Construction Schedule within ten (10) Working Days from Contract award. The Construction Schedule shall be based on the Contractor's initial schedule submitted at the RFP phase. Notify the Consultant of any major changes from the initial schedule.

.2 Submit schedules in PDF and Excel files. Submit via email unless otherwise requested.

.3 Consultant will review the Construction Schedule and return review copy within ten (10) Working Days after receipt.

.4 If changes are required, resubmit, the Construction Schedule for Acceptance within five (5) Working Days after return of review copy.

.5 The Accepted Construction Schedule shall be baselined and all progress updates shall be made against this version. The baselined Accepted Construction Schedule shall not be changed without the agreement of the Consultant and shall be subject to review and Acceptance prior to becoming the new baselined Construction Schedule.

.6 Submit updated progress schedule with each monthly construction report in accordance with clause 2.2 of this section.

.7 Distribute copies of revised schedule to:

.1 Job site offices.

.2 Subcontractors.

.3 Other concerned parties.

.8 Instruct recipients to report to Contractor within five (5) Working Days any problems anticipated by timetable shown in the schedule.

1.05 CONSTRUCTION SCHEDULE UPDATES

.1 Show projected percentage of completion of each item as of the last date of the month.

.2 Indicate progress of each activity to date of submission schedule.

.3 Show changes occurring since previous submission of Construction Schedule:

.1 Major changes in scope.

.2 Activities modified since previous submission.

.3 Revised projections of progress and completion.

.4 Other identifiable changes.

.4 Provide a narrative report to define:

.1 Problem areas, anticipated delays, and impact on schedule.

.2 Corrective action recommended and its effect.

.3 Effect of changes on schedules of other prime contractors.

.5 Schedules shall be continuous, and logic driven without using hard constraints, Lags and Leads.

2 PRODUCTS:

2.01 DAILY CONSTRUCTION REPORTS:

.1 Prepare a daily construction report recording the following information concerning events at Project Site and include progress photos as applicable:

.1 List of subcontractors at Project Site.

.2 Approximate count of personnel at Project Site.

.3 Equipment at Project Site.

.4 Material Deliveries.

.5 Accidents/Incidents/Near Misses.

.6 Meetings and Significant Decisions.

.7 Unusual and emergency Events.

.8 Stoppages, Delays, Shortages, and Losses.

.9 Orders and requests of Authorities Having Jurisdiction.

.10 Change Orders received and implemented.

.11 Construction Work Change Directives received and implemented.

.12 Services Connected and Disconnected.

.13 Equipment or System Tests and Startups.

.14 Partial Completions and Occupancies.

.15 Substantial Completions Authorized.

.16 Progress made in Work that day

.2 Submit daily reports at the end of each shift to ONTC and the Consultant.

.3 A report shall be submitted for each Work site.

2.02 MONTHLY CONSTRUCTION REPORTS:

.1 Monthly progress reports shall be prepared by the Contractor and submitted to the Consultant in the form of an electronic copy of the relevant Construction Schedule files to demonstrate how the Work is actually progressing and the planned and detailed sequencing of the Work at the time of the report. The cut-off date for the monthly progress report shall be the last date of the month and the report shall be submitted no later than ten (10) Working Days after the cut-off date.

.2 Each monthly progress report shall be in a format acceptable to the Owner, and shall be arranged according to the following headings and sub-headings:

.1 Executive Summary.

1. Activity to (date).
2. Forecast activity to (date).

.2 Project Cost Information:

1. Budget Summary.
2. Cash Allowance Log.
3. Change Order Log.

.3 Project Data:

1. Project Schedule.
2. Shop Drawing Log.
3. Site Inspection Log.
4. Site Testing Log.

.4 Risk and Critical Issues Log.

.5 Site Photos.

.3 Each monthly progress report shall include:

.1 An updated schedule showing progress against the baselined Accepted Construction Schedule, comparing actual and target progress for all milestones and activities. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.

.2 Criticality report listing activities and milestones with up to five (5) days of total float used as first sort for ready identification of near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.

.3 Progress report in early start sequence, listing for each trade, activities due to start, to be underway, or finished within two months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

.4 A schedule narrative, including:

1. Detailed descriptions of progress, including each stage of procurement, fabrication, delivery to site, construction, installation, and testing;
2. Discussion of the basis for any work sequencing, logic, interdependencies or original activity duration revisions incorporated into an updated progress schedule; and
3. Comparisons of actual and planned progress, with a brief commentary on any actual or forecast delays or problems that might have an impact on the completion. date of the Work, and a discussion of the measures being (or to be) adopted to overcome these.
4. Charts showing the status of Submittals, permits and approvals, utility relocations, purchase orders, manufacturing/fabrication and construction.
5. For each fabricated item, the name and location of the fabricator, percentage progress, and the actual or expected dates of commencement of fabrication, Contractor's inspections, tests and delivery.
6. Progress photographs taken, prepared, and submitted in formats specified, all in accordance with Section 01 32 33 - Photographic Documentation.
7. Request For Information (RFI) log.

.5 Timely submission of updates is of significant and crucial importance to the management of this project. Lack of or late receipt of updates diminishes their value to the Owner and the Consultant. Therefore, if the Contractor fails to submit any progress schedule or required revision to a progress schedule within the prescribed time period, the Owner, in its sole discretion, may hold back subsequent progress payments until the updated schedule is submitted or the revision is accepted.

.6 The monthly progress reports and progress schedules will be used by the Owner and the Consultant to monitor the Contractor’s performance against the baselined Accepted Construction Schedule.

2.03 RECORDING ACTUAL SITE CONDITIONS ON AS-BUILT DRAWINGS

.1 Obtain from Consultant an electronic copy of the construction Drawings for the purpose of creating As-built drawings.

.2 Record information on a set of black line opaque drawings.

.3 Use marking pens, maintaining separate colours for each major system, for recording information.

.4 Clearly label each As-Built Drawing as “AS-BUILT DRAWING”. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.5 Record actual construction including:

.1 Measured depths of elements of foundation in relation to finish first floor datum;

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements;

.3 Measured locations of pipes, ducts, conduits, outlets, fixtures, access panels, and appurtenances, referenced to visible and accessible features of construction;

.4 Field changes of dimension and detail;

.5 Changes made by Change Orders and Supplemental Instructions;

.6 References to Shop Drawings, where Shop Drawings show more detail.

.7 Referenced Standards to related Shop Drawings and modifications.

.8 Details not on original Contract drawings.

.6 Do not use As-Built Drawings for construction purposes.

.7 Following construction, Contractor shall prepare As-Built Record Drawings in accordance with Section 01 78 00 Closeout Submittals.

2.04 MATERIAL LOCATION REPORTS:

.1 At bi-weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Place of the Work. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

.2 Indicate the following categories for stored materials:

.1 Material stored prior to previous report and remaining in storage.

.2 Material stored prior to previous report and since removed from storage and installed.

.3 Material stored following previous report and remaining in storage.

3 EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

.1 Contractor's Construction Schedule Updating: At weekly intervals, update schedule to reflect actual construction progress and activities.

.2 Distribution: Distribute copies of Accepted Construction Schedule to the Owner, Consultant, Subcontractors, testing and 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

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Project Management Institute (PMI Standards)

.1 A Guide to the Project Management Body of Knowledge (PMBOK Guide) - [Fifth Edition].

.2 Practice Standard for Scheduling - [2011].

.2 AACE International Recommended Practice 37R-06 entitled, “Schedule Levels of Detail – As Applied in Engineering, Procurement and Construction”.

.3 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Section 01 32 00 – Construction Progress Documentation

1.03 DEFINITIONS

.1 Activity: Distinct, scheduled portion of work performed during course of a project.

.2 Activity Duration: time in calendar units between start and finish of a scheduled activity. See also Duration.

.3 Assumption: factor in planning process that is considered true, real, or certain without proof or demonstration.

.4 Bar Chart (Gantt Chart): graphic display of schedule-related information.

.1 In typical bar chart, schedule activities or work breakdown structure components are listed down left side of chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars.

.5 Baseline: approved version of a work product that can be changed only through formal change control procedures and is used as a basis for comparison.

.6 Budget: approved estimate for a project or work breakdown structure component or schedule activity.

.7 Cash Flow: projection of progress payment requests based on cash loaded construction schedule.

.8 Change Control: process whereby modifications to documents, deliverables, or baselines associated with a project are identified, documented, approved, or rejected.

.9 Completion Milestones: they are firstly [Interim Certificate] [Substantial Completion] and secondly Final Certificate.

.10 Constraint: scheduled limiting factor that effects execution of a project, program, portfolio, or process.

.11 Contract: mutually binding agreement that obligates a seller to provide a specified product or service or result and obligates a buyer to pay for it.

.12 Control: comparing actual performance with planned performance, analyzing variance, assessing trends, to effect process improvements, evaluating possible alternatives, and recommending appropriate corrective action as needed.

.13 Corrective Action: intentional activity that realigns performance of project work with project management plan.

.14 Critical Path: sequence of activities that represents longest path through a project, which determines shortest possible duration.

.15 Critical Path Activity: activity on critical path in a project schedule.

.16 Critical Path Method (CPM): method used to estimate minimum project duration and determine amount of scheduling flexibility on logical network of paths within schedule model.

.17 Data Date: point in time when the status of the project is recorded.

.18 Decomposition: technique used for dividing and subdividing project scope and project deliverables into smaller, more manageable parts.

.19 Deliverable: unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project.

.20 Duration: total number of work periods (not including holidays or other non-working periods) required to complete a schedule activity or work breakdown structure component.

.1 Usually expressed as workdays or work weeks.

.21 Early Finish Date (EF): in Critical Path Method, earliest possible point in time when uncompleted portions of schedule activity can finish based on schedule network logic, data date, and schedule constraints.

.1 Early finish dates can change as Project progresses and changes are made to Project plan.

.22 Early Start Date (ES): in Critical Path Method, earliest possible point in time when uncompleted portions of a schedule activity can start based on schedule network logic, data date, and schedule constraints.

.1 Early start dates can change as Project progresses and changes are made to Project Plan.

.23 Execute: directing, managing, performing, and accomplishing project work; providing deliverables, and providing work performance information.

.24 Finish Date: point in time associated with a schedule activity's completion.

.1 Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.

.25 Float: (also known as slack) amount of time a schedule activity can be delayed without delaying early start date of a successor or violating a schedule constraint.

.1 This resource is available to both [PWGSC] and Contractor.

.26 Forecast: estimate or prediction of conditions and events in project future based on information and knowledge available at time of forecast.

.1 Information is based on projects past performance and expected future performance, and includes information that could impact project in future, such as estimate at completion and estimate to complete.

.27 Gantt Chart: see Bar Chart.

.28 Impact Analysis: schedule analysis technique that adds a modeled delay to an accepted construction schedule to determined possible outcome of that delay on project completion.

.29 Imposed Date: a fixed date imposed on a schedule activity or schedule milestone, usually in form of a “start no earlier than” and “finish no later than” date.

.30 Lag: amount of time whereby a successor activity is required to be delayed with respect to a predecessor activity.

.31 Late Finish Date (LF): in critical path method, latest possible point in time when uncompleted portions of a schedule activity can finish based on schedule network logic, project completion date, and schedule constraints.

.32 Late Start Date (LS): in critical path method, latest possible point in time when uncompleted portions of a schedule activity can start based on schedule network logic, project completion date, and schedule constraints.

.33 Lead: amount of time whereby a successor activity can be advanced with respect to a predecessor activity.

.34 Logic Diagram: see Project network diagram.

.35 Logical Relationship: dependency between two activities or between an activity and a milestone.

.36 Master Schedule: summary-level schedule that identifies major deliverable; work breakdowns structure components, and key schedule milestones.

.37 Milestone: significant point or event in a project, program, or portfolio.

.38 Monitor: collect project performance data with respect to a plan, procedure performance measures, and report and disseminate performance.

.39 Network: see Project Schedule Network Diagram.

.40 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.

.41 Project Control System: fully computerized system utilizing commercially available software packages.

.42 Project Management: application of knowledge, skills, tools, and techniques, to project activities to meet project requirements.

.43 Project Management Plan: approved document that describes how project will be executed, monitored, and controlled.

.1 Primary uses of Project Management Plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope,

cost, and schedule baselines.

.2 Project Management Plan may be summary or detailed.

.44 Project Management Planning: development and maintenance of Project Management Plan.

.45 Project Management Planning, Monitoring and Control System: overall system operated to enable monitoring of Project Work in relation to established milestones.

.46 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.

.47 Project Schedule Network Diagram: graphical representation of logical relationships among project schedule activities.

.1 Always drawn from left to right to reflect Project chronology.

.48 Project Scope: work performed to deliver a product, service, or result with specified features and functions.

.49 Quantified days duration: Working Days based on 5 day work week, discounting statutory holidays.

.50 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on one or more project objectives.

.51 Schedule: see Project Schedule.

.52 Schedule Data: collection of information for describing and controlling schedule.

.53 Scope: see Project Scope.

.54 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.

.55 Work Breakdown Structure (WBS): hierarchical decomposition of total scope of work to be carried out by project team to accomplish project objectives and create the required deliverables.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.

.2 Ensure Construction Schedule efficiencies through monitoring of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.

.3 Monitor sufficiently often so that causes of delays can immediately be identified and mitigated.

.2 Project monitoring and reporting:

.1 Keep team aware of changes to schedule, and potential consequences as Project progresses.

.2 Use narrative reports to provide advice on seriousness of challenges and measures to overcome them.

.3 Begin narrative reporting with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

.3 Critical Path Method (CPM) Requirements:

.1 Ensure Construction Schedule is practical and remains within specified Contract duration.

.2 Submit Construction Schedule for Acceptant. If rejected, as schedule is deemed impractical by Consultant, revise and resubmit, until Acceptance is achieved.

.3 Change to Contract Duration:

.1 Acceptance of Construction Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute a change to Contract.

.2 Duration of Contract may only be changed through bilateral Agreement.

.4 Consider the Construction Schedule deemed practical by the Consultant, showing Work completed in less than specified Contract duration, to have float.

.5 First Milestone on Construction Schedule will identify start Milestone with an Early Start, “ES”, constraint date equal to Award of Contract date.

.6 Calculate dates for completion of milestones from plan and Schedule using specified time periods for Contract.

.7 Calculations on updates such that if early finish of Ready for Takeover falls later than specified Contract duration then float calculation to reflect negative float.

.8 Delays to non-critical activities with float may not be basis for time extension.

.9 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates other than required by Contract Documents.

.10 Allow for adverse weather conditions normally anticipated and show in Construction Schedule.

.1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions appropriate for the location of the Work.

.11 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.

.1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.

.12 Arrange participation on and off site of Subcontractors and suppliers, as required by the Consultant, for purpose of network planning, scheduling, updating and progress monitoring.

.1 Acceptance by the Consultant of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract Documents.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit impact analysis of schedule for changes that result in extension of contract duration.

.1 Include draft Construction Schedule update and report as outlined in article “PROGRESS MONITORING AND REPORTING”.

1.06 QUALITY ASSURANCE

.1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Ready for Takeover, including Commissioning.

1.07 WORK BREAKDOWN STRUCTURE (WBS)

.1 Prepare construction Work Breakdown Structure (WBS) within five (5) Working Days of contract award.

.1 Develop WBS through at least five levels: project, stage, element, sub-element and work package.

1.08 PROJECT MILESTONES

.1 Contractor shall include appropriate Milestones in accordance with the scope contained in the Contract Documents. At minimum, Milestones should be included, by station, for Shop Drawing start and end, construction start and end, testing and commissioning start and end, Substantial Performance of the Work and Ready for Takeover.

1.9 DETAILED CONSTRUCTION SCHEDULE

.1 Provide detailed project Construction Schedule (CPM logic driven) within ten (10) Working Days of Contract award date showing activity sequencing, interdependencies and duration estimates. In addition to the Milestones listed in 1.09.1, include listed activities as follows:

.1 Sequence for Shop Drawings.

.2 Samples.

.3 Submittals and Consultant review period.

.4 Procurement.

.5 Construction.

.1 Site clearing.

.2 Site utilities.

.3 Foundation Work.

.4 Special Subcontractor Work.

.5 Equipment delivery and Installations.

.6 Finishes.

.6 Installation.

.7 Site works.

.8 Testing.

.9 Commissioning and Acceptance.

.10 Line Closures and flagging

.11 Any required permits

.12 Installation of Protection of Finishings – Owner review prior to installation

.2 Schedule should be Level 3, in form of a horizontal bar chart. “Level 3” means the level of detail required for a Project Control Schedule as set out in the AACE International Recommended Practice 37R-06 entitled, “Schedule Levels of Detail – As Applied in Engineering, Procurement and Construction”.

.3 Detail CPM schedule to cover the activities in detail from Contract award date to Substantial Performance of the Work and Ready for Takeover.

.4 Clearly show sequence and interdependence of construction activities and indicate:

.1 Start and completion of all items of Work, their major components, and interim milestone completion dates.

.2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:

.1 Time for Submittals, resubmittals and review.

.2 Time for fabrication and delivery of manufactured Products for Work.

.3 Delivery of Products Supplied by Others

.4 Interdependence of procurement and construction activities.

.3 Include sufficient detail to assure adequate planning and execution of Work. Activities duration should be less than ten (10) Working Days.

.6 Provide level of detail for Project activities such that sequence and interdependency of Contract Document tasks are demonstrated and allow co-ordination and control of Project activities. Show continuous flow from left to right.

.7 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form “Critical Path”. Increased number of critical activities is seen as indication of increased risk.

.8 Insert Change Orders in appropriate and logical location of Construction Schedule. After analysis, clearly state and report to Consultant for review effects created by insertion of new Change Order.

1.10 REVIEW OF CONSTRUCTION DETAIL SCHEDULE

.1 Submit Construction Schedule in accordance with 01 32 00 Construction Progress Documentation.

.2 Submittal of Construction Schedule indicates that it meets Contract Document requirements and will be executed generally in sequence.

1.11 COMPLIANCE WITH DETAIL SCHEDULE

.1 Comply with Accepted Construction Schedule.

.2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after written receipt of Acceptance by Consultant.

.3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.

.1 Corrective measures may include:

.1 Increase of personnel with more experience/qualifications on site for effected activities or work package.

.2 Increase in materials and equipment.

.3 Overtime work and additional work shifts.

.4 Submit to Consultant, justification, Construction Schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. As part of supporting evidence, include:

.1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved Construction Schedule.

.2 Prepared schedule indicating how change will be incorporated into overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.

.3 Other supporting evidence requested by Owner and Consultant.

.4 Do not assume approval of Contract extension prior to receipt of written Acceptance from Owner.

.5 In event of Contract extension, display in Construction Schedule that scheduled float time available for Work involved has been used in full without jeopardizing earned float.

.1 Consultant will determine and advise Contractor number of allowable days for extension of Contract based on Construction Schedule updates for period in question, and other factual information.

.2 Construction delays affecting Construction Schedule will not constitute justification for extension of the Ready for Takeover date.

1.12 PROGRESS AND REPORTING

.1 On an ongoing basis, the Contractor shall keep the Construction Schedule on job site to show “Progress to Date”. Arrange participation on and off site of Subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Consultant and or Owner at least once monthly to establish progress on each current activity shown on applicable networks.

.2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.

.3 Perform Construction Schedule update monthly with status dated (Data Date) on last date of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

.4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.

.5 Submit to Consultant copies of updated Construction Schedule.

.6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.

.7 As part of the monthly progress report, in accordance with 01 32 00 – Construction Progress Documentation, include a written report based on the updated Construction Schedule, showing Work performed to date, comparing Work progress to planned, and presenting current forecasts. Report summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate potential delay. Include in report:

.1 Description of progress made.

.2 Pending items and status of: permits, Shop Drawings, Change Orders, possible time extensions.

.3 Status of Contract Ready for Takeover and Milestones.

.4 Current and anticipated problem areas, potential delays and corrective measures.

.5 Review of progress and status of Critical Path activities.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 MEASUREMENT AND PAYMENT

.2 Separate measurement or payment will not be made for Work required under this section. All costs in connection with the Work specified herein will be considered to be included with the related item of Work or incidental to the Work.

1.03 FREQUENCY OF PHOTOGRAPHIC DOCUMENTATION

.1 The Contractor shall take photographs as indicated in Specification sections, at all construction milestones as identified in the Accepted Construction Schedule, and at each of the following stages of construction:

.1 Before commencement of clearing and demolition;
.2 Upon completion of clearing and demolition;
.3 Upon completion of excavation
.4 Upon completion of foundation and concrete work.
.5 Delivery and installation of Structural steel.
.6 Building Envelope Construction (roof, walls, doors, windows, etc.)
.7 Upon completion of any remedial Work.
.8 Upon completion of the Work.
.9 Anytime a problem arises that may result in a potential claim and the problem can be illustrated by photographs.

.2 Furnish at least three different views or vantage points of each milestone and stage of construction. Furnish an average of 20 photographs each month until completion of the Work. Location of views shall be as agreed with the Consultant.
.3 Contractor shall take photos at each shift and include photos in the daily report in accordance with section 01 32 00-Construction Progress Documentation.
.4 Submit photos to the Consultant with the monthly progress reports in accordance with section 01 32 00-Construction Progress Documentation and other reports in accordance with Specification sections and Contract Documents.
.5 Transfer photos to the Owner at the end of the Project.

1.04 QUALITY AND QUANTITY OF PHOTOGRAPHS

.1 All photographs shall be digital photographs in pdf, jpg or png format with the following requirements:

.1 Minimum resolution: 1024 x 768 pixels.

.2 Colors: 24 Bits per Pixel.
.3 Maximum File size of 3MB.

.2 Digital photographs provided shall use the following file naming convention:

PYYMMDDLOCATIONSEQ.EXT

P =	Photograph
YYMMDD =	Date in Year, Month, Day format
LOCATION =	(8 Characters maximum) Location taken, either by BART 3-character alpha numeric + 5, or Milepost by line designation. (e.g. M90, C40-west, A1MP32-1, etc.)
SEQ =	Sequential number from 001 to 999.
EXT =	File extension (e.g. pdf, jpg, or png).

.3 If flash drives are used to store photos they shall be labeled to include the Contract number and the date the photographs were taken.

1.05 IDENTIFICATION OF PHOTOGRAPHS

.1 The following information shall be furnished for each digital photograph in a manner approved by the Owner.

.1 Title of Contract and Contract Number;
.2 Site location.
.3 Identification of subject shown;
.4 Station point of camera and direction of view;
.5 Time and date taken.

1.06 VIDEO RECORDINGS

.1 The Contractor shall provide video recordings to supplement Contract photographs of certain construction milestones as identified in the Accepted Construction Schedule, and events as indicated herein:

.1 Start of construction, including clearing and demolition operations, as applicable;
.2 Highlights of all formal inspections; and
.3 Highlights of the final inspection and acceptance by the Owner and Consultant and Authority having jurisdiction.
.4 Video recordings shall be at minimum standard definition (480p).

.2 Video recordings shall include an unobtrusive time and date indicator on the film, accurately depicting the time and date when the photography was performed.
.3 If flash drives are used to store videos they shall be labeled to include the Contract number and the date the video was taken.
.4 Individual digital video files shall use the file naming convention indicated above, paragraph 1.03.2, however the filename shall be modified such that the first character shall be “V” for video instead of “P”.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Section 01 32 33 – Photographic Documentation

.2 Section 01 43 00 - Quality Assurance.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Submit to the Consultant Submittals listed in Specifications for review and Acceptance. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by Submittal until review is complete and Acceptance has been provided.

.3 Present Shop Drawings, Product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review Submittals before submission to the Consultant. Stamp Submittals as “Approved by Contractor” prior to submitting to the Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each Submittal has been checked and coordinated with requirements of Work and Contract Documents and Contractors own quality procedures. Submittals not stamped, signed, dated and identified as to specific Project will be returned without being examined and considered rejected.

.6 Notify the Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify site measurements and affected adjacent Work are coordinated.

.8 Keep one Accepted copy of each Submittal on site.

1.04 SHOP DRAWINGS, PRODUCT DATA AND OTHER SUBMITTALS

.1 Refer to CCDC 2 GC 3.8 Shop Drawings and Supplementary General Conditions.

.2 Refer to Specifications for all other required Submittals.

.3 Submit for review and Acceptance Shop Drawings stamped and signed by professional engineer licensed in Province of Ontario, Canada.

.4 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and

installed. Indicate cross references to Contract Drawings and Specifications.

.5 Allow ten (10) Working Days for Consultant review of each Submittal, unless otherwise specified.

.6 Adjustments requested on Shop Drawings by the Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Consultant and do not proceed with Work. Such adjustment shall be approved by a Change Directive or Change Order issued by the Owner in accordance with the Contract Documents.

.7 Make changes in Shop Drawings as the Consultant may require, consistent with Contract Documents. When resubmitting, notify the Consultant in writing of revisions other than those requested.

.8 Accompany Submittals with transmittal letter containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each Shop Drawing, Product data, and sample.

.5 Other pertinent data.

.9 Submittals to include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of site measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified site dimensions and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Material being supplied, all connections, attachments, anchorages and locations of exposed fastenings as applicable.

.11 Typical and special installation conditions, including setting or erection details.

.12 Relationship to adjacent work.

.13 Copy of associated Project warranty.

.10 After the Consultant review and Acceptance, distribute copies.

.11 Submit electronic copy of Shop Drawings for requirements requested in Specifications and as the Consultant may reasonably request. Submit electronic copies of Product data sheets or brochures for requirements requested in Specifications and as requested by the Consultant where Shop Drawings will not be prepared due to standardized manufacture of Product.

.1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams used to illustrate standard manufactured products or any other specified information.

.2 Delete information not applicable to Project.

.3 Supplement standard information to provide details applicable to Project.

.4 Cross-reference Product data information to applicable portions of Contract Documents.

.12 Submit electronic copies of test reports for requirements requested in Specifications and as requested by the Consultant.

.1 Report signed by authorized official of testing laboratory that material, Product or system identical to material, Product or system to be provided has been tested in accord with specified requirements.

.13 Submit electronic copies of certificates for requirements requested in Specifications and as requested by the Consultant.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of Product, system or material attesting that product, system or material meets Specification requirements.

.2 Certificates must be dated after the award of the Contract, complete with the Project name.

.14 Submit electronic copies of manufacturers' instructions for requirements requested in Specifications and as requested by the Consultant.

.1 Pre-printed material describing installation of Product, system or material, including special notices and Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of manufacturer's site reports for requirements requested in Specifications and as requested by the Consultant.

.1 Material describing installation of Product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in Specifications and as requested by Owner, after a review of an electronic copy has been completed and Accepted by the Consultant.

.1 Submit four (04) hard copies, unless otherwise specified, of reviewed and Accepted Operation and Maintenance Data.

.18 Delete information not applicable to Project.

.19 Supplement standard information to provide details applicable to Project.

.20 If upon review by the Consultant, no major corrections are requested, electronic copies will be returned as Accepted or Accepted with comments (in the case of minor corrections) and fabrication and installation of Work may proceed. Requested minor corrections shall be made in a timely manner. If Shop Drawings are rejected, noted copy will be returned and resubmission of corrected Shop Drawings for review and Acceptance, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.21 Acceptance of the Shop Drawings does not mean confirmation that the Submittal does not include errors or omissions, defects or deficiencies.

1.05 SAMPLES

.1 Submit for review and Acceptance samples in duplicate as requested in respective Specifications. Label samples with origin and intended use.

.2 Deliver samples prepaid to the Consultant at the address provided during the Pre-Construction Meeting.

.3 Notify the Consultant in writing at the time of submission of deviations in samples from the requirements of Contract Documents. Deviations may be rejected and the Contractor shall resubmit either a sample compliant with the Contract Documents or an alternative sample with written deviations.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by the Owner or the Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Consultant and do not proceed with Work. Such adjustment shall be approved by a Change Directive or Change Order issued by the Owner.

.6 Make changes in samples which the Consultant may require, consistent with Contract Documents.

.7 Reviewed and Accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.06 MOCK-UPS

.1 Erect mock-ups in accordance with section 01 43 00 - Quality Assurance.

1.07 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic colour digital photography in accordance with section 01 32 33 –

Photographic Documentation, Contract Documents, and as directed by the Consultant.

.2 Provide photographs in the requested format to demonstrate progress and how deficient items identified within the Consultant review and inspection reports have been corrected.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.1 R.S.C., 1985, c. L-2

.2 Province of Ontario

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. [1990, c.0.1, as amended and O. Reg. 213/91 as amended] - Updated August 8, 2023.

.3 National Building Code of Canada (NBC):

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.4 The Canadian Electric Code (as amended)

.5 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2009 Code of Practice for Access Scaffold.

.2 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.

.3 CSA Z462- Workplace Electrical Safety Standard.

.6 National Fire Code of Canada 2015 (as amended)

.1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.

.7 American National Standards Institute (ANSI):

.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.8 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Section 01 31 19 – Project Meetings

.2 Section 01 33 00 - Submittal Procedures

.3 Section 01 35 43 – Fire Safety Requirements

.4 Section 01 35 43 - Environmental Procedures

.5 Section 01 51 00 - Temporary Utilities

.6 Section 01 56 00 - Temporary Barriers and Enclosures

.7 ONTC Contractor Subcontractor Policy.

.8 ONTC HOT WORK Program.

.9 ONTC Electrical Safety Policy.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit for Acceptance Project-specific Health and Safety Plan within seven (7) Working Days after Contract award and fifteen (15) Working Days prior to commencement of Work on site. Health and Safety Plan must include:

.1 Results of site-specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Emergency Procedures.

.3 The Consultant's review and Acceptance of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.4 Submit electronic copies of Contractor's authorized representative's work site health and safety inspection reports to the Owner and the Consultant, and Authority Having Jurisdiction (AHJ) when required.

.5 Submit to the Owner and the Consultant copies of reports or directions issued by health and safety inspectors of the Authority Having Jurisdiction (AHJ).

.6 Submit to the Owner and the Consultant electronic copies of incident and accident reports.

.7 Submit to the Consultant WHMIS Safety Data Sheets (SDS) and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements. Include and an update the Health and Safety Plan as required.

.8 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit to the Consultant certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel.

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.04 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

.2 Provide copies of all notices to the Consultant.

.3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of Project.

1.05 SAFETY ASSESSMENT

.1 Conduct a site-specific hazard assessment based on review of Contract Documents, required Work, and Project site. Identify any known and potential health risks and safety hazards.

.2 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications and , include, but not be limited to, the following:

.1 Primary requirements:

.1 Contractor's and ONTC safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for Project safety; include an organization chart for Project with safety responsibilities clearly indicated.

.4 General safety rules for Project.

.5 Job-specific safe work procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

.10 Occupational Health and Safety communications and record keeping procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the Work.

.3 List hazardous materials to be brought on site as required by Work.

.4 Indicate engineering and administrative control measures to be implemented at the Place of Work for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all Subcontractors. Ensure that work/activities of Subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Health and Safety Plan as required, and re-submit for Acceptance in accordance with 01 33 00 – Submittal Procedures

.5 Review and Acceptance: the review and Acceptance of site-specific Health and Safety Plan shall not relieve the Contractor of responsibility for errors or omissions in final site-specific Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract Documents.

1.06 MEETINGS

.1 Schedule and administer Health and Safety meeting with the Owner and the Consultant prior to commencement of Work. This meeting shall be included in the Pre-construction Meeting.

.2 Attend all subsequent Health and Safety meetings called by the Owner or the Consultant.

1.07 REGULATORY REQUIREMENTS

.1 Conduct the Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.08 PROJECT/SITE CONDITIONS

.1 Work at site may involve contact with:

.1 Public.

.2 ONTC employees.

.3 Other contractors and consultants.

.4 Third Party Property Owner.

.2 The Contractor is solely responsible for all utility detection and clearances prior to starting the Work.

.3 The Contractor will not rely solely upon the Drawings or other information provided for utility locations.

.4 Carry out any activities involving asbestos in accordance with applicable Provincial / Federal Regulations.

.5 Removal and handling of asbestos will be in accordance with applicable Provincial / Federal Regulations.

.6 Refer to reports in Attachment 1 to the Specifications for further site conditions and assessment reports for any noted hazardous or contaminated materials or substances present at Place of the Work. Contractor should their own assessments prior to commencing Work.

1.09 GENERAL REQUIREMENTS

.1 In accordance with 01 56 00 – Temporary Barriers and Enclosures, provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

1.10 RESPONSIBILITY

.3 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.

.4 Contractor will be responsible and **assume the role of Constructor** as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

.5 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.

.6 Provide first aid, hygiene, and medical facilities at the Place of the Work in accordance with requirements of provincial and local governmental occupational health, safety, and workers' compensation statutes, public health guidance publications (where warranted) and Contract Documents.

1.11 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

.2 Comply with all Federal and Provincial laws relating to Health and Safety including Acts and Regulations as well as Lower Tier Municipality By-Laws.

.3 Comply with all applicable industry safety standards.

.4 Comply with legislative requirements for work performed including, but not limited to:

.1 Qualifications of workers;

.2 Training;

.3 Supervision, and;

.4 Use of onsite equipment.

.5 Provide any and all personal protective equipment for Contractor's own workers where prescribed by legislation.

1.12 UNFORSEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise Contractor's nominated Health and Safety Coordinator and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise the Consultant verbally and in writing.

1.13 CONTRACTOR HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:

.1 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel that do not successfully complete required training are not permitted to enter site to perform Work.

.2 Maintain a training record/log of Contractor employee including all Subcontractors, suppliers and other parties retained by the Contractor for the execution of the Work, at the jobsite and electronic copy, available for the Owner and the Consultant review at request.

.3 Be responsible for implementing, revising, enforcing daily and monitoring site-specific Contractor's site-specific Health and Safety Plan.

.4 Visit each Place of the Work regularly, at least biweekly or as required by health and safety laws and regulations, to ensure Work is being completed in compliance with Contractor's Health and Safety programs and all applicable laws and regulations.

.2 Contractor's nominated site supervisor may complete some of daily tasks of the Health and Safety Coordinator provided the site supervisor has the proper qualifications to complete those tasks.

1.14 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Ontario having jurisdiction, and in consultation with the Consultant.

.2 Post legible versions of the following documents on site:

.5 Site Specific Health and Safety Plan.

.6 Sequence of work.

.7 Emergency procedures.

.8 Site drawing showing Project layout, locations of the first-aid station, marshalling stations, and emergency transportation provisions.

.9 Notice of Project.

.10 Site plans.

.11 Notice as to where a copy of the Workers' Compensation Act and Regulations is available on the work site for review by employees and workers.

.12 Workplace Hazardous Materials Information System (WHMIS) documents.

.13 WHIMS Safety Data Sheets (SDS).

.14 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.15 Others as required.

1.15 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by Authority Having Jurisdiction (AHJ), the Consultant or by Owner.

.2 Provide the Consultant with written report of action taken to correct non-compliance of health and safety issues identified.

.3 The Owner or the Consultant may stop Work if non-compliance of health and safety regulations is not corrected. The Contractor/Subcontractors will be responsible for any costs arising from such a “stop work order”.

1.16 BLASTING

.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by the Owner.

1.17 POWDER ACTUATED DEVICES

.1 Use powder-actuated devices only after receipt of written permission from Owner.

1.18 ELECTRICAL SAFETY REQUIREMENTS

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.2 Before undertaking any Work, coordinate required energizing and de-energizing of new and existing circuits with the Owner.

.3 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.19 ELECTRICAL LOCKOUT

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers,

including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Owner or the Consultant.

.3 Keep the documents and lockout tags at the site and list in a logbook for the full duration of the Contract. Upon request, make such data available for viewing by the Owner, the Consultant or by any authorized safety representative.

1.20 HOT WORK:

.1 Hot Work Permit will be required; Contractor must notify the Consultant five (5) Working Days in advance prior to any hot work activities and provide, for review, a completed Hot Work permit form including a plan to mitigate any risks identified by the Contractor in their job hazard analysis. Hot Work shall proceed only after receiving the Owner's approval.

1.21 SILICA

.1 Preventive measures to apply to the work site:

.1 Source reduction methods

.1 Work in wet environment or use tools with inflow of water in order to reduce dustiness, if not, collect dust at the source and retain it with a high efficiency filter not to propagate dust in the environment.

.2 Clean surfaces and tools with water, never with compressed air.

.3 Sand and pickle surfaces by using an abrasive containing less than 1 % of silica.

.4 When required, install shields or other containment device to prevent silica dust from migrating toward other workers or the public.

.2 Protection: Wear respiratory protection equipment (mask) during all operations that could generate silica dust.

1.22 WORK STOPPAGE

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

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 National Research Council of Canada (NRC):

1. National Building Code of Canada (NBC).
2. National Fire Code of Canada (NFC).

.2 National Fire Protection Association (NFPA):

1. NFPA 51B-[19], Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.

.3 Ontario Fire Code.

.4 Ontario Occupational Health and Safety Act R.S.O 1990

.5 O.Reg 213/91 Construction Projects

.6 Canada Labour Code R.S.C., 1985 c L-2

.7 Canada Occupational Health and Safety Regulations SOR/86-304

.8 Canadian Construction Documents Committee (CCDC)

1. CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Section 01 35 29.06 – Health and Safety Procedures

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 74 19 – Waste Management and Disposal

.4 ONTC Contractor Subcontractor Policy

.5 ONTC HOT WORK Program

1.03 CONSTRUCTION FIRE SAFETY

.1 Contractor is responsible for construction fire safety in accordance with national and provincial codes, laws and regulations.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit fire safety plan for Acceptance before construction commences.

1.05 REPORTING FIRES

.1 Be aware at all times of nearest fire alarm pull station location, nearest telephone, and

emergency phone number.

.2 Report fire incidents to Fire Department immediately in the following sequence:

.1 Activate nearest fire alarm pull station, if any.

.2 Telephone the Fire Department then Owner

.1 Telephone:911.

.2 Contact Owner at ONTC RTC Hotline # 1-800-558-4129.

.3 Person activating fire alarm pull station to remain at main site entrance and direct Fire Department personnel to location of fire.

.4 When reporting a fire by telephone, give location of fire, building name or number, and be prepared to give basic directions (e.g., northeast corner of base compound, visual reference points).

.5 Promptly inform Owner and Consultant of fire incidents at Place of Work, regardless of size.

1.06 FIRE SAFETY PLAN

.1 Prepare a fire safety plan in cooperation with the local fire department and other applicable regulatory authorities for each Place of Work before beginning Work on site.

.2 Submit fire safety plan to the Consultant for Acceptance who may submit to local fire department for their review.

.3 Limit scope of fire safety plan to the Place of the Work only. Existing fire safety plans covering other existing buildings are not the responsibility of the Contractor.

.4 Prepare fire safety plan in conformance with NFC. Include:

.1 Emergency procedures in case of fire, including:

.1 sounding fire alarm

.2 notifying fire department

.3 instructing occupants on procedures to follow when fire alarm sounds.

.4 evacuating occupants, including special provisions for persons requiring assistance

.5 confining, controlling, and extinguishing the fire.

.2 Appointment and organization of designated supervisory staff to carry out fire safety duties.

.3 Training of supervisory staff and other occupants in their responsibilities for fire safety

.4 Documents, including diagrams, showing type, location, and operation of building fire emergency systems.

.5 Holding of fire drills

.6 Control of fire hazards in the building

.7 Inspection and maintenance of building facilities provided for the safety of occupants.

.5 Post fire safety plan at each entrance to Place of the Work or near each Place of the Work's health and safety board.

.6 Review fire safety plan a maximum of every three (03) months to ensure it takes into account changes in the use and other characteristics of the building or site. Revise fire safety plan when it can be improved.

1.07 FIRE PROTECTION SYSTEM IMPAIRMENT

.1 Maintain existing fire protection systems in an operational state at all times during construction.

.2 Use of fire hydrants, standpipes, or hose systems for purposes other than firefighting is prohibited.

.3 Existing fire protection and alarm systems will not be obstructed, shut off, disabled, or left inactive at end of each Working Day or shift without written authorization from the Owner.

.4 Submit a written request to the Owner and the Consultant for approval ten (10) Working Days in advance of planned interruption of services. Submit written notification for operation including shutting down active fire protection system, including water supply, fire suppression, fire detection, and life safety systems.

.5 Where an existing fire protection system that provides fire alarm monitoring becomes impaired in an existing building, provide a fire watch as directed by the Consultant.

.6 Where systems are affected or impaired during the Work, conduct Work on fire protection system in accordance with NFC.

1.08 TEMPORARY PORTABLE FIRE EXTINGUISHERS

.1 Provide portable extinguishers, or as otherwise directed by Fire Department.

.2 Provide supplemental portable extinguishers to the following areas or as otherwise directed by Fire Department :

.1 Adjacent to hot works

.2 Areas where combustibles materials are stored

.3 Adjacent to areas where flammable liquids or gases are stored or handled

.4 Near or on internal combustion engines

.5 Adjacent to temporary oil fired or gas fired equipment

.6 Adjacent to bitumen heating equipment

.7 Adjacent to each roof installation or repair work area

.3 Provide portable extinguishers classified and rated as 10-A:80B:C, minimum 20 pounds unless otherwise directed by the Fire Department.

.4 Provide dry chemical type extinguishers unless otherwise required by hazard being protected.

.5 Provide a sufficient number of portable extinguishers as per codes and laws requirements.

.6 Inspect and maintain extinguishers in accordance with NFC.

1.09 ACCESS FOR FIRE FIGHTING

.1 Provide and maintain access for firefighting operations in accordance with NFC.

.2 Submit written request to the Owner and the Consultant for approval a minimum of ten (10) Working Days before operation of activities that may cause problems that might impede fire department equipment access and personnel response, including but not limited to:

.1 violation of minimum horizontal and overhead clearances

.2 erecting of barricades and digging of trenches.

Note: Access routes are intended for the movement of fire department vehicles around buildings. Access aisles and access paths are intended for the movement of fire department personnel inside a building.

.3 Maintain a minimum 6.0-m clear horizontal width for access routes, or as otherwise directed by the Consultant.

.4 Maintain a minimum 5.0-m vertical clearance for access routes, or as otherwise directed by the Consultant.

1.10 SMOKING RESTRICTIONS

.1 Smoking is prohibited in buildings, including buildings under construction.

.2 Obey posted signs and restrict smoking to only existing designated smoking areas. Obey posted smoking restrictions near existing buildings.

.3 Provide a temporary approved non-combustible receptacle at each designated smoking area in accordance with the Fire Safety Plan.

1.11 WASTE MANAGEMENT

.1 Manage waste in accordance with Section 01 74 19 – Waste Management and Disposal, and as follows:

.1 Minimize waste materials.

.2 Do not burn waste materials.

.3 Remove waste from Place of Work at end of each Working Day or shift, or more frequently when directed by Fire Department.

.4 Storage:

.1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.

.2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles. Remove at end of each Working Day.

.5 Provide temporary waste bins no closer than 3.0 m to buildings.

1.12 FLAMMABLE AND COMBUSTIBLE LIQUIDS

.1 Handle, store, and use flammable and combustible liquids in accordance with NFC or as otherwise directed by the Fire Department.

.2 Store flammable and combustible liquids such as gasoline, kerosene, and naphtha in quantities not exceeding 45 litres. Store in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual approved certification mark. Obtain written authorization from Owner for storage of quantities of flammable and combustible liquids exceeding 45 litres.

.3 Transfer of flammable or combustible liquids within buildings or on jetties is prohibited.

.4 Transfer of flammable or combustible liquids in vicinity of open flames or any type of heat-producing device is prohibited.

.5 Use of flammable liquids having a flash point below 38 degrees C such as naphtha or gasoline as solvents or cleaning agents is prohibited.

.6 Storing flammable and combustible waste liquids on site is prohibited. Remove daily or more frequently as directed by Fire Department.

1.13 HOT WORKS

.1 Implement a hot works program in accordance with NFC, FMD 4004, and NFPA 51B. Apply Hot Works program to processes involving welding, cutting, roofing, and other hot works when directed by Owner or the Consultant.

.2 In accordance with Section 01 35 29.06 - Health And Safety Requirements, obtain a Hot Works permit 72 hours in advance from Owner for Hot Works in work area. Frequency of renewal for Hot Works permits is at discretion of the Owner.

.3 Provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for fire watch is at discretion of the Owner or the Consultant.

.4 Provide fire watch service as required. Provide fire watchers trained in use of fire extinguishing equipment.

.5 Carry out hot works processes in areas free of combustible and flammable content.

.6 Where hot works must be carried out in areas where combustibles are present:

.1 Protect flammable and combustible materials within 15.0 m of hot works in accordance with NFC.

.2 Provide a fire watch during hot works and for a minimum of 60 minutes after work is complete, unless otherwise directed by the Consultant.

.3 Conduct a final inspection of area not less than 4 hours after completion of hot works, unless otherwise directed by the Consultant.

.7 Where there is a possibility of sparks leaking onto combustible materials in areas adjacent to areas where the hot works is carried out:

.1 Cover or close openings in walls, floors, or ceilings to prevent passage of sparks to such adjacent areas.

.2 Provide a fire watch during hot works, and a minimum 60 minutes after hot works is complete.

.3 Conduct a final fire watch inspection not less than 4 hours after hot works is complete, unless otherwise directed by the Consultant.

.8 Protection of flammable or combustible materials:

.1 Remove flammable and combustible materials including combustible or flammable dust or residue from area where hot works is carried out.

.2 When removal is not possible, protect materials with a non-combustible covering.

.9 Provide a temporary fire extinguisher within 3.0 m of hot works, minimum size of 20 lbs Type ABC extinguisher, unless otherwise directed by the Owner or the Consultant.

1.14 HAZARDOUS SUBSTANCES

.1 Perform Work involving the use of toxic or hazardous materials, chemicals or explosives, or otherwise creating hazard to life, safety or health, in accordance NFC.

.2 Provide temporary mechanical ventilation where flammable liquids, such as lacquers or urethanes are used. Eliminate sources of ignition. Provide written notification to the Consultant a minimum of five (5) Working Days before starting Work and immediately at completion of Work.

1.15 QUESTIONS OR CLARIFICATION

.1 Direct questions and requests for clarification on Fire Safety to the Consultant.

.2 The Owner or the Consultant will obtain clarifications from Fire Department. Do not contact Fire Department directly for notification, authorization, or any requests unless situation constitutes an immediate emergency.

1.16 FIRE INSPECTION

.1 Coordinate site inspections by Fire Department through the Consultant.

.2 Allow Fire Fighter unrestricted access to Place of Work.

.3 Cooperate with Fire Department during routine fire safety inspection of Place of work.

.4 Immediately remedy unsafe fire situations observed by Fire Department.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 SUMMARY

.1 The Work of this Section includes, but is not limited to the following:

.1 Hazardous Substances

.2 Environmental Protection

.3 Archaeology and Cultural Heritage

.4 Excess Soil Management

.5 Other Environmental Matters

1.03 GENERAL REQUIREMENTS

.1 Assume responsibility for the protection of the environment and the preservation of public health, in the course of and as affected by the Work of the Contract, in accordance with specified requirements and Environmental Laws, ordinances, rules, regulations, codes and orders of the authorities that have regulatory oversight of or authority over the Work ("Authorities having Jurisdiction")

.2 Give required notices and follow procedures set out by Authorities having Jurisdiction (AHJ) when working adjacent to or in waterways.

.3 Give required notices and follow procedures set out by Authorities having Jurisdiction when handling or encountering hazardous, toxic, controlled substances (hereinafter referred to as hazardous substances).

.4 The following conditions shall be regarded as a hazard to the environment, requiring appropriate action within the scope of this Section:

.1 Presence of friable asbestos.

.2 Presence of abandoned or disused equipment such as fuel tanks, PCB containing equipment and materials (including in-ground hydraulic hoists), batteries, septic tanks, grease / oil interceptors.

.3 Erosion, sedimentation and general disturbance of ecosystems.

.4 Other conditions identified by environmental jurisdictional authorities.

.5 Designated Substances and Hazardous Substance

1.04 DEFINITIONS

.1 "Canadian Environmental Protection Act, 1999 (Canada)" means the Canadian Environmental Protection Act, 1999, S.C. 1999, c. 33, as amended from time to time;

.2 "Designated Substances and Hazardous Substance" includes,

.1 a Hazardous Substance;

.2 those substances identified by Ontario Regulation 490/09 and Ontario Regulation 278/05 as amended, under the Occupational Health and Safety Act (Ontario);

.3 those substances identified and regulated under Part X Hazardous Substances, Can. Regulation 86-304, Canadian Occupational Health

and Safety Regulations;

.4 substances that are identified as falling under identified categories as part of the Workplace Hazardous Materials Information System (WHMIS) or GHS for Hazardous Substances under provincial or federal occupational health and safety legislation;

.5 polychlorinated biphenyls as identified in Ontario Regulation 362, as amended under the Environmental Protection Act (Ontario) and the PCB Regulations (SOR/2008-273), as amended, adopted under the Canadian Environmental Protection Act, 1999 (Canada); and

.6 mould, acrylonitrile, arsenic, asbestos (including asbestos-containing materials), benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica, and vinyl chloride;

.3 "Discharge" means any spill, release, discharge, emission, spraying, injection, inoculation, abandonment, deposit, leak, seep, pour, emptying, throwing, dumping, placing and exhaust to the environment of any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination thereof, either directly or indirectly from human activities that causes or may cause an adverse effect on the environment, or that has not been authorized by the applicable Environmental Approvals;

.4 "Environmental Approvals" means any permit, certificate, registration, license, approval, ruling, variance, exemption or similar requirement relating to environmental matters or other authorization required under Environmental Laws;

.5 "Environmental Consultant" means a reputable, qualified and experienced environmental consulting or engineering firm employing individuals that has been retained by the Contractor to provide technical expertise and guidance to the Contractor on all the Contractor environmental obligations, the Environmental Approvals and all other environmental obligations and matters, including monitoring, managing and addressing soil and groundwater impacts and occupational health and safety;

.6 "Environmental Laws" means:

.1 all federal laws, statutes, by-laws, rules, regulations, orders, ordinances or other requirements having the force of law relating to the protection of the environment or wildlife, natural or cultural resources, archeological and heritage sites, human health or safety, or Hazardous Substances;

.2 all provincial regional and municipal laws, statutes, by-laws, rules, regulations, orders, ordinances or other requirements having the force of law relating to the protection of the environment or wildlife, natural or cultural resources, archeological and heritage sites, human health or safety, or Hazardous Substances.

.7 "Environmental Protection Act (Ontario)" means the Environmental Protection Act, R.S.O. 1990, c. E. 19, as amended from time to time;

.8 "Hazardous Waste" means a "hazardous waste" as such term is defined pursuant to R.R.O 1990, Regulation 347;

.9 "MECP" means the Ontario Ministry of the Environment and Conservation and Parks, and any successor ministry thereto;

.10 "Ontario Water Resources Act (Ontario)" means the Ontario Water Resources Act, R.S.O. c. O.40, as amended from time to time;

.11 "Qualified Person", as defined in O. Reg. 153/04, as amended

.12 "Spill" means, for the purposes of this Project and notwithstanding any less stringent definition under Environmental Laws, a Discharge that,

.1 arises, either directly or indirectly, from human activities; and

.2 causes or may cause an adverse effect on the environment.

.13 "Soil with Environmental Contaminants" means soil or sediment that is considered to be contaminated, i.e., if the quality exceeds the applicable Ministry of the Environment, Conservation and Parks (MECP) Generic Site Condition Standards at the Site for use under Part XV.1 of the Environmental Protection Act (Ontario) (O. Reg. 153/04) or site-specific standards approved by MECP.

.14 "Substances Posing Significant Hazard" means any biological, chemical or physical agent or combination thereof to which exposure of a worker is prohibited, regulated, restricted, limited or controlled by the occupational health and safety enforcement agency of the province/ territory where the Work is to be performed. Should no such provisions be in place in the province/territory where the Work is to be performed, the following substances shall be considered as "Substances Posing Significant Hazard": Asbestos, Silica, Mercury, Lead, Arsenic, Acrylonitrile, Benzene, and Isocyanates."

1.05 HAZARDOUS SUBSTANCES

.1 Submit documentation to the Consultant to show that all Subcontractors have been provided with lists of the Substances Posing Significant Hazard on site. This list must include the name of the substances indicated by the Owner to be on site and any such substance to be used or produced by the Contractor or subcontractors on site during the life of the Work.

.2 Procedures:

.1 Known Conditions: Follow specified requirements in Contract Documents. Review existing site conditions and identify, in writing, to the Consultant, any conditions that differ materially from those indicated in the Contract Documents.

.2 Unknown Conditions: Should an environmentally hazardous condition or a contaminated area be discovered, quarantine the area affected and do no Work that will disturb the hazardous material or contaminated area.

Notify the Consultant immediately of the situation verbally and in writing. Conform to Environmental Law.

.3 Hazardous Substances Disposal:

.1 Dispose of hazardous substances in accordance with Environmental Laws.

.2 Do not under any circumstances, dispose of hazardous substances by burning or burying on site or by discharging into the soil, waterways or drainage system.

1.06 ENVIRONMENTAL PROTECTION

.1 Erosion and Sediment Control:

.1 Minimize amount of bare soil exposed at one time. Stabilize disturbed soil within forty-five (45) days of disturbance to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and watercourses, and repair damage caused by soil erosion and sedimentation.

.2 Provide and maintain appropriate temporary measures such as silt fences, straw bales, ditches, geotextiles, drains, berms, terracing, riprap,

temporary drainage piping, sedimentation basins, vegetative cover, dikes, and other measures that may be required to prevent erosion and migration of silt, mud, sediment, and other debris.

.3 Do not disturb existing embankments or embankment protection.

.4 Conduct weekly inspection of erosion and sediment control measures to detect evidence of erosion and sedimentation. Promptly take corrective measures when necessary.

.5 If soil and debris from site accumulate in ditches or other low areas, remove accumulation and restore area to original condition.

.2 Site Drainage:

.1 Maintain grades to ensure proper site drainage.

.2 Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable liner during periods of work stoppage including at end of each Working Day.

.3 Control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas as required to prevent erosion and sedimentation.

.4 Control surface drainage by ensuring that gutters are kept open and water is not directed across or over pavements or sidewalks, except through pipes or properly constructed troughs. Ensure that runoff from unfinished areas is intercepted and diverted to suitable outlets.

.3 Plant Protection and Site Clearing:

.1 Protect all existing trees and landscaping which is to remain at the Place of Work, using methods and materials recommended by the Canadian Nursery Trades Association and as approved by the Consultant.

.2 If required, install tree protection zone fencing in accordance with Contract Documents and Drawings.

.3 Protect roots of designated trees to drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to area indicated or designated in the Contract Documents. No vegetation removal should occur between April 1 and August 30 to protect birds protected under the *Migratory Birds and Convention Act ("MBCA").*

.6 If vegetation removal must be undertaken between April 1 and August 30, a nest survey must be conducted by a qualified avian biologist to identify and locate active nests of species covered by the MBCA.

.7 Trees free of nests must be removed within 24 hours for nest sweep.

.8 Trees with active nests should be monitored periodically during MBCA window and must remain in place until young birds have fleged the nest. Nest sweep should be conducted by qualified Avian Biologist prior to tree being removed.

.4 Wildlife Habitat Protection

.1 Allow wildlife incidentally encountered during construction to passively move out of the work area.

.2 The Contractor shall comply with the following wildlife exclusion fencing resources:

.1 https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing (OMECP 2020)

.5 Dewatering:

.1 Provide temporary drainage and pumping as necessary to dewater excavations, trenches, foundations, and other parts of the Work.

Maintain such areas free of water arising from groundwater or surface run-off, as required to keep them stable, dry, and protected from damage due to flooding.

.2 Maintain standby equipment necessary to ensure continuous operation of dewatering system.

.3 Do not pump water containing suspended materials or other harmful substances into waterways, sewers or surface drainage systems. Treat or dispose of such water in accordance with Environmental Law.

.6 Pollution Control:

.1 Take measures to prevent contamination of soil, water, and atmosphere by Spills, potentially causing environmental damage.

.2 Be prepared, by maintaining appropriate materials, equipment, and trained personnel on site, to intercept, clean up, and dispose of Spills that may occur.

.3 Promptly report spills and releases that may occur to Owner and Consultant.

.4 Contact manufacturer of Environmental Contaminant, if known and applicable, to obtain safety data sheets (SDS) and ascertain hazards involved and precautions and measures required in cleanup or mitigating actions.

.5 Take immediate action to contain and mitigate harmful effects of the Spill

.7 Dust and Particulate Control:

.1 Implement and maintain dust and particulate control measures in accordance with Environmental Law.

.2 Execute Work by methods that minimize dust from construction operations and spreading of dust on site or to adjacent properties.

.3 Provide temporary enclosures to prevent extraneous materials resulting from sandblasting or similar operations from contaminating air beyond immediate work area.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.5 Use appropriate covers on trucks hauling fine, dusty, or loose materials.

.8 Noise and Vibration Control:

.1 Take measures to control noise and vibration generated by the Work.

.2 All construction vehicles and equipment used in the Work shall comply with the noise limits provided by NPC-115 and NPC-118.

.3 Comply with the requirements of Authorities Having Jurisdiction and local Noise Control By-Laws to ensure noise generated by the Work is not excessive and not disturbing to the occupants of adjacent buildings / properties.

.4 The contractor shall notify the Owner and Consultant of any planned nighttime or weekend construction activities a minimum of thirty (30) days prior to the start of those activities.

.5 Vibration levels during construction of the Work shall comply with the limits noted in Table 7-5 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018). I

.6 The contractor shall monitor vibration at all structures or buildings where there is a potential to exceed the vibration limits.

.7 The contractor shall comply with Enbridge's Third Party Requirements in the Vicinity of Natural Gas Facilities Standard (2021-09-29).

.9 Snow Removal

.1 Allow no accumulation of ice and snow within the Place of the Work. There shall be no use of salt for de-icing in areas of building work.

.2 Remove snow from access routes to the Work to maintain uninterrupted progress of the Work.

.10 Maintaining existing sewerage flows

.1 Maintain existing sanitary sewage flows, where applicable, and provide alternative interim service utilizing duplicate portable sewage pumps, tank trucks and other approved means. Prevent interruption to service throughout the construction period and until the new works are placed in service.

.2 Provide and install all temporary sumps, bulkheads and/or other works in existing sewers, maintenance holes and service connections and provide temporary pumps in duplicate and pipelines to dewater and control the sewage.

.3 Discharge sewerage flows only to those sanitary sewers remaining in service or to tank trucks for approved disposal. Under no circumstances shall contaminated water be discharged or permitted to enter any drainage or natural watercourse.

.4 Temporarily drain or pump any leakage to permit work to be performed in the dry The Contractor's method shall be subject to review and Acceptance of the Consultant.

.11 Drainage ditches and storm sewers

.1 All ditches, drainage channels and/or storm sewer systems which may be affected by construction shall have their flows maintained at all times

during construction. Drainage shall not be impeded, and blockages or water backups are not permitted.

.2 Make allowance in prices for any problems that may be encountered because of ditch flows or storm sewer flows. Any damage because of water or flooding shall be the responsibility of the Contractor.

1.07 ARCHAEOLOGY AND CULTURAL HERITAGE

.1 Archaeology

.1 The Contractor shall comply with the following archaeological reference documents:

.1 2011 *Standards and Guidelines for Consultant Archaeologists* administered by the Ministry of Citizenship and Multiculturalism (MCM); and

.2 Archaeological reports completed for the Project.

.2 Before commencing any construction activities, the Contractor shall prepare, implement, and provide for the Consultant's review and Acceptance, an Archaeological Risk Management Plan setting out protocols for the discovery of human remains or undocumented archaeological resources. This Archaeological Risk Management Plan must be produced by a Licensed Professional Archaeologist. At a minimum it will include the following:

.1 Actions required resulting from the recommendations of the Archaeological reports;

.2 A protocol to be followed if human remains are discovered which includes how the Contractor will ensure that human remains are managed in compliance with Environmental Laws and all requirements of AHJ with respect to such discovery;

.3 A protocol to be followed by the Contractor if previously undocumented archaeological resources are discovered which describes how the Contractor will comply with Environmental laws regarding the management of previously undocumented archaeological resources;

.4 A process to ensure that the Contractor complies with Environmental laws for the management of archaeological sites.

.5 The Contractor shall treat the Archaeological Risk Management Plan as a living document and update it when any archaeological activities occur. Each Archaeological Risk Management Plan Update shall be submitted to the Owner and Consultant for review.

.3 Upon discovery of human remains or previously undocumented archaeological resources, all construction activities or other work that could have a detrimental impact in the immediate vicinity shall be stopped.

.4 Any archaeological materials that are discovered during the course of the Works shall be the responsibility of the Contractor for safekeeping until transferred out of the Contractor's control;

.5 Any future Stage 2, Stage 3 and/or Stage 4 archaeological assessments will adhere to the process noted above.

.6 All archaeological assessments will follow the MCM for Engaging Aboriginal Communities in Archaeology: A Draft Technical Bulletin for Consultant Archaeologists in Ontario.

.2 Cultural Heritage

.1 The Contractor shall comply with the following cultural heritage reference documents:

.1 ONTC Environmental Assessment and Permitting Toolkit, AECOM Canada Limited, 2021;

.2 Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, MCM, 2016;

.3 Ontario Heritage Tool Kit, MCM, 2006;

.4 Standards and Guidelines for Conservation of Provincial Heritage Properties, MCM, 2010;

.5 Standards and Guidelines for Conservation of Provincial Heritage Properties: Heritage Identification Process, MCM, 2014;

.6 Information Bulletin No. 2: Strategic Conservation Plans for Provincial Heritage Properties, MCM, 2017;

.7 Information Bulletin No. 3: Heritage Impact Assessments for Provincial Heritage Properties, MCM, 2017;

.8 Standards and Guidelines for the Conservation of Historic Places in Canada (Parks Canada 2010)

.9 Cultural Heritage Reports (including but not limited to: Cultural Heritage Evaluation Reports, Heritage Impact Assessments, and Strategic Conservation Plans).

.2 Before commencing any construction activities, the Contractor shall prepare, implement, and provide for Consultant's review and Acceptance a Cultural Heritage Risk Management Plan. The plan shall include, at a minimum, the following requirements for all directly and indirectly impacted properties of known heritage significance or potential heritage significance:

.1 The actions required of the Contractor pursuant to the recommendations set out in the Cultural Heritage Reports, Cultural Heritage Evaluation Reports, and Heritage Impact Assessments, and to ensure the protection of identified built heritage resources and cultural heritage landscapes;

.2 The Contractors planned approach to carrying out the actions described in the above, including an approach to document, monitor and mitigate vibration to heritage structures during construction;

.3 A process for updating and resubmitting the Cultural Heritage Risk Management Plan;

.4 A process to ensure that the Contractor complies with Environmental Laws for the management of heritage resources;

.5 A process to ensure that the Contractor provides to the Owner any cultural heritage evaluation reports, cultural heritage reports, cultural heritage impact assessments, conservation plans, or any

other documentation as may be required of the Contractor pursuant to Environmental Law or the Cultural Heritage Reports, in addition to those provided with the Contract Documents.

1.08 EXCESS SOIL MANAGEMENT

.1 Soil and Excavated Materials Management Plan

.1 The Contractor shall prepare, submit for Acceptance to the Owner and Consultant and implement a soil and groundwater management strategy (a "Soil and Excavated Materials Management Plan") that describes how the Contractor will address the handling, management, treatment, reuse, storage, monitoring and disposal of soil and excavated materials (i.e., soil, fill, rock and solid Hazardous Waste and non-Hazardous Waste, including Environmental Contaminants) that is generated or encountered during the Works. The Soil and Excavated Materials Management Plan shall include, at a minimum, descriptions of:

.1 the general principles that the Contractor will apply for managing soil and excavated materials;

.2 the over-arching soil and excavated materials management strategy for the Project in terms of sustainable principles and compliance with regulatory requirements (including, but not limited to, On-site and Excess Soil Management Regulation – O. Reg. 406/19) and best practices;

.3 the estimated quantities of soil and excavated materials to be managed during the Works and proposed methods for minimizing these quantities;

.4 the strategy to reuse soil and excavated material;

.5 the strategy for stockpiling and monitoring the soil and excavated material at the Site, and to mitigate any exceedance of any Authorized Volume;

.6 a preliminary schedule indicating the affected areas to be excavated over the course of the Project, and the associated quantities for each stage of construction;

.7 protocols for characterizing soil and excavated materials quality and determining management, including handling, reuse, storage, transportation, documentation, treatment and disposal requirements;

.8 how soil and excavated materials will be temporarily staged or stored at the site or other worksites for reuse or stockpiled and monitored or transferred to disposal with regard for potential environmental effects and impacts to human health and safety;

.9 how soil and excavated materials quantities will be tracked and reported to the Owner during excavation, transport, treatment, disposal or stockpiling;

.10 how clean fill will be sourced and brought to the site;

.11 mitigation measured to address any impacts associated with the excavation, management, resue, stockpiling, transport, treatment or disposal of soil and excavated materials;

.12 a monitoring plan in which monitoring of the contaminated and hazardous stored soil and excavated material are recorded and reported; and

.13 how the discovery of Environmental Contaminants in areas not previously identified will be managed including a general plan of action for the remediation, storage or removal of Environmental Contaminants as detailed in the Contamination Management Plan defined below

.2 The Contractor shall adhere to groundwater and dewatering management.

.3 The Contractor shall submit the Soil and Excavated Materials Management Plan for Acceptance by the Owner and Consultant.

1.09 CONTAMINATION MANAGEMENT PLAN

.1 The Contractor shall prepare the Contamination Management Plan and submit it to the Owner and the Consultant for Review and Acceptance. The Contamination Management Plan shall include:

.1 the date and time that the Environmental Contaminants was discovered;

.2 a description of the Environmental Contaminants including the location (municipal address and/or UTM coordinates) and a figure depicting the location of the Environmental Contaminants;

.3 a detailed description of the circumstances under which the Environmental Contaminants was discovered, including the preliminary field assessment and observations;

.4 a detailed description of the handling and management of the Environmental Contaminants prior to submittal of the Contamination Management Plan;

.5 a detailed description of the preliminary field investigation including date, time and depth of samples collected, sampling methods, number of samples collected, chemical parameters, media tested and an explanation of the delineation method for Environmental Contaminants;

.6 a figure depicting sampling locations, sample exceedances and estimated vertical and horizontal extent of the Environmental Contaminants in relation to the site;

.7 copies of borehole and test pit logs for sample locations related to the Environmental Contaminants, including soil description and classification;

.8 copies of laboratory certificates of analysis for the samples collected, including grain size analysis (if applicable);

.9 sampling and analysis requirements in accordance with O. Reg. 406/19;

.10 a description of management options for the Environmental Contaminants and the Contractor's preferred management option, including a description of whether containment measures are required to avoid re-contamination or migration of the Environmental Contaminants;

.11 an implementation plan, including a detailed description of how Environmental Contaminants will be managed and estimated quantities of soil and groundwater to be disposed off-site and reused within the Project, if applicable;

.12 any impact to the Project Schedule caused by the discovery of Environmental Contaminants;

.13 additional costs, if any, associated with incremental measures required to manage the Environmental Contaminants;

.14 name and address of the receiver site for the soil containing Environmental Contaminants;

.15 additional information as requested by the Owner and/or Consultant; and

.16 rationale for assigning responsibility for the Environmental Contaminants, including an assessment and comparison of the discovered Environmental Contaminants characteristics against available baseline environmental information such as the Project's Soil and Groundwater Characterization Report.

.2 The Contractor's Qualified Person shall supervise the extraction, transport, removal, disposal or discharge of contaminated media identified in the Contamination Management Plan.

.3 In accordance with Environmental Law, the Contractor shall be responsible for the characterization, testing, and analysis of soil and groundwater that requires off-Site disposal, off-Site reuse or on-Site reuse, to the satisfaction of the receiver or disposal site and to the satisfaction of Owner and Consultant.

.4 The Contractor shall be responsible for registration with the Resource Productivity and Recovery Authority (RPRA) and recordkeeping for disposal of regulated Waste, as applicable.

.5 The Contractor shall update the Contamination Management Plan with additional information following the implementation of the Contamination Management Plan (the "Updated Contamination Management Plan") and the Contractor shall submit such updated plan to the Owner and Consultant in accordance with Project submission timeframes. The Updated Contamination Management Plan shall include:

.1 a summary of the information presented in the Contamination Management Plan;

.2 a detailed description of the handling and management of the Environmental Contaminants following submittal of the Contamination Management Plan;

.3 a detailed description of the handling and management of the Environmental Contaminants following submittal of the Contamination Management Plan;

.4 a detailed description of field investigations conducted during implementation of the Contamination Management Plan including date, time and depth of samples collected, sampling methods, number of samples collected, chemical parameters, media tested and explanation of the delineation method for Environmental Contaminants;

.5 a figure depicting sampling locations, sample exceedances and vertical and horizontal extent of the Environmental Contaminants remediated on site;

.6 copies of borehole and test pit logs for sample locations related to the Environmental Contaminants, including soil description and classification;

.7 quantity of soil and groundwater disposed outside the Lands

and reused within the lands;

.8 name and address of the receiver site for the Environmental Contaminants;

.9 electronic copies of waste manifests or bills of lading;

.10 a description of containment measures for the Environmental Contaminants employed to avoid re-contamination or migration of Environmental Contaminants;

.11 a description of whether the Environmental Contaminants entered lands outside of the Project site;

.12 a description of post-implementation monitoring or sampling needed; and

.13 signature of the Contractor's Qualified Person who supervised the implementation of remediation activities and preparation of the Updated Contamination Management Plan.

.6 The Contractor is encouraged to seek opportunities for beneficial reuse (rather than remove or replace) for as much soil from the Project as possible in a manner that is consistent with Ontario Regulation 406/19, provided that the Contractor complies with its obligations under this Contract.

.7 The Contractor shall evaluate reuse options to consider site-specific excess soil quality criteria in cases where soil is geotechnically suitable for reuse as engineered fill, including where such soil may be subject to some reconditioning such as drying or wetting, but soil quality does not meet the applicable generic excess soil quality standard.

.8 The Contractor shall reuse (rather than remove or replace), as feasible, as much soil on site as possible in a manner that is consistent with Ontario Regulation 153/04, Ontario Regulation 406/19 and the MECP's Rules for Soil Management and Excess Soil Quality Standards, as amended, provided that the Contractor complies with its obligations under this Contract.

.9 The Contractor shall evaluate reuse options in cases where soil is geotechnically stable for reuse but soil quality does not meet the applicable generic excess soil quality standard.

1.10 MANAGEMENT, REMOVAL AND REMEDIATION OF SOIL WITH ENVIRONMENTAL CONTAMINANTS

.1 The Contractor shall be responsible for excavating, handling, managing, stockpiling, removing, and transporting of soil and excavated material as required to complete the Project, including soil and excavated material containing Environmental Contaminants. The Contractor shall reuse or dispose of soil and excavated material that does not contain Environmental Contaminants at its own cost.

.2 The Contractor shall be permitted to reuse any soil and excavated material containing Environmental Contaminants as part of the Works provided the Contractor's reuse of such soil complies with Environmental Laws and MECP Guidelines, Standards and Rules. The Contractor shall not be entitled to any additional compensation from the Owner where such soil or excavated material is reused.

.3 Upon discovery of soil containing Environmental Contaminants that will require excavation to complete the Project and that the Contractor will not reuse, the Contractor shall notify the Owner and Consultant. Such notification shall clearly indicate the anticipated volume of soil containing Environmental Contaminants

that will be excavated and not reused. The Contractor shall not be permitted to provide such notification until the Contamination Management Plan has been submitted for Acceptance to the Owner and Consultant. The Owner shall, no later than fifteen (15) Working Days following Notice in Writing from the Contractor that contains all information provided in the notification, described above, and the Contamination Management Plan, direct the Contractor either to:

.1 dispose of such soil containing Environmental Contaminants; or

.2 stockpile such soil containing Environmental Contaminants on the Place of the Work (or Station Location).

.4 The Owner may specify a maximum volume that is to be disposed of or stockpiled (the "Authorized Volume"). Where the Owner has specified an Authorized Volume, the Contractor shall be required to submit a new notification for any remaining soil containing Environmental Contaminants following completion of the disposal or stockpiling of the Authorized Volume in order to receive further direction from the Owner, including a revised Authorized Volume.

.5 If the Contractor is directed to dispose of soil containing Environmental Contaminants, then:

.1 the Contractor shall proceed to dispose of the soil at a licensed facility in Ontario and inform the Owner of the selected facility;

.2 the Contractor shall be compensated with an agreed upon pricing for each ton of excavated soil containing Environmental Contaminants that is disposed, up to any Authorized Volume and Invoicing and such compensation shall be deemed to include all handling, shipping and disposal fees and costs and all administrative and profit costs of the Contractor.

.6 If the Contractor is directed by the Owner to stockpile such soil containing Environmental Contaminants on the Site, then the Contractor shall:

.1 utilize an agreed upon laydown area;

.2 provide geomembrane ground protection to prevent leaching of Environmental Contaminants;

.3 provide a full geomembrane cover over the stockpile;

.4 provide a permanent monitoring system;

.5 comply with the portions of the On-site and Excess Soil Management Regulation (O. Reg. 406/19) regarding stockpiling, the MECP Rules for Soil Management and Excess Soil Quality Standards and the MECP Management of Excess Soil - A Guide for Best Management Practices;

.6 develop and submit to the Owner a monitoring program for the stockpiled soils for review and Acceptance by the Consultant.

1.11 WEEKLY SOIL AND EXCAVATED MATERIALS REPORT

.1 The Contractor shall provide a template of the Weekly Soil and Excavated Materials Report to the Consultant.

.2 The Contractor shall submit a weekly report for soil and excavated material to the Consultant (each a "Weekly Soil and Excavated Materials Report") that includes at a minimum:

.1 analytical results of chemical samples collected for soil, groundwater or other material in the area of the Works before and after construction;

.2 record of quantity of excavated material, reused at the site in metric tonnes;

.3 record of excavated material stockpiled at the site in metric tonnes;

.4 all back-up documents of soils, groundwater or other materials removed from site, including tickets indicating soil or other material quantity, landfill or final treatment or disposal location;

.5 Site reports complete with photos and back-up documents on all soil, groundwater or other materials remedial work activities;

.6 documentation related to any unforeseen site issues during soil, groundwater or other materials remedial work activities;

.7 a cost table indicating all associated costs in the removal, management, transportation, treatment and disposal of the soil, groundwater or other materials in the area of the Works;

.8 a description of how the discovery of Environmental Contaminants in areas not previously identified will be managed including the preparation of a plan for the re-use, stockpile, remediation or removal of Environmental Contaminants; and

.9 reporting as to how all management activities and best practices have been implemented.

1.12 HAZARDOUS SUBSTANCES BROUGHT ONTO THE SITE

.1 Notwithstanding any Environmental Laws or any other provision, all products and materials, goods or other items which in their natural, original state, or through environmental transformation or degradation contain Hazardous Substances, that are brought onto the site by the Contractor or any person for whom Contractor is at law responsible shall be and remain the sole and exclusive property and responsibility of Contractor and shall not become the property or responsibility of the Owner, notwithstanding their incorporation into or affixation to the site as part of the Work, and notwithstanding any termination or expiration of the Project. Any resulting Environmental Contaminants at the site in respect of any Hazardous Substances so brought onto the site and the remediation and/or removal thereof and the cost of such remediation and/or removal shall be the sole responsibility of the Contractor.

1.13 SPILL PREVENTION PLAN

.1 The Contractor shall prepare, submit, and implement a Spill Prevention Plan (a "Spill Prevention Plan"). The Spill Prevention Plan shall describe the measures the Contractor will take to prevent Spills of liquid chemicals, fuels and lubricants, and manage or otherwise mitigate the effects of any such Spills to construction personnel and the environment during the term of the Project. The Spill Prevention Plan shall consider site-specific characteristics, and include, at a minimum, the following:

.1 the types and nature of liquid chemicals, fuels and lubricants to

be used during the performance of the initial Works;

.2 the facilities and procedures to be used for storing and handling such materials, including Spill response, containment and clean-up materials;

.3 monitoring and inspection procedures, including monthly inspections of Spill response and safety equipment, to ensure that management requirements are maintained and that inspections are documented;

.4 employee training on the storage and use of liquid chemicals, fuels and lubricants and the prevention of Spills;

.5 subsurface infrastructure (for example, weeping tile, infiltration galleries, etc.) that may influence the destination of any Spill material;

.6 the identification of municipal and natural discharge locations (for example, municipal catch basins) and drainage pathways on the Site, and a description of the direction of flow in the event of a Spill;

.7 Spill response procedures for each type of material that may be spilled, and the various environmental media that may be affected (for example, atmosphere, water bodies, ground surface);

.8 procedures for clean-up and restoration of surfaces and environmental media that may be affected by the Spill; and

.9 procedures for notification and reporting of Spill events to Contractor and to Authorities Having Jurisdiction, as applicable.

.2 The Contractor shall submit the Spill Prevention Plan to the for review and Acceptance.

.3 The Contractor shall ensure that a hard copy of the latest revision of the Spill Prevention Plan is available in all site trailers and all site offices.

.4 After each and any occurrence of a Spill, irrespective of the quantity or characteristics of the material spilled, the Contractor shall prepare and submit a spill prevention occurrence report (a “Spill Prevention Occurrence Report”) to the Consultant. The Spill Prevention Occurrence Report shall summarize how all Spill Prevention Plan activities were implemented during the remediation and management of the occurrence of the Spill and the associated outcomes.

1.14 DESIGNATED SUBSTANCES AND HAZARDOUS SUBSTANCE MANAGEMENT PLAN

.1 The Contractor shall review the “Designated Substances Survey Report – Matheson Station”.

.2 The Contractor shall prepare and implement a Designated Substances and Hazardous Substance Management Plan (a “Designated Substances and Hazardous Substance Management Plan”). The Contractor shall submit the Designated Substances and Hazardous Substance Management Plan for review and Acceptance. The Designated Substances and Hazardous Substance Management Plan shall describe:

.1 how the Contractor will manage all Designated Substances and

Hazardous Substance, including, but not limited to, abatement, handling, transportation, testing, removal, disposal and/or ultimate disposition of all Designated Substances and Hazardous Substance determined to be present, or generated as part of the Works;

.2 the general principles that the Contractor will apply for managing the necessary removal of Designated Substances and Hazardous Substances;

.3 the Contractor's over-arching Designated Substances and Hazardous Substance management strategy in terms of sustainable principles and compliance with Environmental Laws and best practice;

.4 locations of Designated Substances and Hazardous Substances to be abated, managed or removed by Contractor during the Work. The Contractor shall carry out necessary testing for Designated Substances and Hazardous Substances under section 30 of the Occupational Health and Safety Act (Ontario), and under section 8 Regulation 278/05, and protect workers from working with or in proximity to or from being otherwise exposed to Designated Substances at the Site or the Works. The Designated Substances and Hazardous Substance Management Plan shall describe all applicable processes for same;

.5 the Contractor's protocols for safe handling, abatement, management, and removals, including disposal requirements;

.6 how the Contractor will ensure that no adverse impacts will result to adjacent properties during the abatement, handling, management or removal of Designated Substances and Hazardous Substances;

.7 how the Contractor will conduct its activities in compliance with the Occupational Health and Safety Act (Ontario) and all applicable law and industry practices;

.8 the further necessary measures the Contractor will take to ensure the safety of all personnel accessing the Site and the Works, to the standards of applicable Occupational Health and Safety Law;

.1 the Contractor's contingency plans to mitigate adverse impacts; and

.2 the Contractor's reporting procedures to document and report to the Owner how all testing, management activities, best practices and mitigation measures have been implemented.

.3 Contractor acknowledges that section 30(5) of the Occupational Health and Safety Act (Ontario) shall not apply to the circumstances of the site and the Works of the Owner, given the obligations of the Contractor set out in Section 1.13.2.4.

.4 The Contractor shall prepare and submit a Designated Substances and Hazardous Substance implementation report (a "Designated Substances and Hazardous Substance Implementation Report") to the Consultant for Acceptance. The Designated Substances and Hazardous Substance Implementation Report shall summarize how all Designated Substances and Hazardous Substance

Management Plan activities were implemented during the Works and the associated outcomes.

1.15 OTHER ENVIRONMENTAL MATTERS

.1 Organic Materials

.1 Organic materials from excavation operations may contain peat, topsoil and subsoil materials. Contractor shall remove these materials from the Site in accordance with Environmental Laws and best practice. The Contractor shall not allow burial or reuse of any excavated organic materials on the site.

.2 Protection/Decommissioning of Existing Monitoring Wells

.1 The Contractor shall be responsible for temporary protection and final decommissioning of all existing or newly installed monitoring wells in accordance with Ontario Regulation 903 under the Ontario Water Resources Act (Ontario), as directed by the Owner, including with respect to:

.1 any and all monitoring wells installed as part of geotechnical, environmental, or hydrogeological investigations in connection with the Project; and

.2 all wells installed as part of the studies undertaken by the Owner and that were provided as part of the project background information.

.2 The Contractor shall, prior to Ready-for-Takeover (unless the Owner provides an alternative timing), decommission any wells installed by the Contractor as part of its own investigation and monitoring work as necessary to complete the Works.

2 Products

2.01 NOT USED

3 Execution

3.01 NOT USED

3.02 END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 This Section references laws, bylaws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction (AHJ), and other legally enforceable requirements applicable to the Work and that are or become enforced during performance of the Work.

1.02 REFERENCE STANDARDS AND REFERENCE DOCUMENTS

.1 If specified referenced standards do not indicate an edition or version, the latest edition or revision issued by the publisher at the time of RFP closing shall apply, except as follows:

.1 If a particular edition or revision date of a specified standard is referenced in an applicable code or other regulatory requirement, the edition or version in the regulatory reference shall apply.

.2 The specified reference standards establish minimum requirements. If Contract Documents indicate requirements that conflict with a reference standard, the more stringent requirements shall apply.

.3 If multiple reference standards are specified and the standards establish different requirements, the most stringent requirement shall apply.

.4 In case of discrepancy or uncertainties, refer to the Consultant for interpretation or clarification.

.5 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.03 CODES

.1 Building Code: Perform Work in accordance with the Ontario Building Code including amendments up to the time of RFP closing and other codes of provincial or local application.

.2 Fire Code: Perform Work in accordance with the Ontario Fire Code 2020 including amendments up to the time of RFP closing and other codes of provincial or local application.

.3 Energy Code: Perform Work in accordance with the National Energy Code of Canada for Buildings (NECB) 2020 and Part 12 of OBC Resource Conservation and Environmental Integrity and Supplementary Standard SB-10 whichever is more stringent, including amendments up to the time of RFP closing and other codes of provincial or local application.

.4 Plumbing Code: Perform Work in accordance with Ontario Plumbing Code Part 7 of OBC. including amendments up to the time of RFP closing and other codes of provincial or local application.

.5 If there is a conflict or discrepancy between codes, the most stringent requirements shall apply.

.6 Specific design and performance requirements listed in Specifications and indicated on Drawings may exceed minimum requirements established by referenced Codes; these requirements will govern over the minimum requirements listed in the referenced Codes.

1.04 FEES

.1 Except as otherwise specified, Contractor shall apply for, obtain, and pay fees associated with permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:

.1 Regulatory requirements and fees in force at the time of RFP closing, and

.2 A change in regulatory requirements or fees scheduled to become effective after the time of RFP closing and of which public notice has been given before the time of RFP closing.

2 PRODUCTS

2.01 EASEMENTS AND NOTICES

.1 Owner will obtain permanent easements and rights of servitude that may be required for performance of the Work.

.2 Contractor shall give notices required by regulatory requirements.

2.02 PERMIT REQUIREMENTS

.1 Construction Related Permits:

.1 **Municipal building permit is not required**.

.2 If required, MTO Building and Land Use Permits will be obtained by the Owner.

.3 Obtain and pay for all other required Certificates, Licenses and other permits required by regulatory municipal, provincial or federal authorities to complete the Work.

.4 Contractor will require that specific Subcontractor[s] obtain and pay for permits required by authorities having jurisdiction (AHJ), where their work is affected by work requiring permits.

.5 Contractor shall display permits in a conspicuous location at the Place of the Work.

.2 Occupancy Permits:

.1 Contractor shall apply for obtain and pay for any required permits and or certificates where required by AHJ.

.2 Contractor shall correct deficiencies in accordance with the Consultant’s instruction. If a deficiency is not corrected, the Owner reserves the right to make correction and charge Contractor for costs incurred.

.3 Contractor shall turn all permits and certificates over to Owner.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.2 ASTM International (ASTM):

.1 ASTM E329-[20]Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

.3 International Organization for Standardization (ISO):

.1 ISO 9001: [2015], Quality Management Systems – Requirements

1.02 SUMMARY

.1 This section describes administrative and procedural requirements for proactive Contractor activities to assure the quality of construction before and during execution of the Work.

1.03 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 45 00 – Quality Control

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Contractor is responsible for self-performed testing and inspections and submittal of test reports to the Consultant.

.2 The Owner may employ and pay for quality audit services performed through third-party observation and testing to validate the Contractor's performance of the Work and perform whole Work testing at completion of Project.

.3 Contractor to provide a Quality management system that establishes a standardized approach to managing quality of materials and workmanship during the execution of Work in accordance with ISO 9001. The quality management system shall consist of plans, procedures, and organization necessary to produce complete the Work in compliance with the Contract Document requirements.

1.05 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit a Quality Management Plan to the Consultant for review and Acceptance prior to Preconstruction meeting.

.1 The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Owner will consider an interim plan for the first twenty (20) Working Days of operation. The Contractor may begin mobilization during the interim period.

.2 The Work will be permitted to begin only after Acceptance of the Quality Management Plan or Acceptance of an interim plan applicable to the portion of the Work to be started.

.3 The Quality Management Plan shall include, as a minimum, the following to cover all Work both at the Place of the Work, and in off-site locations (such as manufacturing facilities), including Work by Subcontractors, fabricators, suppliers, and purchasing agents:

.1 A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the quality control staff shall implement the three-phase control system for all aspects of the work specified. The staff shall include the person responsible for quality who shall report to the Contractor's project manager.

.2 The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a quality control function.

.3 A copy of the letter to the person responsible for quality signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of person responsible for quality, including authority to stop work that is not in compliance with the Contract Documents. The person responsible for quality shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters will also be supplied to the Consultant.

.4 Procedures for scheduling, reviewing, certifying, and managing Submittals, including those of Subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with the Contract Documents.

.5 Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, portion of the Work to be tested, test frequency, and person responsible for each test.

.6 Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.

.7 Procedures for tracking defects and deficiencies from identification through Acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

.8 Reporting procedures, including proposed reporting formats.

.9 A list of the definable features of Work. A definable portion of the Work is a task which is separate and distinct from other tasks and has separate control requirements. This list will be agreed upon with the Consultant during a coordination meeting.

.10 Acceptance of the Contractor's Quality Management Plan is required prior to the start of the Work. Acceptance is conditional and will be predicated on satisfactory performance during the Work.

.11 The Owner reserves the right to require the Contractor to make changes in its Quality Management Plan and operations, as necessary, to obtain the quality specified.

.12 Refer to the Contract Documents for additional requirements.

.4 Submit a detailed testing and inspections schedule for Acceptance to the Consultant in accordance with the Contractor's Quality Management Plan.

.5 Submit certificates for Products, process and system for Acceptance by the Consultant.

.6 Submit formal testing and inspections reports per ASTM E329 and as indicated in Specifications to the Consultant in accordance with the Contract Documents.

.7 Submit one digital copy of each Quality Assurance inspection and test report to the Consultant, except where Specifications indicate otherwise.

.8 Submit mill test certificates, as required, in technical Specifications and as indicated on Drawings.

1.06 Quality Control Organization:

.1 The requirements for the quality control organization are a person responsible for quality and sufficient number of additional qualified personnel to ensure compliance to Contract Documents.

.2 Provide a quality control organization which shall be available at all times during progress of the Work and with complete authority to take any action necessary to ensure compliance with the Contract Documents.

1.07 QUALIFICATIONS

.1 Manufacturers' Qualifications:

.1 specializes in manufacturing the Products specified in the Specifications.

.2 minimum three (03) years documented experience with a record of successful performance.

.2 Suppliers' Qualifications:

.1 authorized to distribute manufacturer's Products

.2 has capacity to supply required Products without delaying the Project

.3 Fabricators' Qualifications:

.1 experienced in producing Products required for this Project

.2 successful record of in-service performance

.3 sufficient production capacity to fabricate required Products without delaying the

Project

.4 Installer Qualifications:

.1 firm or individual experienced in design and installation, application, and erection of materials to the extent required for this Project

.2 successful record of in-service performance

.5 Testing and Inspecting Agency Qualifications:

.1 accredited organizations by the Standards Council of Canada for testing and inspection

.2 capable of reliably performing testing of building products and inspections of construction activities in accordance with ISO 9001 and ASTM E329.

.6 Licensed Professionals Qualifications:

.1 individual registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the province, state or jurisdiction in which the Project is to be constructed.

1.08 CERTIFICATIONS

.1 Ensure that certification of Products, processes, and systems includes physical and examination testing as specified in ASTM E329 SO 9001 to confirm compliance with Specifications requirements.

1.09 COORDINATION

.1 Coordinate and schedule tests and inspections with accredited testing, inspection agencies as indicated in Contract Documents and in accordance with ASTM E329 requirements.

.2 Coordinate Contractor’s Quality Management system with the Consultant for reporting, scheduling access and incidental labor required by Quality Auditor’s reports if required.

.3 When attendance is required, notify the Consultant in advance before proceeding with tests and inspections, and additional tests and inspections as may be reasonably requested by the Consultant.

.4 Coordinate testing and inspections schedule with Subcontractor, testing agencies, and other affected parties.

1.10 SITE SAMPLES

.1 Testing agency is responsible for obtaining representative samples of those materials required to be tested and evaluated in accordance with the Contractual Documents.

.2 Ensure testing agency performs sampling in accordance with ASTM E329.

.1 When sampling collection is required by testing agency, ensure proper protection, handling and storing of samples.

.3 Testing agency to document procedures and appropriate techniques to select samples.

.4 Record details of environmental conditions present during the sampling, such as rain or freezing weather that may affect testing of sample or interpretation of test results.

1.11 Mock-ups

.1 Mock-ups can be used as a reference for assessing quality of workmanship and site-applied finishes as requested in the Project's Contract Documents.

.2 Prepare mock-ups for Work specifically requested in Specifications. Except when required in other sections, obtain the Consultant's Acceptance to construct and install mock-ups. When not required, Contractor shall indicate the use of mock-ups in their Quality Management Plan.

.3 Assemble mock-ups at the Place of the Work in locations acceptable to the Consultant, or where location is indicated in the technical Specifications.

.4 Schedule mock-ups ready for the Consultant review and Acceptance in orderly sequence, to avoid delays in Work.

.1 Failure to prepare mock-ups in ample time is not considered sufficient reason to request an extension of Contract Time. Claims for extension of Contract Time by reason of such default will not be considered.

.5 Consult with the Consultant in scheduling dates for construction and review of mock-ups. Provide sufficient notice as directed by the Consultant.

.6 Construct mock-ups using materials, finishes, colours, and methods proposed for the completed Work. Mock-ups to demonstrate proposed workmanship and range of aesthetic appearance.

.7 Where a mock-up represents or affects multiple Specification sections, coordinate activities to ensure mock-ups are complete.

.8 Modify or replace mock-ups when unacceptable to the Consultant.

.9 Maintain acceptable mock-ups in an undisturbed condition as a standard for judging the completed Work.

.10 Demolish and remove mock-ups at conclusion of the Work or when Acceptable to the Consultant.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

1. Canadian Construction Documents Committee (CCDC)

    .1 CCDC 2-2020, Stipulated Price Contract.

1.02 SUMMARY

.1 This Section describes administrative and procedural requirements for reactive activities to verify that completed Work conforms to Contract Documents requirements.

.2 Having inspection and testing agencies employed by Contractor or the Owner does not relieve the Contractor of their responsibility to perform Work in accordance with Contract Documents.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Allow and coordinate access to Work on site, manufacturing off site, and fabrication off site with inspection and testing agencies, the Consultant and the Owner.

.2 Retain and pay for inspection and testing that are designated for Contractor's own Quality Management Plan, and when testing and inspection are required by Authorities Having Jurisdiction (AHJ).

.3 Provide advanced notice, minimum five (05) Working Days to the Consultant and to each inspection/testing agency for inspection and testing required by Contract Documents or by (AHJ).

.4 Where Owner cooperation, input or participation is required to fully perform inspection and test activities, particularly in relation to the correct operation of Products Supplied by Other and installed by the Contractor, provide a minimum ten (10) Working Days' notice to the Consultant.

.5 In advance of each test, notify appropriate agency and the Consultant in the order that attendance arrangements can be made.

.6 Employment of inspection and testing agencies does not relax or remove responsibility to perform Work in accordance with Contract Documents.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit schedule of testing and inspection activities to the Consultant, applicable Subcontractors, testing agencies, Owner, and other affected parties. Include the following:

    .1 List each testing and inspection agency

.2 Identify types of tests and inspections for each agency, and cross reference to applicable specification section number-title in Contract Documents

.3 Description of test and inspection

.4 Identify applicable reference standard

.5 Identify test and inspection method

.6 Indicate number of each test and inspection required

.3 Submit one digital copy of each quality assurance inspection and test report to the Consultant, except where a technical Specification section indicates otherwise.

.4 Submit reports for inspection and testing required by Contract Documents or by AHJ and performed by Contractor-retained inspection and testing agencies within ten (10) Working Days after inspection or test is completed, except where a technical Specification section indicates a different time period.

.5 Submit one digital copy of each quality control inspection and test report to the Consultant, except where a technical Specification section indicates otherwise. Maintain copies available at Place of the Work in accordance with Section 01 78 00 - Closeout Submittals.

.6 Deliver copies of quality control reports to Subcontractor of Work being inspected or tested.

1.05 SITE QUALITY CONTROL PROCEDURES

.1 Provide labor, Construction Equipment, and temporary facilities to obtain and handle test samples and materials on site. Arrange for sufficient space to store and cure test samples.

.2 Deliver samples and materials required for testing, as requested in technical Specification sections. Submit with reasonable promptness and in an orderly sequence to avoid delays in Work.

.3 Before Project start, photograph Project site and existing conditions in accordance with Section 01 33 00 – Submittal Procedures.

1.06 TESTING AND INSPECTION SERVICES

.1 The Owner may retain and pay for independent inspection and testing agencies to inspect, test, or perform other quality control reviews of parts of the Work, in addition to those carried by the Contractor.

.2 Consultant may order any part of the Work to be reviewed or inspected if the Work is suspected to be not in accordance with Contract Documents. If, upon review such Work is found not in accordance with Contract Documents, the Contractor shall correct such Work and pay cost of additional review and correction.

.3 Provide equipment required for executing inspection and testing by appointed agencies.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and testing to ascertain full degree of defect. Correct defect and irregularities as advised

by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

.5 Quality control testing and inspection reports to include the following:

.1 Project name and number

.2 Testing/Inspection agency's name, address, telephone number, and website

.3 Date of issuing report

.4 Dates and locations of tests, inspections, or samples

.5 Description of the Work and test and inspection method

.6 Numbers and titles of associated Specification sections

.7 Test and inspection data and interpretation of test results (e.g., pass or fail)

.8 Ambient conditions at time of test, inspection, or sampling

.9 Recommendations on re-testing and re-inspecting, if applicable.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

1.03 TEMPORARY ELECTRICITY

.1 When Electrical power is not available at site, make all necessary arrangements and pay for all costs for a temporary electrical service of sufficient capacity to supply temporary lighting, operation of power tools, cranes and equipment for all construction, implementation, and inspection and testing purposes. Supply and install necessary temporary cables and other electrical equipment and make all temporary connections as required. If generators are used, they should be of the kind that minimize noise impact to surrounding areas and residents.

.2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance, and removal.

.3 When Electrical power supply is available at site and supply is metered to ONTC, subject to agreement of the Consultant, it may be provided for construction use at no cost. Contractor shall ensure their use shall not cause the overall use to exceed supply voltage and capacity. Connect to existing power supply in accordance with Canadian Electrical Code.

.4 Electrical power systems installed under this Contract may be used for construction requirements only with prior approval from the Consultant if warranties are not affected. Repair damage to electrical system caused by the Contractor’s use under this Contract.

.5 Temporary power distribution wiring shall comply with Ontario Electrical Safety Code. Obtain inspection certificates for temporary electrical work.

1.04 TEMPORARY FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work in accordance with Section 01 35 35 – Fire Safety Protection.

1.05 TEMPORARY HEATING COOLING AND VENTILATING

.1 Provide temporary heating as required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be of the flameless (vent free) type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of Work.

.2 Protect Work and Products against dampness and cold.

.3 Prevent moisture and condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation, and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain minimum temperatures recommended by applicable codes and regulations in areas where construction is in progress.

.5 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours, or gases in occupied areas during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in a manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operating ventilation and exhaust system after cessation of work process until complete removal of harmful contaminants is ensured.

.6 Permanent heating, ventilating, and air conditioning system of building must not be used.

1.06 TEMPORARY LIGHTING

.1 Provide and maintain temporary lighting throughout Project. Ensure level of illumination on all work area is suitable and will meet or exceed the requirement of Health and Safety regulations and as per applicable codes and standards.

.2 Electrical lighting systems installed under this Contract may be used for construction requirements only with prior approval of the Consultant if warranties are not affected.

.1 Repair damage to lighting systems caused by use under this Contract.

.2 Replace lamps that have been used for more than [3] months.

.3 Temporary lighting installed under this Contract shall not cause light nuisance and or adversely impact ONTC Operations and surrounding areas and properties. Make adjustments to the satisfaction of Owner.

1.07 TEMPORARY SANITARY FACILITIES

.1 Provide sanitary facilities in accordance with Occupational Health and Safety requirements in the

Place of the Work. Use of Owner's existing sanitary facilities or new sanitary facilities is not allowed.

1.08 TEMPORARY TELECOMMUNICATIONS

.1 If required, provide and pay for temporary telephone, data hook up equipment necessary for own use and use of the Consultant.

1.09 TEMPORARY WATER

.1 When available, Owner will provide water for construction use. Otherwise, the Contractor will be responsible for the water supply and all associated costs.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance, and removal as required.

2.01 INSTALLATION AND REMOVAL

.1 Provide temporary utilities to execute Work expeditiously.

.2 Remove all such temporary utilities from site after use.

.3 Be responsible for the careful and reasonable use of Owner-supplied utilities. Make good and remediate any damage caused by use under this contract.

.4 Pay costs for installation, maintenance and removal.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.

.2 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.

.3 CSA Group (CSA)

.1 CSA-A23.1/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-0121-[M1978(R2003)], Douglas Fir Plywood.

.3 CAN/CSA-S269.2-[M1987(R2003)], Access Scaffolding for Construction Purposes.

.4 CAN/CSA-Z321-[96(R2001)], Signs and Symbols for the Occupational Environment.

.4 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

1.03 INSTALLATION AND REMOVAL

.1 For each Place of the Work prepare site plan indicating proposed location and dimensions of the Construction Area to be fenced and used by Contractor, number of trailers if required, area for parking vehicles, avenues of ingress/egress to fenced area and details of fence installation. Construction Area shall be within the area indicated in the Contract Drawings. Submit site plan to Consultant for review and Acceptance.

.2 Indicate use of supplemental or other staging areas.

.3 Provide construction facilities in order to execute Work expeditiously.

.4 After use remove from site all such work installed under this section 01 52 00 – Construction Facilities. Reinstate area to same or better state before start of Project.

1.04 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, platforms, temporary stairs.

1.05 HOISTING

.1 Provide, operate and maintain hoists, cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists and cranes to be operated by qualified operator.

1.06 ELEVATORS

.1 When applicable, permanent elevators are not to be used by Contractor, Subcontractor or supplier personnel or for transporting of materials unless approved by the Owner. Co-ordinate use with the Owner if use is permitted.

.2 If use of elevators is approved by the Owner, provide protective coverings for finish surfaces of walls, floors and entrances.

1.07 SITE STORAGE/LOADING

.1 Confine Work and operations of employees to the Construction Area. Do not unreasonably encumber premises with Products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work. Be solely responsible and liable for damages resulting from violation of this requirement.

.3 Products shall be stored only in areas designated or approved by the Consultant and shall not be left on the ground or in undesignated areas.

.4 Site storage and loading requirements to be in accordance with Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

1.08 CONSTRUCTION PARKING

.1 Parking may be permitted on site provided it does not disrupt performance of Work. Arrange with the Consultant and obtain approval before site usage. Show location of agreed parking on site plan.

.2 Parking within the Construction Area shall be managed by the Contractor as long as it does not affect work performance or Safety.

.3 Provide and maintain adequate access to Project sites.

.4 Parking arrangements shall be in accordance with location specific restrictions contained in section 011400 – Work Restrictions.

1.09 TEMPORARY SECURITY

.1 Contractor is responsible for the security of the Place of the Work and any off-site other locations used by the Contractor for the execution of the Contract such as off-site temporary storage spaces.

.1 Temporary Site Security:

1. Site Fencing: Before beginning excavation and before construction activities begin, provide temporary site enclosure fencing with lockable gates to prevent unauthorized access.
2. Extent of Fencing: To enclose entire Project site or a portion sufficient to accommodate construction activities as indicated on Drawings.

3. Distribute gate keys to authorized personnel only. Supply Consultant and Owner with one set of keys each.

.2 Temporary Building Security:

1. Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized access, vandalism, theft, and similar security violations.
2. Distribute building entrance keys to authorized personnel only. Supply Owner and Consultant with one set of keys each.

1.10 OFFICES

.1 Provide one field office for the duration of the Work. The field office can be located within the Contractor Construction trailer and shall have proper heating, lighting, and ventilation and be of sufficient size to accommodate site meetings.

.2 Provide one workspace in field office for use by the Owner and the Consultant.

.3 Provide marked and fully stocked first-aid case in a readily available location.

.4 Subcontractors to provide their own offices as necessary. Arrange with the Consultant location of these offices.

.5 Maintain offices in a clean condition.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof storage space (sea-cans, sheds, etc.) for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof storage space on site in manner to cause least interference with work activities.

.3 Ensure all equipment, tools and materials (including salvaged material) are stored clear of the rail Right of Way in a position where it they will not interfere with train operations and employee movements. Ensure all equipment, tools and materials and are secured in such a manner that they cannot fall or be placed foul of the rail line.

1.12 SANITARY FACILITIES

.1 Provide sanitary facilities for workforce in accordance with governing regulations and ordinances and in accordance with 01 51 00 – Temporary Facilities.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.13 CONSTRUCTION SIGNAGE

.1 No other signs or advertisements, other than warning signs, are permitted on site.

.2 Signs and notices for safety and instruction in English Graphic symbols to CAN/CSAZ321.

.3 Maintain approved signs and notices in good condition for duration of Project and dispose of offsite on completion of Project or earlier if directed by the Consultant.

.4 Provide signage in compliance O. Reg. 213/91 CONSTRUCTION PROJECTS, Canada Occupational Health and Safety Regulations SOR/86-304, Ontario Occupational Health and Safety Act, R.S.O. 1990 and applicable laws and standards.

.5 The Owner may supply or instruct the Contractor to supply other signs. Signs shall be installed by the Contractor. Specification of signage will be provided by the Owner. Any additional cost will be valued as per Contract Documents.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by the Consultant.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor’s traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor shall be responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary only after obtaining the Consultant’s approval.

.8 Access roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by the Owner.

.12 Lighting: to assure full and clear visibility for full width of access road and work areas during night work operations.

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of Work, access roads designated by the Owner.

1.15 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities at a location approved by the Consultant.

2.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of Authorities Having Jurisdiction, sediment and erosion control drawings, sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of Authorities Having Jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Specification covers the operational requirements and traffic control for heavy civil contracts when roadway traffic is to be accommodated during construction.

.2 The Contractor shall complete all Work relevant to this section in accordance with Ontario Provincial Standard Specification (OPSS):

.1 OPSS.PROV 706 – TEMPORARY TRAFFIC CONTROL DEVICES

.2 Sections – Measurement for Payment and Basis of Payment are not used.

1.2 RELATED REQUIREMENTS

.1 Section 32 11 16.01 - Granular Sub-base

.2 Section 32 11 23 - Aggregate Base Courses

.3 Section 32 12 16 - Asphalt Paving

1.3 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.2 Ministry of Transportation, Ontario (MTO) – Ontario Traffic Manual, Book 7: Temporary Conditions.

1.4 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 When working on travelled way:

.1 Place equipment in position to minimize interference and hazard to travelling public.

.2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.

.3 Do not leave equipment on travelled way overnight.

.3 Close lanes of road only after receipt of written approval from Owner and Authority Having Jurisdiction (AHJ).

.1 Before re-routing traffic, erect suitable signs and devices to Ontario Traffic Manual, Book 7: Temporary Conditions.

.4 Keep travelled way graded, free from potholes and of sufficient width for required number of lanes of traffic.

.1 Provide 7 m wide minimum temporary roadway for traffic in two-way sections through Work and on detours.

.2 Provide 5 m wide minimum temporary roadway for traffic in one-way sections through Work and on detours.

.5 Provide gravelled detours or temporary roads as needed to facilitate passage of traffic around restricted construction area:

.1 Place and compact granular sub-base in accordance with Section 32 11 16.01 - Granular Sub-base.

.2 Place and compact granular base in accordance with Section 32 11 23 - Aggregate Base Courses.

.3 Place and compact asphalt concrete pavement in accordance with Section 32 12 16 - Asphalt Paving.

.6 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, except where other means of road access exist that meet approval of Owner and AHJ.

1.5 INFORMATION AND WARNING DEVICES

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices to Ontario Traffic Manual, Book 7: Temporary Conditions.

.3 Place signs and other devices in locations recommended in Ontario Traffic Manual, Book 7: Temporary Conditions.

.4 Meet with Owner and AHJ, as needed, prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Owner and AHJ.

.5 Continually maintain traffic control devices in use:

.1 Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Remove or cover signs which do not apply to conditions existing from day to day.

1.6 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag personnel, trained in accordance with, and properly equipped to Ontario Traffic Manual, Book 7: Temporary Conditions for situations as follows:

.1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not readily available.

.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.7 At each end of restricted sections where pilot cars are required.

.8 Delays to public traffic due to contractor’s operators: 15 minutes maximum.

.2 Where roadway, carrying two-way traffic, is restricted to one lane, for 24 hours each day, provide portable traffic signal system.

.1 Adjust, as necessary, and regularly maintain system during period of restriction.

.2 Ensure signal system meets requirements of Ontario Traffic Manual, Book 7: Temporary Conditions.

1.7 OPERATIONAL REQUIREMENTS

.1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Owner and AHJ to protect and control public traffic, existing conditions for traffic to be restricted.

.2 Maintain existing conditions for traffic crossing right-of-way.

2 Products

NOT USED

3 Execution

NOT USED

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.

.2 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.

.3 CSA Group (CSA)

.1 CSA-O121-[M1978(R2003)], Douglas Fir Plywood.

1.02 RELATED REQUIREMENTS

.1 Section 01 14 00 – Work Restrictions

.2 Section 01 52 00 – Construction Facilities

.3 Section 01 55 26 – Traffic Controls

.4 Section 01 57 00 – Temporary Controls.

.5 Section 01 74 00 – Cleaning

.6 Section 01 74 19 – Waste Management and Disposal.

1.03 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.04 HOARDING

.1 Unless otherwise specified, erect temporary site enclosures using self-supporting 1.8m high metal fence. Provide lockable truck gate(s). Maintain fence in good repair.

.2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.05 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades as required by applicable Laws, codes and governing authorities.

1.06 WEATHER ENCLOSURES

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

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

1.07 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.

.2 Maintain and relocate protection until such Work is complete.

1.08 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.09 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

.2 Ensure public use of operational facilities is protected appropriately. Reference section 01 14 00 – Work Restrictions, for details of operational facilities.

1.10 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.12 PROTECTION OF FINISHES

.1 Provide protection for finished and partially finished finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with the Owner locations and installation of protection of finishes five (5) Working Days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.13 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Sections 01 74 00 – Cleaning and 01 74 19 – Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 This Specification covers the requirements for temporary controls of soil erosion and sediment loss, control of pests, control of pollution entering the soil, prevention of pollution in stormwater, control of site dust, and site security.

1.02 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.2 The Contractor shall complete all Work relevant to this section in accordance with Ontario Provincial Standard Specification (OPSS):

.1 OPSS.PROV 804 – TEMPORARY EROSION CONTROL

.2 OPSS.PROV 805 – TEMPORARY SEDIMENT CONTROL

.3 Sections – Measurement for Payment and Basis of Payment are not used.

1.03 TEMPORARY PEST CONTROL

.1 Perform pest control to minimize attraction and harboring of rodents, insects, and other pests. Perform extermination and control procedures at regular intervals.

.2 Project shall be free of pests and their residues at Substantial Performance of the Work.

.3 Perform pest control in accordance with integrated pest management principles with no hazardous or toxic substances released into stormwater or environment.

1.04 TEMPORARY ENVIRONMENTAL CONTROL

.1 Use construction methods that comply with environmental regulations and minimize possible air, waterway, and subsoil contamination and pollution.

.2 Meetings: Train persons on equipment fueling, spill prevention and response, good housekeeping protocols, material handling, and waste material handling before their first day on site.

.3 Management:

.1 Monitor and repair leaks of polluting liquids on vehicles. Prevent leaks of antifreeze, brake fluid, diesel fuel, gasoline, oil, transmission fluid, and other liquids that may be harmful to the environment or storm drainage systems.

.2 Store petroleum products in clearly labelled sealed containers. Provide spill kits and impermeable tarps at fueling and maintenance areas.

.3 Supply a collection skid or similar material for waste materials.

.4 Tightly seal and store paint containers, sealers, and curing compounds in a protected location when not required. Prevent excess materials from discharging into storm drainage system.

.5 Prevent concrete trucks from discharging surplus concrete or drum wash water on site.

.6 Place absorbent materials to soak up excess form release agents. Replace absorbent materials when saturated.

.7 When applying fertilizer, minimize the discharge of pollutants into stormwater.

1.05 TEMPORARY SITE DUST CONTROL

.1 Provide measures to prevent airborne dust to adjacent properties and walkways

according to requirements of AHJ and meeting requirements of authority having jurisdiction, including but not limited to the local municipality.

.2 Create and implement a site-specific dust control plan.

.3 Dust Control Windbreaks: Geotextile fabric attached to snow or temporary site fencing with fence posts and tie wires. Other measures will be considered.

.4 If surface water taking in excess of 50,000 L/day is required for dust suppression or other activities, the contractor is to prepare an Environmental Activity and Sector Registry (EASR) as outlined in Ontario Regulation 63/16 (O. Reg.), made under the Environmental Protection Act, Registrations Under Part 11.2 of the Act – Water Taking.

1.06 TEMPORARY SECURITY

.1 Temporary Site Security:

.1 Site Fencing: Before beginning excavation and before construction activities begin, provide temporary site enclosure fencing with lockable gates to prevent unauthorized access.

.2 Extent of Fencing: To enclose entire Project site or a portion sufficient to accommodate construction activities as indicated on Drawings.

.3 Distribute gate keys to authorized personnel only. Supply Owner with one set of keys.

.2 Temporary Building Security:

.1 Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized access, vandalism, theft, and similar security violations.

.2 Distribute building entrance keys to authorized personnel only. Supply Owner with one set of keys.

1.07 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit information in accordance with Section 01 33 00 - Submittal Procedure.

.2 Submit the following:

.1 Stormwater Pollution Control Plan (SWPCP): Submit SWPCP indicating methods, plans, and details of controls including:

.1 SWPCP coordinator information and their responsibilities

.2 Stormwater pollution prevention team to assist in implementation of SWPCP during construction

.3 Description of existing site conditions, including:

.1 existing land use of the site, such as wooded areas, grassed areas, pavements, buildings, and other structures,

.2 location of surface waters on or adjacent to Project site, such as lakes, ponds, rivers, streams, wetlands, and similar water features,

.3 soil types on Project site,

.4 water bodies that will receive site runoff, including the eventual main body of water that receives stormwater, and

.5 drainage areas and potential stormwater contaminants.

.4 Stormwater management controls and various Best Management Practices required to reduce erosion, sediment, and pollutants in stormwater discharge.

.5 Proposed waste water management equipment and materials.

.6 Facility monitoring plan and how controls will be coordinated with construction activities.

.7 Schedule and allowances to amend the plan if required.

.8 Sample inspection log.

.2 Erosion and Sedimentation Control Plan:

.1 Submit drawings indicating location of erosion and dust control methods,

.2 Describe methods for maintaining, cleaning and repairing erosion and dust control methods, and

.3 Submit product data indicating actual materials including:

.1 Measures used to prevent soil loss by stormwater runoff and wind erosion.

.2 Methods used to protect soil stockpiles and berms.

.3 Methods used to prevent loss of sediment into storm sewers or adjacent waterways.

.4 Methods to prevent site dust and particulate matter pollution.

3 During the course of work, submit detailed digital photographs indicating temporary sediment and erosion control measures.

.4 Site Quality Control Submittals: Submit logs of inspection and maintenance of control measures.

2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

.1 Protect storm sewers and roadways in accordance with local municipal requirements.

.2 Protect waterways and ground water in accordance with AHJ.

.3 The Contractor is notified of the presence of existing utilities within Project limits, including but not limited to Bell, North Bay Hydro, Enbridge, Hydro One, Northern Ontario Wire. Care shall be taken during construction operations to avoid damages to the existing utilities. The Contractor shall provide protection and/or support to all existing utilities as required to facilitate their construction operations. The Contractor shall familiarize themselves with utility plans prior to undertaking works in these locations.

3 EXECUTION

3.1 CLOSEOUT ACTIVITIES

.1 Remove temporary control measures shortly before Substantial Performance of the Work or when acceptable to the Owner.

.2 Restore landscape areas that were damaged by temporary control measures.

3.2 MAINTENANCE

.1 Inspection and Maintenance:

.1 Inspect, repair, and maintain temporary control measures during construction.

.2 Inspect control measures weekly to prevent unwanted situations such as odours, mosquitoes, and weeds. Confirm control measures are working properly. Repair or replace when required.

.3 Repair silt fences and erosion control fabric when damaged.

.4 Perform non-routine inspection and maintenance arising from unplanned incidents such as repairs after severe weather and accidental damage.

.5 Record each inspection and maintenance event in a daily log. Keep a copy of logs at the Project site. Maintain permanent file of logs until final acceptance of the Work.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Section 01 11 00 - Summary Of Work.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 73 00 – Execution.

1.03 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials in execution of Work.

.3 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.

.4 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

.5 Unless otherwise indicated in Specifications, maintain uniformity of manufacture for any particular or like item.

.6 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.04 AVAILABILITY

.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of Products are foreseeable, notify the Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Owner reserves right to substitute more

readily available products of similar character, at no increase in Contract Price or Contract Time.

1.05 STORAGE, HANDLING AND PROTECTION

.1 Handle and store Products in a manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled Products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store Products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious Products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber, etc. on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged Products at own expense and to satisfaction of the Consultant.

.9 Touch-up damaged factory finished surfaces at own expense and to the Consultant satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.06 TRANSPORTATION

.1 Pay costs of transportation of Products required in performance of Work, unless otherwise specified.

.2 Transportation cost of Products Supplied By Others will be paid for by the Owner. Unload, handle, store and protect such Products.

1.07 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 the Consultant in writing, of conflicts between Specifications and manufacturer's instructions, so that the Consultant will establish course of action.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes the Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.08 QUALITY OF WORK

.1 Ensure quality of Work is of highest standard, executed by workers experienced and skilled in

respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. The Owner and the Consultant reserve the right to require dismissal from site workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with the Consultant, whose decision is final.

1.09 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

.3 Co-ordinate with the Consultant delivery times. Ensure to provide sufficient notices for large deliveries that may impact traffic or block roads.

1.10 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform the Consultant if there is interference. Install as directed by the Consultant.

1.11 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.12 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform the Consultant of conflicting installation and propose alternative solution for Acceptance.

1.13 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.14 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Unless otherwise specified, use heavy hexagon heads, semi-finished. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building or structures. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of the Consultant.

1.16 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, [and/or building occupants] [and pedestrian and vehicular traffic].

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 – Quality Control.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit the following before Work begins at the Place of Work:

.1 Service locations: Document locations and extents of service lines in work areas.

.3 Submit the following informational submittals as Work progresses:

.1 Land Survey information: Name address, and registration information.

.4 Submit documentation that verifies accuracy of site engineering work when requested by the Consultant.

.5 Submit certificate signed by surveyor indicating elevations and locations of completed Work that conform to Contract Documents and those that do not conform.

1.04 QUALIFICATIONS

.1 Surveyor: Qualified, registered land surveyor, licensed to practice at the Place of the Work, and acceptable to the Consultant.

1.05 SETTING OUT OF WORK

.1 Survey existing conditions and correlate with all requirements indicated in the Specifications.

.2 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.3 Provide devices needed to lay out and construct work.

.4 Review existing conditions and identify, in writing to the Consultant, any conditions that differ materially from those indicated in the Contract Documents.

1.06 RECORDS

.1 Maintain a complete, accurate log of control and survey work as Work progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing

dimensions, locations, angles, and elevations of Work. Keep copies available at the job site with other progress documentation. Submit to the Consultant at request.

.3 Record locations of maintained, re-routed, and abandoned service lines.

.4 Provide a final survey of building and structure location, surrounding grades as affected by the Work and buried utilities.

1.07 SUBSURFACE CONDITIONS

.1 Promptly notify the Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should the Consultant determine that conditions do differ materially, instructions will be issued by the Owner for changes in Work as provided in Changes and Change Orders.

1.08 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Employ competent person to lay out Work in accordance with the Contract Documents.

.3 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space in accordance with manufacturer's recommendations for safety, access and maintenance.

.4 Submit Shop Drawings which indicate relative position of various services and equipment to the Consultant for review and Acceptance. Contractor is responsible for coordination of all equipment and services before installation.

2.01 NOT USED

.1 Not Used.

3.01 EXAMINATION REQUIREMENTS

.1 Verification of Conditions:

.1 Verify that substrate and other conditions are acceptable for installation of materials, assemblies, and systems in accordance with manufacturer’s instructions and recommendations.

.2 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.3 After uncovering, inspect conditions affecting performance of Work.

.4 Examine conditions, with installers, for defects affecting performance of the Work. Where Work of one Section depends on Work of other Sections being properly completed, verify

that Work is complete and suitable to receive the subsequent work.

.5 Proceed with installation only after unacceptable conditions are remedied.

.6 Proceeding with cutting, patching, or installation will be considered Contractor's acceptance of existing conditions.

.2 Existing Services:

.1 Confirm locations and extent of service lines in area of Work before beginning work on site. Submit findings.

.2 Immediately notify the Consultant if unknown services are encountered. Confirm findings in writing.

.3 Remove abandoned service lines within 2 m of structures. Cap or seal lines at cut-off points as indicated on Drawings.

.3 Pre-Installation Testing:

.1 Perform manufacturer-recommended pre-installation site test of substrate and submit to the Consultant a report of test results indicating whether test results meet the manufacturer's minimum requirements and recommendations.

.4 Evaluation and Assessment:

.1 Verify that pre-existing substrate conditions are acceptable for installation of materials, assemblies, and systems in accordance with manufacturer's instructions and recommendations.

.2 Proceed with installation only after unacceptable conditions are remedied. The remedial work will be completed by the Contractor to the satisfaction of the Consultant. Cost of such remedial work shall be as per Contract Documents.

3.02 PREPARATION

.1 Protection of In-Place Conditions:

.1 Provide supports to ensure structural integrity of surroundings. Provide devices and methods to protect other portions of Project from damage.

.2 Provide protection from weather and other potentially damaging conditions at areas which will be exposed when uncovering work. Maintain excavations free of water.

.2 Perform surface preparation in compliance with Contract Documents.

.3 Survey Reference Points:

.1 Locate and confirm reference points before starting site Work. Protect permanent reference points during construction.

.2 Changes or relocations should not be made without prior written notice to the Consultant.

.3 Notify the Consultant if a reference point is lost or destroyed.

.4 Surveyor to replace reference points in accordance with original land survey.

.5 Notify the Consultant if a reference point requires relocation because of necessary changes in grades or locations.

.4 Survey Requirements:

.1 Unless otherwise indicated in Specifications, establish minimum two permanent benchmarks on site, referenced to established benchmarks by survey reference points. Record locations with horizontal and vertical data in Project As-Built Record Drawings.

.2 Establish lines and levels, location and layout, by instrumentation.

.3 Stake for grading, fill and topsoil placement and landscaping features.

.4 Stake slopes and berms.

.5 Establish pipe invert elevations.

.6 Stake batter boards for foundations.

.7 Establish foundation column locations and floor elevations.

.8 Establish lines and levels for mechanical and electrical work.

.5 If Contractor is found to be in error, all costs incurred to correct condition shall be assumed by the Contractor, unless otherwise specified in Contract Documents.

END OF SECTION

1 GENERAL

1.01 SECTION INCLUDES

.1 Common requirements for installing, applying, and erecting Products. Includes procedures and Submittals for cutting and patching to existing conditions and required repairs arising from tests and destructive inspections.

1.02 REFERENCE STANDARDS

1. Canadian Construction Documents Committee (CCDC)
    1. CCDC 2-2020, Stipulated Price Contract.

1.03 RELATED REQUIREMENTS

.1 Section 01 14 00 – Work Restrictions

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 45 00 – Quality Control.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit proof of anchor and fastener load carrying capacity for a work result, when requested.

.3 Submit written request in advance of cutting or altering to existing conditions which may affect the following:

.1 structural integrity of existing elements: Submit structural details and calculations performed by a professional structural engineer registered or licensed in Province of Ontario, Canada for the Consultant review and Acceptance. Include evidence of unsatisfactory structural integrity of the elements according to the Consultant.

.2 integrity of weather-exposed and moisture-resistant elements.

.3 efficiency, maintenance, safety, or accessibility of operational elements.

.4 visual qualities of sight-exposed elements.

.5 Work of Owner or other contractor(s).

.4 Submit a request for cutting or altering which includes:

.1 identification of the Project; and

.2 location and description of affected existing conditions including changes to structural elements, function of elements, and visual appearance of existing elements; and the

location and identification of utilities that will be temporarily out of service during cutting and patching activities.

.5 Submit site plan drawings for each Place of the Work indicating relative location of various services and equipment upon the request of the Consultant.

.6 Submit a work plan for review and Acceptance including:

.1 a statement why cutting or altering is unavoidable and describe alternatives to cutting and patching if available;

.2 a description of proposed Work and proposed Products;

.3 specific description of reinstatement activities following completion of the Work.

.4 the effect of cutting or altering on work by Owner or other contractors;

.5 written acknowledgment by other contractors affected by cutting or altering, if applicable; and

.6 proposed date(s) and time(s) Work will be executed.

1.05 QUALIFICATIONS

.1 Engage a structural engineer licensed at the Place of Work, to submit details and calculations when altering existing structural elements.

2 PRODUCTS

2.01 MATERIALS

.1 Patching Materials: If possible, use the same materials found in the existing conditions, except in fire-resistance rated materials and assemblies.

.2 Materials visible from the floor area: Use materials that visually match existing adjacent surfaces and match existing functional performance.

3 EXECUTION

3.01 COMMON INSTALLATION/APPLICATION/ERECTION REQUIREMENTS

.1 Fit several parts together, to integrate with other Work.

.2 Remove and replace defective and non-conforming Work.

.3 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.

.4 Notify the Consultant in writing, of conflicts between Specifications and manufacturer's instructions, so that the Consultant can establish course of action.

.5 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes the Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

.6 Provide openings in non-structural elements for penetrations of mechanical and electrical Work.

.7 Conceal pipes, ducts and wiring in floor, wall, partition, and ceiling assemblies in finished areas, except as indicated otherwise.

.8 In addition to the manufacturer's recommendations for safety, access, accessibility, and maintenance, locate equipment, fixtures, and distribution systems where it shall provide minimal interference and shall maximize on usable space.

.1 Location of equipment, fixtures, and outlets indicated on Drawings and in Specifications are approximate.

.2 Notify the Consultant of impending installation and obtain Acceptance for actual locations.

3.02 BRACING AND ANCHORING

.1 Anchors and Fasteners: Unless otherwise indicated elsewhere:

.1 Provide any necessary anchors and fasteners to fasten each component securely for its intended purpose. Allow for building movement, including from thermal expansion and contraction of materials and assemblies.

.2 Prevent electrolytic reaction between dissimilar metals and materials.

.3 Provide hot-dip galvanized or stainless steel anchors and fasteners for securing exterior work;

.4 Locate anchors and fasteners within individual load limit or shear capacity. Ensure anchors and fasteners are permanently secured.

.5 Where exposed to view, evenly distribute anchors and fasteners in a single area; and

.6 Where exposed to view, provide metal anchors, fasteners, and related accessories with the same texture, colour, and finish as adjacent materials.

.2 Non-Conforming Work: Anchors and fasteners installed which cause substrate cracks or spalling are not acceptable.

3.03 CUTTING AND PATCHING

.1 Proceed with cutting and patching only after the review and Acceptance by the Consultant of all Submittals listed in Article 1.03, Actions and Informational Submittals.

.2 Perform cutting, fitting, and patching including excavation and fill, to complete Work in accordance with related technical Specification sections.

.3 Use special techniques to avoid damaging existing conditions that will remain, and which will result in proper surfaces to receive patching and finishing.

.4 Employ original installer to perform cutting and patching for weather-exposed elements, moisture-resistant elements, and surfaces exposed to view.

.5 Cut rigid materials using masonry saw, core drill, or other tool recommended by the Product manufacturer or applicable industry association. Pneumatic or impact tools are not allowed on masonry work without the approval of the Consultant.

.6 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.7 Refinish surfaces to match adjacent finishes. Refinish continuous surfaces to nearest intersection (e.g., edges of partition). Refinish assemblies by refinishing entire unit. Provide entire surface with uniform finish, colour, and texture.

3.04 ADJUSTING

.1 Remove and replace patching that is visually unsatisfactory to the Consultant.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 PROJECT CLEANLINESS

.1 Maintain Place of the Work in tidy condition, free from accumulation of waste material and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Consultant.

.3 Do not burn waste materials on site.

.4 Clear snow and ice from access to Place of the Work, bank/pile snow in designated areas only approved by Owner, or remove from site, as agreed upon at outset of Contract.

.5 Make arrangements with and obtain permits from Authorities Having Jurisdiction (AHJ) for disposal of waste and debris.

.6 Provide on-site steel containers for collection of waste materials and debris.

.7 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.

.8 Dispose of waste materials and debris at appropriate off-site facilities.

.9 Clean interior areas prior to start of finishing Work and maintain areas free of dust and other contaminants during finishing operations.

.10 Store volatile waste in covered metal containers and remove from premises at end of each Working Day, unless authorized otherwise by the Consultant.

.11 Provide adequate ventilation during use of volatile or noxious substances. Use of existing or new ventilation systems is not permitted for this purpose.

.12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate new or existing systems or facilities.

1.03 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus Products, tools, Construction Equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others and leave Place of the Work clean and suitable for occupancy.

.3 Prior to final review, remove remaining surplus Products, tools and Construction Equipment.

.4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Owner or the Consultant.

.5 Do not burn waste materials on site.

.6 Make arrangements with and obtain permits from Authorities Having Jurisdiction (AHJ) for disposal of waste and debris.

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, wood, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings, and at exterior of building.

.9 Clean lighting reflectors, lenses, and other lighting surfaces.

.10 Vacuum, clean, and dust interiors, behind grilles, louvres and screens.

.11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Clean and sweep roofs, gutters, areaways, and sunken wells.

.16 Sweep and wash clean paved areas.

.17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.18 Clean roofs, downspouts, and drainage systems.

.19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.20 Remove snow and ice from access to Place of the Work.

1.04 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 The Project shall generate the least amount of waste possible. Contractor shall implement processes to ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.02 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.2 ASTM International (ASTM)

.1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program

1.03 DEFINITIONS

.1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.

.2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, re-modeling , repair and demolition operations.

.3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity, or reactivity.

.4 Non-hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.

.5 Non-toxic: Not poisonous to humans either immediately or after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the Project site to another site for remanufacture into a new product for reuse by others.

.8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the Project site.

.11 Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.

.12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.

.13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.14 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings;

.2 Wood preservatives; strippers and household cleaners;

.3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.

.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 RELATED REQUIREMENTS

.1 Section 01 31 19 - Project Meetings

.2 Section 01 33 00 - Submittal Procedures

.3 Section 01 51 00 - Temporary Utilities

.4 Section 01 74 00 – Cleaning.

1.05 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all divisions of the Work for the Project and ensure that requirements of the Waste Management Plan (WMP) are followed.

.2 Preconstruction Meeting: During the pre-construction meeting arranged in accordance with Section 01 31 19 - Project Meetings, discuss the Contractor's Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.06 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit required information in accordance with Section 01 33 00 - Submittal Procedures.

.2 Action Submittals: Provide the following Submittals for Acceptance before starting any Work of this section:

.1 WMP: Submit to the Consultant for review a draft WMP including a preliminary analysis of

anticipated site-generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies. The Owner and the Consultant may provide comments within five (05) Working Days. Update as required and resubmit to the Consultant the final WMP for Acceptance within (05) Working Days.

.2 WMP shall include, but not limited to:

.1 Material Streams: Analysis of the proposed jobsite waste being generated, including material types and quantities forming a part of identified material streams in the WMP materials removed from site destined for alternative daily cover at landfill sites and land clearing debris cannot be considered as contributing to waste diversion and will be included as a component of the total waste generated for the site.

.2 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into WMP.

.3 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the Project, and the proposed local market for each material.

.4 Landfill Materials: materials that cannot be recycled, reused or composted.

.5 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the Project.

.6 Materials Handling Procedures: A description of the means by which any recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

.7 Transportation: A description of the means of transportation of the recyclable materials, whether materials will be site separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site, and destination of materials.

1.07 PROJECT CLOSEOUT SUBMITTALS

.1 Diversion Documentation: Submit as constructed information in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 Waste Management Report: Submit for this Project in a format acceptable to submittal requirements and that includes the following information:

.1 Accounting: Submit information indicating total waste produced by the Project.

.2 Composition: Submit information indicating types of waste material and quantity of each material.

.3 Diversion Rate: Submit information indicating total waste diverted from landfill as a

percentage of the total waste produced by the Project.

.4 Submit copies of transportation documents or shipping manifests indicating weights of materials, and other evidence of disposal indicating final location of waste diverted from landfill and waste sent to landfill.

1.08 DELIVERY, STORAGE, AND HANDLING

.1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the Project waste and the available recycling and reuse programs in the Project area.

.1 Provide separate containers for reusable and/or recyclable materials such as:

.1 Metals.

.2 Wood.

.3 Plastics

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

2.01 NOT USED

.1 Not Used.

3.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

.1 Contractor is responsible for designating an on-site party or parties responsible for instructing workers and overseeing and documenting results of the WMP for the Project.

.2 Distribute copies of the WMP to the job site foreman, each Subcontractor, the Owner, the Consultant and other site personnel as required to maintain WMP.

.3 Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the Project to employees and Subcontractors at appropriate stages of the Project.

.4 Layout and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:

.1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local

regulations.

.5 Submit to the Consultant a monthly summary of waste generated by the Project including details of waste diverted for recycling:

.1 Submittal of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Owner and the Contractor.

.2 Monthly waste summary shall contain the following information:

.1 The amount in tonnes or m 3 and location of material landfilled,

.2 The amount in tonnes or m 3 and location of materials diverted from landfill, and

.3 Indication of progress based on total waste generated by the Project with materials diverted from landfill as a percentage.

3.02 CONTRACTOR'S RESPONSIBILITY

.1 Subcontractors shall cooperate fully with the Contractor to implement the WMP.

.2 The Contractor shall be responsible for all additional costs incurred by the Owner and the Contractor arising from the failure to comply with the WMP.

END OF SECTION

1.01 GENERALREFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify the Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request the Owner inspection.

.2 The Owner Inspection:

.1 The Owner, the Consultant and the Contractor will inspect the Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted and balanced and fully operational.

.4 Certificates required by Authority Having Jurisdiction submitted and approved.

.5 Operation of systems: demonstrated to Owner's personnel.

.6 Commissioning of equipment and systems: completed in accordance with 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS and copies of final Commissioning Report submitted to the Consultant.

.7 Apply for certification of Substantial Performance of the Work and Ready-For-Takeover in accordance with the Contract Documents.

.8 Submit all Close-Out Documentation described in GC 5.5.1.2.and section 01 78 00 – Closeout Submittals

.9 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by the Owner and the Consultant.

.2 When Work is incomplete according to the Owner or the Consultant, complete outstanding items and request re-inspection.

1.03 FINAL CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 SUMMARY

.1 Comply with the requirements of this section and other related sections. When the Project is being completed at multiple sites, the requirements shall be met at each location as applicable.

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting with the Owner and the Consultant, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review manufacturer's installation instructions and warranty requirements.

.3 Establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.2 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.3 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to the Consultant for review and Acceptance the operating and maintenance manual (in English). Schedule the Submittal such that Acceptance is received prior to the commencement of training of O&M personnel.

.3 Following completion of training of operations and maintenance personnel, provide four hard (4) copies and an electronic copy in PDF format of finalized operations and maintenance manual.

.4 Provide spare parts, maintenance materials and special tools of same quality and manufacture as Products provided in Work.

.5 Provide evidence, if requested, for type, source and quality of Products supplied.

.6 Provide a complete set of As-Built Record Drawings sealed by an engineer licensed in the province

of Ontario.

.7 Provide all other required Closeout Documentation in accordance with the Contract Documents.

1.05 OPERATIONS AND MAINTENANCE MANUAL

.1 FORMAT

.1 Organize data as an instructional manual.

.2 Binders: Vinyl, hard covered, 3 ‘D’ ring, loose leaf [219 x 279] mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings:

.1 Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title ‘Project Record Documents’; list title of Project and identify subject matter of contents.

.5 Arrange content under section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate Product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer’s printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide CAD files in dwg format.

.2 CONTENTS

.1 Table of Contents for Each Volume: provide title of Project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of Products and systems, indexed to content of volume.

.2 Include the following contents:

.1 As-Built Record Drawings

.2 Product data, and samples.

.3 Site test records.

.4 Inspection certificates.

.5 Manufacturer’s certificates.

.6 Inventory of spare parts, special tools and maintenance materials.

.7 Maintenance Management System (MMS) identification system used.

.8 WHMIS information.

.9 WHMIS Safety Data Sheets (SDS).

.10 Electrical Panel inventory containing a detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

.11 Other documents as required and specified in other sections of Specifications.

.12 Provide digital photos, if requested, for site records.

.3 For each Product or system:

.1 List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

.4 Product Data: mark each sheet to identify specific Products and component parts, and data applicable to installation; delete inapplicable information.

.5 Provide a set of As-Built Record Drawings that accurately reflect as-constructed, as-built or as-fabricated Work and that have been sealed by a professional engineer licensed in the Province of Ontario.

.1 Provide hard copies within the operations and maintenance manuals and electronic copies in both native CAD format and PDF.
.2 Label each document “AS-BUILT RECORD” in neat, large, printed letters.

.6 Drawings: supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.7 Typewritten Text: As required to supplement Product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer’s instructions.

.7 Label record documents and file in accordance with section number listings.

.8 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.9 Keep record documents and samples available for inspection by the Owner and the Consultant.

.10 Specifications: mark each item to record actual construction, including:

1. Manufacturer, trade name, and catalogue number of each Product actually installed particularly optional items and substitute items.

.2 Changes made by Addenda and Change Orders.

. .11 Training: Refer to Section 01 79 00 - Demonstration and Training.

.3 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.2 Give function, normal operation characteristics and limiting conditions.

.3 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.4 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.5 Include installed colour coded wiring diagrams.

.6 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

1. Include regulation, control, stopping, shut-down, and emergency instructions.
2. Include summer, winter, and any special operating instructions.

.7 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.8 Provide servicing and lubrication schedule, and list of lubricants required.

.9 Include manufacturer's printed operation and maintenance instructions.

.10 Include sequence of operation by controls manufacturer.

.11 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.12 Provide installed control diagrams by controls manufacturer.

.13 When applicable, provide Contractor's coordination drawings, with installed colour-coded piping diagrams.

.14 When applicable, provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.15 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.16 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and Section 01 91 13 - General Commissioning Requirements.

.17 Additional requirements: As specified in individual Specification sections.

.4 MATERIALS AND FINISHES

.1 Building Products, applied materials, and finishes: Include Product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.2 Moisture-protection and weather-exposed Products: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Additional requirements: As specified in individual Specifications sections.

1.06 FINAL SURVEY

.1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.07 MAINTENANCE MATERIALS

.1 Spare Parts:

- .1 Provide spare parts, in quantities specified in individual Specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to the Consultant.
  - .2 Include approved listings in operation & maintenance manual.
- .5 Obtain receipt for delivered products and submit before final payment.

.2 Extra Stock Materials:

- .1 Provide maintenance and extra materials, in quantities specified in individual Specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to the Consultant.
  - .2 Include approved listings in operation & maintenance manual.
- .5 Obtain receipt for delivered Products and submit before final payment.

.3 Special Tools:

- .1 Provide special tools, in quantities specified in individual Specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Deliver to site; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to the Consultant.
  - .2 Include approved listings in operation & maintenance manual.

1.08 DELIVERY, STORAGE, AND HANDLING

.1 Store, at a location agreed with the Consultant, spare parts, maintenance materials, and special

tools in a manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged Products at own expense to the satisfaction of the Owner and the Consultant.

1.09 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to warranties and extended warranties.

.2 Submit warranty management plan, twenty (20) Working Days before planned pre-warranty meeting, to the Consultant review and Acceptance.

.3 Warranty management plan to include required actions and documents to assure that the Owner receives all warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase with each application for payment.

.6 Assemble approved information in binder, submit upon acceptance of Work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by Subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute Submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Early Occupancy or Ready-for-Takeover is verified.

.8 Conduct joint 04 month and 09 month warranty inspection, measured from date determined above in clause 1.14.7.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, Subcontractors, manufacturers, or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 04 and 09 month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

1.10 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil- and water-resistant tag approved by Owner.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of Acceptance until Project is accepted for occupancy.

.4 Indicate the following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel before date of Substantial Performance of the Work.

.2 The Owner will provide a list of personnel to receive instructions and coordinate their attendance at agreed-upon times.

.3 Preparation:

.1 Verify conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

.3 Ensure equipment has been inspected and put into operation in accordance with specified Contract Documents.

.4 Ensure testing, adjusting, and balancing have been performed in accordance with Section 01 91 13 - General Commissioning Requirements, and equipment and systems are fully operational.

.4 Demonstration and Instructions:

.1 Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of equipment at agreed-upon times at the designated location.

.2 Instruct personnel in phases of operation and maintenance using operations and maintenance manuals as basis of instruction.

.3 Review contents of operations and maintenance manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 The amount of time to be provided for instruction of each item of equipment or system shall be agreed with the Owner in advance.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit, for Acceptance, a plan including a schedule of times and dates for the demonstration of each item of equipment and each system. Ensure plan is submitted such that Acceptance is received two weeks before designated dates.

.3 Submit reports within one week after completion of demonstration, provided that demonstration

and instructions have been satisfactorily completed.

.4 Include in report time and date of each demonstration, with list of persons present.

.5 Provide sufficient copies of completed operations and maintenance manuals for use in demonstrations and instructions.

1.04 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Provide demonstration and training as per this section.

.2 Submit written report that demonstration and instructions have been completed.

END OF SECTION

1 GENERAL

1.01 SUMMARY

1.02 This section includes general requirements relating to commissioning (Cx) of Project components and systems, specifying general requirements for performance verification (PV) of components, equipment, sub-systems, systems, and integrated systems.

1.03 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

1.04 RELATED REQUIREMENTS

.1 Section 01 31 19 – Project Meetings

.2 Section 01 32 16.16 Construction Progress Schedule Critical Path Method

.3 Section 01 45 00 - Quality Control.

.4 Section 01 77 00 - Closeout Procedures.

.5 Section 01 78 00 - Closeout Submittals.

.6 Section 01 79 00 - Demonstration and Training.

.7 01 91 13.13 – Commissioning Plan

.8 01 91 13.16 – Commissioning Forms

1.05 ABBREVIATIONS

.1 AFD: Alternate Forms of Delivery, service provider

.2 Cx: Commissioning

.3 EMCS: Energy Monitoring and Control Systems

.4 O&M: Operations and Maintenance.

.5 PI: Product Information

.6 PV: Performance Verification

.7 TAB: Testing, Adjusting and Balancing.

1.06 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 The Consultant will observe some or all commissioning activities at their discretion.

.2 Owner's Performance Testing: Performance testing of equipment or systems by the Owner or the Consultant will not relieve Contractor from compliance with specified start-up and testing procedures.

.3 Cooperate fully with the Owner and the Consultant during stages of Acceptance and Ready-for-Takeover.

.4 Coordination with Authorities Having Jurisdiction (AHJ):

.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of AHJ, arrange for AHJ to witness procedures to avoid duplication of tests and to facilitate an earlier acceptance of equipment or facility.

.2 Obtain certificates of approval, acceptance, and compliance with rules and regulations of AHJ.

.3 Submit copies of certificates to the Consultant within three (03) days of test.

.2 Commissioning Meetings:

.1 Arrange Cx meeting(s) as per this section and in accordance with other Specification sections.

.2 Provide agenda, in accordance with section 01 91 13 – Project Meetings, a minimum of five (05) Working Days before meeting(s).

.3 Use Cx meetings to resolve issues, monitor progress, and identify defects and deficiencies relating to Cx.

.4 Continue Cx meetings on a regular basis, including during equipment start-up period, and functional testing period until commissioning deliverables have been addressed.

.5 At 60% construction completion stage arrange a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Additional agenda topics include the following:

.1 Review duties and responsibilities of Contractor and Subcontractors, addressing delays and potential problems.

.2 Determine the degree of involvement of Subcontractors and manufacturer's representatives in the Cx process.

.6 Ensure Subcontractors and relevant manufacturer representatives are present at 60% construction completion stage, at subsequent Cx meetings, and when otherwise required.

.3 Observation of Starting and Testing:

.1 Provide twenty (20) Working Days' notice before beginning commissioning.

.2 The Owner and the Consultant will observe start-up and testing.

.3 The Consultant and/or Owner may be present at tests performed and documented by Subcontractors, suppliers, and equipment manufacturers.

.4 Conflicts:

.1 Report conflicts between requirements of this section and other sections to the Consultant and obtain interpretation or clarification before starting commissioning work.

.2 Failure to report conflicts and obtain interpretation or clarification will result in application of the more stringent requirement.

.5 Excess Administration:

.1 Contractor shall pay the costs related to Consultant's excess contract administration if third and subsequent verifications occur where:

.1 Verification of reported results fail to receive the Owner or Consultant's Acceptance.

.2 Repetition of second verification again fails to receive Acceptance.

.3 The Consultant deems Contractor's request for second verification was premature.

.2 The cost of the Consultant's excess contract administration will be based on a rate of $260 per hour.

1.07 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Submit, for review and Acceptance, no later than six (06) weeks after award of Contract:

.1 draft Cx documentation and

.2 preliminary Cx schedule.

.2 Request changes to Submittals in writing to the Consultant and obtain written Acceptance or rejection at least eight (8) weeks before start of Cx.

.3 Where Cx procedures are not specified, submit proposed ones to the Consultant and obtain written Acceptance at least eight (8) weeks before start of Cx.

.4 Submit additional documentation relating to Cx process as required by the Consultant.

.5 If instruments installed in Contract will be used for Cx of TAB and PV, then submit TAB and PV instrument calibration certificates for review.

.6 Submit EMCS sensor calibration certificates.

.2 Commissioning Schedule:

.1 Create and submit detailed Cx schedule in accordance with section 01 32 16.16 – Construction Progress Schedule and section 01 91 13.13 – Commissioning Plan. The Contractor shall ensure the Cx schedule is incorporated into the Construction Schedule.

.2 Allow in the schedule adequate time for Cx activities such that activities are completed prior to the required occupancy date, including commissioning activities prescribed in the Specifications including:

.1 Acceptance of Cx reports

.2 Verification of reported results

.3 Repairs, retesting, re-commissioning, and re-verification

.4 Training

.3 Start-Up Documentation:

.1 Assemble start-up documentation and submit to the Consultant for review and Acceptance before beginning commissioning.

.2 Start-up documentation to include:

.1 Factory and on-site test certificates for specified equipment.

.2 Pre-start-up inspection reports.

.3 Signed installation/start-up checklists.

.4 Start-up reports.

.5 Step-by-step description of complete start-up procedures so the Consultant or Owner can repeat start-up at any time.

.4 Submit for review and Acceptance:

.1 Complete list of proposed instruments and equipment to perform commissioning.

.2 List data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

.5 Commissioning Documentation:

.1 Submit completed Cx documentation to Consultant for review and Acceptance.

1.08 MAINTENANCE MATERIALS SUBMITTALS

.1 Supply and document maintenance materials, spare parts, and special tools as specified in other Specification sections.

1.09 SITE CONDITIONS

.1 Where Cx of weather-dependent, occupancy-dependent, or seasonally-dependent equipment or

systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions, if acceptable to the Consultant, with manufacturer's assistance in accordance with equipment manufacturer's instructions, data, and approved formulae.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 GENERAL

.1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Perform Cx after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and Accepted. Complete Cx in the most effective and timely manner available.

.1 Objectives: Verify that installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.

.2 Contractor shall be responsible for the entire Cx process, operating equipment and systems, troubleshooting, and making adjustments as required.

.1 Operate systems at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems should interact with each other as intended in accordance with Contract Documents and design criteria.

.2 Make adjustments as needed, during these checks, to enhance performance and meet environmental or user requirements.

COMMISSIONING OVERVIEW

.1 Refer to Section 01 91 13.13 - Commissioning Plan for additional Cx responsibilities.

.2 Cx activities supplement the site quality control and testing procedures described in relevant technical Specification sections.

.3 Conduct Cx in coordination with other activities carried out during the Project delivery stages.

.4 Cx shall identify issues early on in the construction stages, which are addressed during Construction and Cx stages. This step ensures the built facility meets functional and operational requirements while operating as intended under weather, environmental and occupancy conditions. Cx activities include the transfer of critical knowledge to the Owner's facility operations personnel.

.5 The Owner will verify *Ready-For-Takeove*r has been achieved in accordance with the requirements of GC 12.1.1 and after:

.1 Completed Cx documentation has been received, reviewed for suitability, and reviewed and Accepted by the Consultant.

.2 Equipment, components and systems have been commissioned, and

.3 O&M training has been completed.

3.02 PRE-COMMISSIONING REVIEW

.1 Before Construction:

.1 Review Contract Documents and confirm in writing to the Consultant the following:

.1 Adequacy of provisions for Cx.

.2 Aspects of design and installation pertinent to success of Cx.

.2 During Construction:

.1 Coordinate provision, location, and installation of provisions for Cx.

.3 Before Beginning Cx:

.1 Verify Cx Plan, documentation and schedules are up-to-date.

.2 Verify installation of related components, equipment, systems, and sub-systems are complete.

.3 Review Cx requirements and procedures.

.4 Verify documentation used for the Cx process is shelf-ready (bound, organized, indexed, etc.).

.5 Review design criteria and intent, and special features to ensure full understanding.

.6 Submit complete start-up documentation to Consultant for Acceptance.

.7 Verify systems have been cleaned thoroughly.

.8 Complete TAB procedures on systems and submit TAB reports to Consultant for review and Acceptance.

.9 Verify “As-Built” system schematics are available.

.4 Inform Consultant in writing of defects and deficiencies in installed Work together with plan for rectification.

3.03 STARTING AND TESTING

.1 Contractor to bear all costs associated with Cx activities, including, but not limited to, costs of the following:

.1 inspections, including disassembly and re-assembly after approval, and for starting, testing, adjusting, and;

.2 temporary testing equipment.

.3 required personnel and test equipment.

3.04 PERFORMANCE VERIFICATION TOLERANCES

.1 Application Tolerances:

.1 A specified range of acceptable deviations of measured values from specified values or specified design criteria except for special areas that shall be within +/- 10% of specified values.

.2 Instrument Accuracy Tolerances:

.1 To be of higher order of magnitude than equipment or system being tested.

.3 Measurement Tolerances During Verification:

.1 Unless otherwise specified, actual values shall be within +/- 2% of recorded values.

3.05 MANUFACTURER SERVICES

.1 During factory testing, manufacturer, through the Contractor, to:

.1 Coordinate time and location of testing.

.2 Arrange for Consultant to observe testing.

.3 Submit testing documentation for review and Acceptance by Consultant.

.4 Obtain written Acceptance of test results and documentation from the Consultant before delivery to site.

.2 Obtain manufacturer's installation, start-up and operations instructions before start-up of components, equipment and systems, and review with Consultant.

.1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.

.2 Modify procedures that may be detrimental to equipment performance and review with manufacturer before start-up.

.3 Integrity of warranties:

.1 Use manufacturer's trained start-up personnel where specified in other Specification sections or where required to maintain integrity of warranty.

.2 Verify with manufacturer that testing as specified will not void warranties.

.4 Qualifications of manufacturer's personnel:

.1 Experienced in design, installation and operation of equipment and systems.

.2 Ability to interpret test results accurately.

.3 Report results in clear, concise, logical manner.

3.06 COMMISSIONING PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in a normal and safe manner before conducting start-up, testing and Cx.

.2 Conduct start-up and testing in the following distinct phases:

.1 Included in delivery and installation:

.1 Verification of conformity to Specification, reviewed and Accepted Shop Drawings and completion of PI report forms.

.2 Visual inspection of quality of installation.

.2 Start-up: Follow accepted start-up procedures.

.3 Operational testing: Document equipment performance.

.4 System PV: Include repetition of tests after correcting deficiencies.

.5 Post-Substantial Performance Verification: To include fine-tuning.

.3 Correct deficiencies and obtain Acceptance from the Consultant after distinct phases have been completed and before beginning the next phase.

.4 Document required tests on approved PV forms.

.5 Failure to follow accepted start-up procedures may result in re-evaluation of equipment by an independent testing agency selected by the Owner. If evaluation report indicates that equipment start-up procedure was deficient and resulted in equipment damage, perform the following:

.1 Minor equipment/systems: Perform corrective measures acceptable to the Consultant .

.2 Major equipment/systems: If evaluation report indicates that equipment damage is minor, perform corrective measures acceptable to the Consultant.

.3 If evaluation report indicates that major equipment damage has occurred, the Consultant will reject equipment.

.1 Remove rejected equipment from site and replace with new equipment.

.2 Perform specified start-up procedures on new equipment/systems.

3.07 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems as directed or recommended by equipment/system manufacturer.

.2 With manufacturer’s assistance, develop written maintenance program and submit to Consultant

for review and Acceptance before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of Substantial Completion.

3.08 TEST RESULTS

.1 If start-up, testing, or PV produce unacceptable results, repair, replace or repeat specified starting or PV procedures until acceptable results are achieved.

.2 Provide labor and materials and assume costs for re-commissioning.

3.09 START OF COMMISSIONING

.1 Notify Consultant at least ten (10) Working Days before start of Commissioning

.2 Start Cx after elements affecting start-up and performance verification of systems have been completed.

3.10 TEMPORARY INSTRUMENTS AND EQUIPMENT

.1 Provide all required instruments and equipment required to complete commissioning.

3.11 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 under actual and accepted simulated operating conditions, over entire operating range, and in all modes, and

.2 on independent systems and interacting systems.

.2 Cx procedures to be repeatable and reported results are to be verifiable.

.3 Follow equipment manufacturer’s operating instructions.

.4 Where applicable, make EMCS trending information available as supporting documentation for performance verification.

3.12 EXTENT OF VERIFICATION

.1 Laboratory areas:

.1 Provide labour and instrumentation to verify up to 100% of reported results.

.2 Elsewhere:

.1 Provide labour and instrumentation to verify up to 30% of reported results, unless otherwise specified in other Specification sections.

.3 Number and location to be at discretion of the Consultant.

.4 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, and instrumentation.

.5 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.

.6 Perform additional commissioning until results are Acceptable to the Consultant.

3.13 INSTALLED INSTRUMENTATION

.1 Use instruments installed under Contract for TAB and PV if:

.1 Accuracy complies with this Specification section.

.2 Calibration certificates have been submitted to Consultant.

.2 Calibrated EMCS sensors may be used to obtain performance data if sensor calibration has been completed and accepted.

3.14 DEFICIENCIES DISCOVERED DURING COMMISSIONING

.1 Correct defects and deficiencies found during the Cx process. Re-verify equipment and components within the defective or deficient system to verify proper performance, including related systems if requested by the Consultant.

.2 Costs associated with re-commissioning defective and deficient work is the responsibility of Contractor.

3.15 MISCELLANEOUS CHECKS AND ADJUSTING

.1 Make adjustments and changes which become apparent as Cx proceeds.

.2 Perform static and operational checks as applicable and as required.

3.16 DEFICIENCIES AND DEFECTS

.1 Correct deficiencies and defects found during start-up and Cx to satisfaction of Owner and the Consultant.

.2 Report concerns, deficiencies, and defects affecting Cx to Owner and the Consultant in writing. Stop Cx until problems are rectified. Proceed only with written Acceptance from the Consultant.

3.17 CLOSEOUT ACTIVITIES

.1 Completion of Commissioning:

.1 Upon completion of Cx, leave systems in normal operating mode, unless otherwise agreed with the Consultant.

.2 Except for warranty and seasonal verification activities specified in Cx Specifications, complete Cx before issuance of Substantial Completion Certificate of Completion.

.3 Cx to be considered complete when contract Cx deliverables have been submitted and Accepted by the Consultant.

.2 Activities Upon Completion of Commissioning:

.1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

.3 Training:

.1 In accordance with Section 01 79 00- Demonstration and Training.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 Section Includes:

.1 Description of overall structure of Plan and roles and responsibilities of commissioning team.

1.02 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.2 CCDC 2-2020, Stipulated Price Contract.

1.03 RELATED REQUIREMENTS

.1 Section 01 45 00 - Quality Control.

.2 Section 01 77 00 - Closeout Procedures.

.3 Section 01 78 00 - Closeout Submittals.

.4 Section 01 79 00 - Demonstration and Training.

1.04 GENERAL

.1 Provide fully functional facilities and or systems:

.1 Systems, equipment and components meet user's functional requirements before date of Acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
.2 Facility user and O&M personnel have been fully trained in aspects of installed systems.
.3 Optimized life cycle costs.
.4 Complete documentation relating to installed equipment and systems.

.2 Term "Cx" in this section means "Commissioning".

.3 Use this Cx Plan as master planning document for Cx:

.1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
.2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
.3 Sets out deliverables relating to O&M, process and administration of Cx.
.4 Describes process of verification of how built works meet Owner requirements.
.5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
.6 Management tool that sets out scope, standards, roles and responsibilities,

expectations, deliverables, and provides:

.1 Overview of Cx.
.2 General description of elements that make up Cx Plan.
.3 Process and methodology for successful Cx.

.4 Acronyms:

.1 Cx - Commissioning.
.2 O&M - Operations and Maintenance.
.3 EMCS - Energy Monitoring and Control Systems.
.4 WHMIS Safety Data Sheets (SDS).
.5 PI - Product Information.
.6 PV - Performance Verification.
.7 TAB - Testing, Adjusting and Balancing.
.8 WHMIS - Workplace Hazardous Materials Information System.

.5 Commissioning terms used in this Section:

.1 Bumping: short term start-up to prove ability to start and prove correct rotation.

.2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.05 DEVELOPMENT OF CX PLAN

.1 Submit for Acceptance a draft Cx Plan. Cx Plan shall be 100% completed within eight (8) weeks of award of Contract. Cx Plan shall take into account:

.1 Shop Drawings and Product data.
.2 Approved changes to Contract Documents.
.3 Contractor's Construction Schedule.
.4 Cx schedule.
.5 Contractor's, Subcontractor's, suppliers' requirements.
.6 Project construction team's and Cx team's requirements.

.2 Submit completed Cx Plan to the Consultant for Acceptance.

1.06 REFINEMENT OF CX PLAN

.1 During construction phase, revise, refine and finalize Cx Plan to include:

.1 Changes resulting from Owner program modifications.

.2 Accepted design and construction changes.

.2 Revise, refine and update every four (4) weeks during construction phase. At each revision, indicate revision number and date.

.3 Submit each revised Cx Plan to Consultant for review and obtain Acceptance.

.4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

.5 Final Cx Plan shall be Accepted six (6) weeks prior to start of Commissioning.

1.07 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

.1 Contractor to maintain overall responsibility for the Project and is the sole point of contact between members of commissioning team.

.2 Contractor will select Cx Team consisting of following members:

.1 Quality assurance team will ensure Cx activities are carried out to ensure delivery of a fully operational Project including:

.1 Review of Cx documentation from operational perspective.

.2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.

.3 Protection of health, safety and comfort of occupants and O&M personnel.

.4 Monitoring of Cx activities, training, development of Cx documentation.

.5 Work closely with members of Cx Team.

.2 Construction Team: Contractor, subcontractors, suppliers and support disciplines, are responsible for construction/installation in accordance with Contract Documents, including:

.6 Testing.

.7 TAB.

.8 Performance of Cx activities.

.9 Delivery of training and Cx documentation.

.10 Assigning one person as point of contact with Consultant and Cx Manager for administrative and coordination purposes.

.3 Contractor's Cx Agent implements specified Cx activities including:

.1 Demonstrations.

.2 Training.

.3 Testing.

.4 Preparation, submission of test reports.

.4 The Consultant is responsible for:

.1 Verifying implementation of final Cx Plan

.2 Monitoring of day to day Cx activities

.3 witnessing any or all Cx activities

.5 Owner: represents lead role in Operation Phase and onwards and is responsible for:

.1 Receiving facility.

.2 Day-To-Day operation and maintenance of facility.

1.08 CX PARTICIPANTS

.1 Employ the following Cx participants, as required, to verify performance of equipment and systems:

.1 Installation Contractor/Subcontractor:

.2 Equipment and systems except as noted.

.2 Equipment manufacturer: equipment specified to be installed and started by manufacturer:

.1 To include performance verification.

.3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.

.4 Specialist Cx agency:

.1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.

.5 Owner:

.1 Coordinates Owner's staff participation in Cx activities as required.

.6 Ensure that Cx participant:

.1 Could complete work within scheduled time frame.

.7 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel as per warranties terms. Provide names of participants to the Consultant and details of instruments and procedures to be followed for Cx [8] weeks prior to starting date of Cx for review and Acceptance.

1.09 EXTENT OF CX

.1 Commission all new systems/equipment installed as part of the Work, including but not limited to, the systems contained in section 01 11 00 – Summary of Work and detailed in the technical Specifications.

.

1.10 DELIVERABLES RELATING TO THE CX PROCESS

.1 General:

.1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.

.2 Definitions:

.1 Cx as used in this section includes:

.1 Cx of components, equipment, systems, subsystems, and integrated systems.

.2 Factory inspections and performance verification tests.

.3 Deliverables: submit in accordance with 01 33 00 - Submittal Procedures:

.1 Cx Specifications.
.2 Startup, pre-Cx activities and documentation for systems, and equipment.
.3 Completed installation checklists (ICL).
.4 Completed product information (PI) report forms.
.5 Completed performance verification (PV) report forms.

.6 Results of Performance Verification Tests and Inspections.
.7 Description of Cx activities and documentation.
.8 Description of Cx of integrated systems and documentation.
.9 Tests Reports.
.10 Training Plans.
.11 Cx Reports.
.12 Prescribed activities during warranty period.

.4 Consultant to witness tests and reports of results provided to the Owner.

.5 Consultant may participate.

1.11 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

.1 Items listed in the Cx Plan shall include the following:

.1 Pre-Start-Up inspections.
.2 The Consultant may monitor some or all of these pre-start-up inspections.
.3 Include completed documentation with Cx report.
.4 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and verified by Consultant and does not form part of Cx specifications.
.5 Include completed documentation in Cx report.

.2 Complete following Pre-Cx activities as relevant to the Work with reference to technical Specifications:

.1 Pre-Cx activities - ARCHITECTURAL AND STRUCTURAL:

.2 Pre-Cx activities - MECHANICAL:
.1 HVAC equipment and systems:
.1 "Bump" each item of equipment in its "stand-alone" mode.
.2 At this time, complete pre-start-up checks and complete relevant documentation.
.3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
.4 Perform TAB on systems. TAB reports to be Accepted by Consultant.

.3 Pre-Cx activities EMCS:
.1 EMCS trending to be available as supporting documentation for performance verification.
.2 Perform point-by-point testing in parallel with start-up.
.3 Carry out point-by-point verification.
.4 Demonstrate performance of systems, to be witnessed by Consultant prior to start of Final Acceptance Test period.
.5 Perform final Cx and operational tests during demonstration period and test period.
.6 Only additional testing after foregoing have been successfully completed to be "Off-Season Tests".

.4 Pre-Cx activities - LIFE SAFETY SYSTEMS
.1 Include all equipment and systems.
.2 Reports of test results to be witnessed by Consultant before verification.

.5 Pre-Cx activities - ELECTRICAL:

.1 High voltage distribution systems over 750 V.
.2 Low voltage distribution systems under 750 V.
.3 Requires independent testing agency to perform pre- energization and post-energization tests.
.4 Emergency power generation systems
.5 Transfer switches: test by simulating loss of power. Verify availability of power at equipment requiring same.
.6 Uninterruptible power systems: test under full and partial load conditions.
.7 Lighting systems:
.8 Emergency lighting systems:
.9 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.
.10 Low voltage systems: these include:
.11 Clock, communications, low voltage lighting control systems and data communications systems.
.12 Security, surveillance and intrusion alarm systems: to include verification by Owner and Consultant

1.12 START-UP

.1 Start-up components, equipment and systems.

.2 Consultant to monitor some or all of these start-up activities.

.1 Rectify start-up deficiencies to satisfaction of the Consultant.

.3 Performance Verification (PV):

.1 Contractor's Cx Agent to perform.
.2 Repeat when necessary until results are acceptable to Consultant.
.3 Use modified generic procedures to suit project requirements.
.4 Consultant to review and Accept reported results using approved PI and PV forms.
.5 Owner and Consultant reserve right to verify up to 30% of reported results at random.
.6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.13 CX ACTIVITIES AND RELATED DOCUMENTATION

.1 Perform Cx using procedures developed by Contractor and Accepted by Consultant.

.2 Consultant to monitor Cx activities.

.3 Upon satisfactory completion, Contractor performing tests to prepare Cx Report using Accepted PV forms.

.4 Consultant may witness reported results of Cx activities and forward to Owner.

.5 Owner and Consultant reserve right to verify a percentage of reported results at no cost to Contractor.

1.14 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

.1 Cx to be performed by specified Cx specialist, using procedures Accepted by the Consultant.

.2 Tests to be witnessed by Consultant and documented on Accepted report forms.

.3 Upon satisfactory completion, Cx specialist to prepare Cx Report, to be submitted to Consultant for review and Acceptance.

.4 Owner and Consultant reserve right to verify percentage of reported results.

1.15 CX SCHEDULES

.1 Prepare detailed Cx Schedule and submit to Consultant for review and Acceptance. Integrate Cx schedule into Project Construction Schedule such that there is a complete Critical Path for the entire Work. Include:

.1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:

.1 Design criteria, design intents.
.2 Pre-TAB review
.3 Cx agents' credentials
.4 Cx procedures
.5 Cx Report format
.6 Discussion of heating/cooling loads for Cx
.7 Submission of list of instrumentation with relevant certificates
.8 Notification of intention to start TAB
.9 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
.10 Notification of intention to start Cx: 14 days before start of Cx.
.11 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
.12 Identification of deferred Cx.
.13 Implementation of training plans.
.14 Cx reports: immediately upon successful completion of Cx.

.2 Detailed training schedule to demonstrate no conflicts with testing, completion of Project and hand-over to Owner.

.3 Cx schedule for verification of performance in all seasons and wear conditions.

.2 Consultant, Contractor and Contractor's Cx Agent will monitor progress of Cx against this schedule.

1.16 CX REPORTS

.1 Submit reports of tests, witnessed and verified by Consultant.

.2 Include completed and certified PV reports in properly formatted Cx Reports.

.3 Before reports are Accepted, reported results to be subject to verification by Consultant or Owner.

1.17 ACTIVITIES DURING WARRANTY PERIOD

.1 Cx activities must be completed before issuance of Substantial Performance of the Work Certificate. It is anticipated that certain Cx activities may be necessary during Warranty Period,

including:

.1 Fine tuning of HVAC systems.
.2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.

1.18 TRAINING PLANS

.1 Refer to Section 01 79 00 - Demonstration and Training.

1.19 FINAL SETTINGS

.1 Upon completion of Cx to satisfaction of the Consultant, lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 Section Includes:

.1 Commissioning forms to be completed for equipment, system and integrated system.

.2 Related Requirements

.1 Section 019113 -General Commissioning Requirements.

1.02 INSTALLATION/START-UP CHECK LISTS

.1 Include the following data:

.1 Product manufacturer's installation instructions and recommended checks.

.2 Special procedures as specified in relevant technical sections.

.3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.

.2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Consultant supplemental additional data lists will be required for specific Project conditions.

.3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.

.4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Consultant. Check lists will be required during Commissioning and will be included in Operations and Maintenance Manual (O&M) at completion of Project.

.5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.03 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the operations and maintenance manual at completion of Work.

.2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Consultant's Acceptance.

1.04 PERFORMANCE VERIFICATION (PV) FORMS

.1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment

and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with Project requirements.

.2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.

.3 Prior to PV of integrated system, complete PV forms of related systems and obtain Consultant's Acceptance.

1.05 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

.1 Develop appropriate verification forms and submit to the Consultant for Acceptance prior to use.

.1 Additional commissioning forms to be in same format.

1.06 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

.2 Strategy for Use:

.1 Contractor's Commissioning Agent to prepare and use Project-specific Commissioning forms, Accepted by Consultant.

.2 Contractor will provide required Shop Drawings information and verify correct installation and operation of items indicated on these forms.

.3 Confirm operation as per design criteria and intent.

.4 Identify variances between design and operation and reasons for variances.

.5 Verify operation in specified normal and emergency modes and under specified load conditions.

.6 Record analytical and substantiating data.

.7 Verify reported results.

.8 Form to bear signatures of recording technician and reviewed and signed off by Consultant.

.9 Submit immediately after tests are performed.

.10 Reported results in true measured SI unit values.

.11 Provide Consultant with originals of completed forms.

.12 Maintain copy on site during start-up, testing and commissioning period.

.13 Forms to be both hard copy and electronic format with typed written results in Operation and Maintenance Manual.

1.07 LANGUAGE

.1 English

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

PART 3 – RFQ SPECIFICATIONS

SCHEDULE 3-A-3
REFERENCE DOCUMENTATION
AND REPORTS

Policy Documents
Canadian Rail Operating Rules – May 09 2022
ONTC Electrical Safety Policy and Program
ONTC Hot Work Program
ONTC Policy – Contractor Subcontractor
ONTC Railway Flagging Protection Policy

Reports
02311183 – GI, New Mechanical Building (ONTC)
Hearst Mechanical Private Locate 1-2
Heart Mechanical Private Locate 2-2
NL2024-002_TOPO_v1 (2)
ONR – Hearst Maintenance Buildings – DSS Report

CANADIAN RAIL OPERATING RULES

May 9, 2022 Version

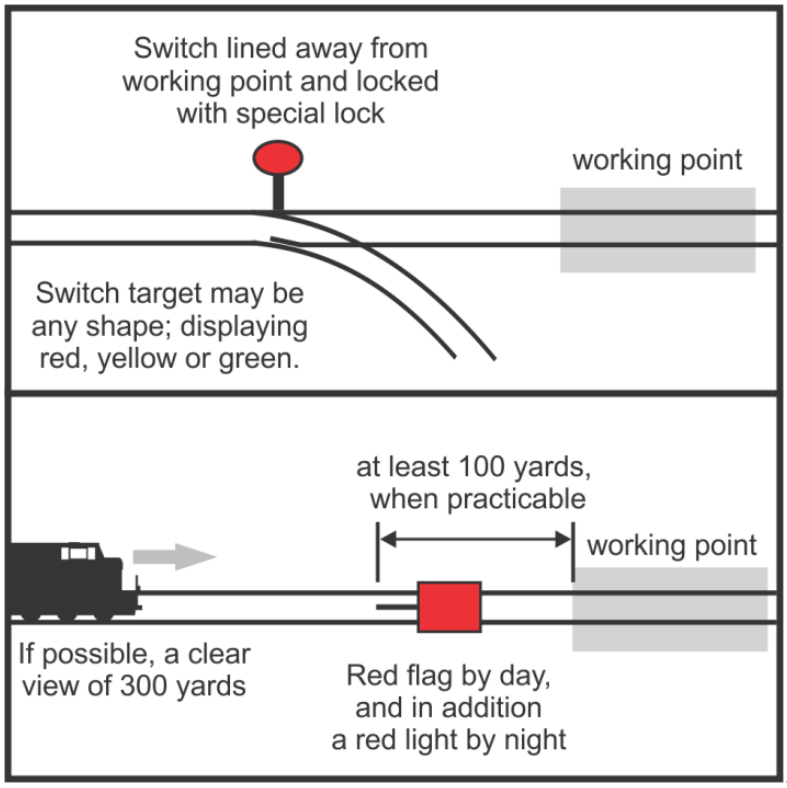
The official version of the CROR, in its entirety, applies to all railway companies. Certain railway companies may not, as a practical matter, perform each and every activity that the CROR governs. In this case, for greater employee clarity, the railway company's rule book must contain the rules that govern activities they do perform.

Those rules shown as OPTIONAL may be adopted by a railway.

When used by a railway, they will not indicate the word “OPTIONAL” in that company’s version of the CROR.

It is optional to print the CROR and Protection of Track Units and Track Work together as one book or separately as CROR book 1 and CROR book 2.

TABLE OF CONTENTS



GENERAL NOTICE

Safety and a willingness to obey the rules are of the first importance in the performance of duty. If in doubt, the safe course must be taken.

DEFINITIONS

For the purpose of these rules and special instructions, the following definitions apply:

ADVANCE SIGNAL
A fixed signal used in connection with one or more signals to govern the approach of a movement to such signal.

ADVANCED TRAIN DISPATCHING SYSTEM
Train control technologies that provide enhancements for protecting overlapping authorities with ability to provide signal indications into protected track.

AUTOMATIC BLOCK SIGNAL SYSTEM (ABS)
A series of consecutive blocks in which ABS rules apply.

BLOCK
A length of track of defined limits, the use of which by a movement is governed by block signals.

BLOCK SIGNAL
A fixed signal at the entrance to a block to govern a movement entering or using that block.

CAUTIONARY LIMITS
That portion of the main track or main tracks within limits defined by cautionary limit sign(s).

CENTRALIZED TRAFFIC CONTROL SYSTEM (CTC)
A system in which CTC rules apply.

CONTROLLED BLOCK
A block in CTC between consecutive controlled locations or points.

CONTROLLED SIGNAL
A CTC block signal which is capable of displaying a Stop indication until requested to display a less restrictive indication by the RTC.

CONTROLLED LOCATION
A location in CTC the limits of which are defined by opposing controlled signals.

CONTROLLED POINT
A signal location in CTC consisting of controlled signal(s) in one direction only.

CROSSOVER
A track joining adjacent main tracks, or a main track and another track.

DAILY OPERATING BULLETIN (DOB)
A document containing applicable information from each GBO, instructions and other information requiring compliance within limits indicated in special instructions.

ELECTRONIC COMMUNICATIONS METHOD (ECM)
An electronic method for transmission and cancellation of authorities, instructions or information.

ENGINE
A locomotive(s) operated from a single control or a cab control car, used in train, transfer or yard service.

ENGINE IN YARD SERVICE
An engine with or without cars utilized exclusively in switching, marshalling, humping, trimming and industrial switching.

EQUIPMENT
One or more engines and/or cars which can be handled on their own wheels in a movement.

EXCLUSIVE TOP
A TOP that provides exclusive occupancy of the track to one foreman. No more than two track units can operate within the limits of an Exclusive TOP.

EXCLUSIVE TRACK UNIT SPEED
When protected by an Exclusive TOP, it is a speed that permits a track unit to stop short of a switch not properly lined.
Track units handling equipment must not exceed the lesser of; authorized freight, passenger or temporary speed restrictions. The delivery method for temporary speed restrictions will be indicated in special instructions.

FIXED SIGNAL
A signal or sign at a fixed location indicating a condition affecting the operation of a movement.

FOLLOW-UP TOP
A TOP issued within limits of a movement(s) that has passed or will be identified by the foreman as having passed the foreman’s location.

GENERAL BULLETIN ORDER(S) (GBO)
Instructions regarding track condition restrictions and other information that affect the safety and operation of a movement.

GRAVITY DROP
Releasing stationary equipment and permitting it to roll under its own momentum.

HEAVY GRADE
A portion of a track 2 miles in length or greater, with an average grade greater than 1.0%, and less than or equal to 1.8%.

HIGH RISK LOCATION
A track, or portion of a track, other than a main track, subdivision track, or siding; identified in special instructions, on which unattended equipment requires the application of Rule 112(a).

HUMPING
Pushing equipment at a regulated speed then releasing it under its own momentum, in an engineered environment where the route and speed are controlled through automated or assisted devices.

INTERLOCKING
An arrangement of interconnected signals and signal appliances for which interlocking rules and special instructions are in effect.

INTERLOCKING LIMITS
The tracks between the extreme or outer opposing interlocking signals of an interlocking.

INTERLOCKING SIGNAL
A fixed signal at the entrance to or within interlocking limits to govern the use of the routes.

KICKING
Pushing equipment then releasing it under its own momentum. Does not include humping.

MAIN TRACK
A track of a subdivision extending through and between stations governed by one or more methods of control upon which movements, track units and track work must be authorized.

MARKER
When used, will indicate the last piece of equipment in a movement. It will be one of the following :

- a red light, a red reflectorized plaque, a sense and braking unit (SBU), or
- an occupied caboose, distributed power remote locomotive consist or distributed braking car, when the last piece of equipment in the direction of travel.

METHOD OF CONTROL
Rules and/or special instructions governing the use of a track(s).

MOUNTAIN GRADE
A portion of a track 2 miles in length or greater, with an average grade greater than 1.8%.

MOVEMENT(S)
The term used in these rules to indicate that the rule is applicable to trains, transfers or engines in yard service.

MULTI-TRACK
Two or more main tracks of a subdivision at the same location.

NON-MAIN TRACK (NMT)
Any track(s) other than those listed in time table columns as having CTC, OCS, ABS or Cautionary Limits applicable and unless otherwise provided include a requirement to operate at REDUCED speed.

NON-SIGNALLED SIDING
A siding where non-main track rules apply, the use of which may be governed by special instructions.

OCCUPANCY CONTROL SYSTEM (OCS)
A system in which OCS rules apply.

OCCUPATIONAL TERMS:

Assistant Conductor
An employee working under the supervision of a conductor. May also be referred to as trainman or yardman.

Conductor
An employee in charge of the operation of a movement.

Employee
A person qualified to regulatory and company standards employed by the company. Applies to contract employees and employees of other companies and railways operating and/or performing other rules related duties on the host railway trackage.

Foreman
An employee in charge of the protection of track work and track units.

Locomotive Engineer
An employee in control of the engine.

Pilot
An employee assigned to a movement when the locomotive engineer or conductor, or both, are not fully acquainted with the physical characteristics or rules of the railway over which the movement is to be operated.

Proper Authority
The rail traffic controller or the appropriate railway supervisor.

Rail Traffic Controller (RTC)
An employee in charge of the supervision and direction of movements and for the provision of protection for track work and track units on a specified territory.

Signalman
An employee in charge of an interlocking.

Sub-foreman
A rules qualified employee that works under the protection held by a foreman.

Switchtender
An employee that handles switches for other employees.

Utility Employee
An employee who can be used as a temporary crew member or perform other assigned duties.

RUNNING SWITCH
Pulling equipment then releasing it under its own momentum.

SCHEDULE
Information pertaining to the operating times of a passenger train.

SIDING
A track adjacent and connected to the main track which is so designated in the time table, GBO or operating bulletin.

SIDING CONTROL TERRITORY (SCT)
Non-signalled sidings indicated in special instructions where SCT rules are applicable.

SIGNALLED SIDING
A siding where CTC rules apply.

SIGNAL INDICATION
The information conveyed by a fixed signal.

SINGLE TRACK
One main track on a subdivision at a location.

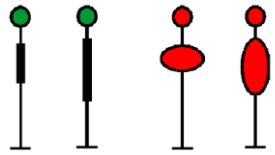
SWITCHES:

Auto-Normal Switch
A locally-controlled switch, which will automatically restore to normal position after a movement has cleared the switch track circuit.

Dual Control Switch
A switch equipped for powered and hand operation.

Electric Switch Lock
An electric lock connected with a hand operated switch to prevent its operation until the lock is released.

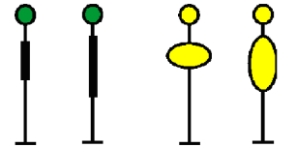
Main Track Hand Operated Switch
A switch connected to the main track used to route equipment or a track unit to or from the main track.



Normal Position Reverse Position

Note: Switch targets may be different shapes than illustrated but must not be diamond shape.

Non-Main Track Hand Operated Switch
A switch used to route equipment or a track unit within non-main track territory.



Normal Position Reverse Position

Note: Switch targets may be different shapes than illustrated but must not be diamond shape.

Power-Operated Switch
A switch equipped for powered operation, but not equipped for hand operation.

Semi-Automatic Switch
A non-main track switch equipped with an internal securing mechanism that permits equipment to trail through the switch points thus setting the switch for the route being used.

Set for Normal Route | Set for Other Than Normal Route

Note: Switch targets must be diamond shaped.

Spring Switch
A switch equipped with a spring mechanism arranged to restore the switch points to normal position after having been trailed through.

Switch
A device used to route equipment or a track unit from one track to another.

SPEEDS:

DIVERGING Speed
A speed not exceeding 25 miles per hour.

LIMITED Speed
A speed not exceeding 45 miles per hour.

MEDIUM Speed
A speed not exceeding 30 miles per hour.

REDUCED Speed
A speed that will permit stopping within one-half the range of vision of equipment.

RESTRICTED Speed
A speed that will permit stopping within one-half the range of vision of equipment, also prepared to stop short of a switch not properly lined and in no case exceeding SLOW speed.
When moving at RESTRICTED speed, be on the lookout for broken rails.
When a broken rail is detected, the movement must be stopped immediately and must not resume until permission is received from the RTC or signalman.

SLOW Speed
A speed not exceeding 15 miles per hour.

TURNOUT Speed
Unless otherwise provided by signal indication or special instructions, a speed not exceeding 15 MPH.

STATION
A location identified by a station name sign and designated by that name in the time table.

SUBDIVISION
Railway trackage designated by time table.

SUBDIVISION TRACK
A Non-Main Track so indicated in the time table method of control column that is an extension of the main track, and the through track at that location, defined with subdivision mile posts. REDUCED speed is applicable to a maximum speed as indicated in the time table. Transfers must not exceed 15 MPH.

TABULAR GENERAL BULLETIN ORDER (TGBO)
A document specific to a movement, containing applicable information from each GBO, instructions and other information requiring compliance
within limits indicated in the TGBO.

TIME TABLE
The special instruction that contains subdivision description information and footnotes relating to the operation of movements and track units. Time table may contain information applicable on other tracks.

TRACK OCCUPANCY PERMIT (TOP)
Authority issued for the protection of track units and track work.

TRACK UNIT (TU)
A vehicle or machine capable of on-track operation utilized for track inspection, track work and other railway activities when on a track.

TRACK UNIT SPEED
A speed that;
(a) permits a track unit to stop within one-half the range of vision of equipment or a track unit;
(b) permits a track unit to stop short of a switch not properly lined or any obstruction or track defect that may prevent safe passage; and
(c) does not exceed maximum authorized speed for that track unit.
Track units handling equipment must not exceed the lesser of; authorized freight, passenger or temporary speed restrictions. The delivery method for temporary speed restrictions will be indicated in special instructions.

TRACK WORK
Any work on or near the track that may render the track unsafe for movements at normal speed or where protection against movements may be required for employees and machines involved in track construction and repairs.

TRAILING END
The tail end of the last piece of equipment in a movement in the direction of travel.

TRAIN
An engine with or without cars intended to operate on the main track at speeds in excess of 15 MPH or a track unit when so designated.

TRAIN INFORMATION BRAKING SYSTEM (TIBS)
A system with rear and front communication components capable of:
(i) monitoring and displaying brake pipe pressure on the rear car;
(ii) calculating and displaying distance measurement;
(iii) initiating an emergency brake application at the rear of the train from the controlling locomotive.

TRANSFER
An engine with or without cars operating on main track at speeds not exceeding 15 MPH**.**

UNATTENDED
When an employee is not in close enough proximity to take effective action.

YARD
A system of non-main tracks, utilized to switch equipment and for other purposes over which movements may operate subject to prescribed signals, rules and special instructions.

GENERAL RULES

A Every employee in any service connected with movements, handling of main track switches and protection of track work and track units shall;

(i) be subject to and conversant with applicable CROR rules, special instructions and general operating instructions;

(ii) have a copy of this rule book, the general operating instructions, current time table and any supplements, and other documents specified by the company accessible while on duty;

(iii) provide every possible assistance to ensure every rule, special instruction and general operating instruction is complied with and shall report promptly to the proper authority any violations thereof;

(iv) communicate by the quickest available means to the proper authority any condition which may affect the safe operation of a movement and be alert to the company's interest and join forces to protect it;

(v) obtain assistance promptly when it is required to control a harmful or dangerous condition;

(vi) be conversant with and governed by every safety rule and instruction of the company pertaining to their occupation;

(vii) pass the required examination at prescribed intervals, not to exceed three years, and carry while on duty, a valid certificate of rules qualification;

(viii) seek clarification from the proper authority if in doubt as to the meaning of any rule or instruction;

(ix) conduct themselves in a courteous and orderly manner;

(x) when reporting for duty, be fit, rested and familiar with their duties and the territory over which they operate;

(xi) while on duty, not engage in non-railway activities which may in any way distract their attention from the full performance of their duties. Except as provided for in company policies, sleeping or assuming the position of sleeping is prohibited. The use of personal entertainment devices is prohibited. Printed material not connected with the operation of movements or required in the performance of duty, must not be openly displayed or left in the operating cab of a locomotive or track unit or at any work place location utilized in train, transfer or engine control; and

(xii) restrict the use of communication devices to matters pertaining to railway operations. Cellular telephones must not be used when normal railway radio communications are available. When cellular telephones are used in lieu of radio all applicable radio rules must be complied with.

B Special Instructions will be found in time tables, general operating instructions, operating bulletins or GBO. They may be appended to or included within copies of the *Canadian Rail Operating Rules* but do not diminish the intent of the rule unless official exemption has been granted.

C Employees must:

(i) be vigilant to avoid the risk of injury to themselves or others;
(ii) expect a movement, track unit or equipment to move at any time, on any track, in either direction;
(iii) not stand in front of approaching equipment for the purpose of entraining;
(iv) not ride the side or above the roof of moving equipment when passing side and/or overhead restrictions;
(v) not be on the roof of moving equipment, or on the lading of a moving open top car;
(vi) not be on the end of a car while in motion except for the purpose of operating a hand brake; and
(vii) not ride on any car known or suspected to contain a shifted load or damaged such that its structure or components may not be secure, or any car trailing such car.
(viii) not entrain or detrain moving equipment at a speed exceeding 4 MPH except in the case of an emergency. The intent to entrain or detrain moving equipment must be communicated to the locomotive engineer, who must confirm when the speed is less than 4 MPH.

D Each employee must be acquainted with, and be on the lookout for, restricted side and overhead clearances. Where standard restricted clearance signs are used, no other advice of restricted clearance will elsewhere or otherwise be given. If such signs are not provided in a yard or terminal, the location of the restricted clearance will be shown in special instructions.

E Overhead and side clearance may be restricted on a track at a main shop, diesel shop or car shop. Where restricted clearance exists on such track, it will not be marked by a standard restricted clearance sign nor will its location be elsewhere or otherwise given.

F Employees must not ride on top or side of equipment when on any main shop, diesel shop or car shop track, whether or not the overhead and side clearance is restricted.

G

(i) The use of intoxicants or narcotics by employees subject to duty, or their possession or use while on duty, is prohibited.
(ii) The use of mood altering agents by employees subject to duty, or their possession or use while on duty, is prohibited except as prescribed by a doctor.
(iii) The use of drugs, medication or mood altering agents, including those prescribed by a doctor, which, in any way, will adversely affect their ability to work safely, by employees subject to duty, or on duty, is prohibited.
(iv) Employees must know and understand the possible effects of drugs, medication or mood altering agents, including those prescribed by a doctor, which, in any way, will adversely affect their ability to work safely.

H Unless otherwise specified, these rules are applicable without respect to the number of main tracks.

I Rules pertaining to the main track also apply to tracks specified as signalled sidings and other signalled tracks.

J When an Electronic Communications Method (ECM) is used, each transmission received must be examined to ensure legibility. If the transmission is not legible this must immediately be reported to, and retransmitted by, the RTC. Illegible transmissions must not be used and in the case of paper based authorities, must be destroyed.

K When the term “in writing” is used in these rules, special instructions and general operating instructions, if the written permission, authority or instruction referred to is not received personally by the receiving employee, it must be copied by the receiving employee and repeated back to the sender to ensure it was correctly received.

L Wherever the following occupational names or titles appear in these rules, special instructions, or general operating instructions, they apply to the employee, who is qualified and is responsible for performing the duties of:
conductor,
assistant conductor,
flagman,
foreman,
locomotive engineer,
pilot,
rail traffic controller,
signalman,
snow plow foreman,
sub-foreman,
switchtender.

M Wherever the following: engine, train, transfer or movement appear in these rules, special instructions or general operating instructions, the necessary action will be carried out by a crew member or crew members of the movement. In addition:

(i) where only one crew member is employed, operating rules and instructions requiring joint compliance may be carried out by either the locomotive engineer or conductor, and

(ii) in the absence of a locomotive engineer on a crew consisting of at least two members, the conductor will designate another qualified employee to perform the rules required duties of the locomotive engineer.

(iii) the minimum operating crew requirement for a freight train or transfer carrying one or more loaded tank cars of dangerous goods is two (2) crew members.

(iv) the minimum operating crew requirement for a transfer using remote control locomotives (excluding distributed power) is two crew members.

N The following abbreviations and acronyms as well as those authorized by special instructions may be used:

ABS	Automatic Block Signal System
ack	Acknowledgement
ANS	Auto Normal Switch
AWD	Automatic Warning Devices
B/E CTC Sign	Begin/End CTC Sign
B/E MT Sign	Begin/End Main Track Sign
CL Sign	Cautionary Limit Sign
cndr	Conductor
com	Complete
CTC	Centralized Traffic Control System

DOB	Daily Operating Bulletin
E	East
ECM	Electronic Communications Method
eng	Engine
engr	Locomotive engineer
exp	Express
FIT	Field Information Terminal
frmn	Foreman
frt	Freight
GBO	General Bulletin Order(s)
HBD	Hot Box and Dragging Equipment Detector
jct	Junction
LCS	Local Control Switch
MPH	Miles per hour
MP	Mile Post
N	North
NA	Not Applicable
NMT	Non-main Track
no	Number
OCS	Occupancy Control System
psgr	Passenger
rpt	Repeat
RTC	Rail Traffic Controller
SCS	Special Control System
SCT	Siding Control Territory
SNS	Station Name Sign
S	South
sdg	Siding
SI	Special Instruction
STK	Subdivision Track
sub	Subdivision
swt	Switch
TGBO	Tabular General Bulletin Order
TIBS	Train Information Braking System

TOP	Track Occupancy Permit
trk	Track
trnm	Trainman
TU	Track Unit
W	West
wk	Work
xover	Crossover
xing	Crossing

RTC may use approved office abbreviations for station and subdivision names and for controlled points when entering addresses on computer generated forms. The normal abbreviations for days of the week and calendar months may be used.

O In these rules when the distance prescribed for the placement of signals, signs or flags is not possible due to track configuration, the maximum distance available applies. If the maximum distance available will place an advance flag at the same location as the flag it governs the approach to, such advance flag need not be placed but such must be indicated in the GBO.

TIME AND TIME TABLES

1. TIME

The 24 hour system will be used and will be expressed in four digits. The digits 2359 or 0001 will be used to express the time at midnight.

2. WATCHES

Every conductor, assistant conductor, locomotive engineer, pilot, foreman, snow plow foreman and such other employees as the company may direct, shall, when on duty, use a reliable watch that indicates hours, minutes and seconds and shall;

(i) be responsible to ensure that it is kept in proper working condition so that it does not reflect a variation of more than 30 seconds in a 24 hour period;

(ii) set it to reflect the correct time if it reflects a variation of more than 30 seconds;

(iii) before commencing work, compare the time on their watch with a railway approved time source. Where a railway approved time source is not accessible, obtain the correct time from the RTC or by comparing with another employee who has obtained the correct time. Every crew member assigned to train, transfer or yard service shall compare the time with one another as soon as possible after commencing work.

3. TIME IN EFFECT

Special instructions will indicate whether Standard Time, Daylight Saving Time or other designated time is in effect.

4. NOTICE OF TIME CHANGE

Notice of time change will be given by operating bulletin and posted at least 72 hours prior to the time change taking effect. Notice will also be given by GBO at least 24 hours prior to the change and for not less than 6 days after it takes effect.

5. EMPLOYEES ON DUTY WHEN TIME CHANGES

Each employee on duty when time changes, who is required to use a watch, must change time as follows:

(i) From Standard Time to Daylight Saving Time: At 0200 Standard Time, set the time ahead one hour to indicate 0300 Daylight Saving Time;

(ii) From Daylight Saving Time to Standard Time: At 0200 Daylight Saving Time, set the time back one hour to indicate 0100 Standard Time;
and immediately verify correct time according to Rule 2 clause (iii).

6. TIME TABLES

Each time table, from the moment it takes effect, supersedes the preceding time table.

7. NOTICE OF NEW TIME TABLE OR SUPPLEMENT

Notice will be given by operating bulletin and posted at least 72 hours prior to a new time table or supplement taking effect. Notice will also be given by GBO at least 24 hours prior to the new time table or supplement taking effect and for not less than 6 days after it takes effect.
Notice must also be communicated to all other affected employees.

8. SYMBOLS AND DIAGRAMS

(a) The following symbols when used in the time table indicate:

- B Operating bulletins
- C Cautionary limits
- D Trains or Transfers report departure to RTC
- S Special Derail
- X Crossover between main tracks
- Y Wye
- * See footnote
- + Interlocking - see footnotes.

(b) Method of control and the limits of single track or multi-track will be indicated in the time table.

(c) The location of each interlocking, non-interlocked drawbridge and non-interlocked railway crossing at grade will be indicated in subdivision footnotes or special instructions.

(d) Siding capacity and the extent of Cautionary Limits, TGBO and DOB limits will be indicated in time table columns, to the side of the station column or in subdivision footnotes.

SIGNALS – GENERAL

11. FUSEES

(a) A movement approaching a red fusee burning on or near its track, or beyond the nearest rail of an adjacent track, must proceed at REDUCED speed to a point two miles beyond the location of the fusee. If moving at other than REDUCED speed, the movement must immediately reduce to that speed.

(b) A fusee should not be placed on a public crossing at grade or where it may cause fire.

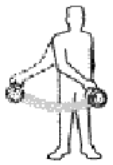
(c) **OPTIONAL**
When the fusee is located on the track occupied by an approaching movement operating at REDUCED or RESTRICTED speed as required by other than Rule 11, a stop must be made before passing the location of the fusee.

12. HAND SIGNALS

(a) Employees whose duties may require them to give hand signals must have the proper appliances, keep them in good order and ready for immediate use. Night signals must be used from sunset to sunrise and when day signals cannot be plainly seen.
Note: The hand or a flag displayed in the same manner as the lantern, which is illustrated in the following diagrams, gives the same indication.

METHOD OF DISPLAY AND INDICATION

(i) Swung from side to side at right angle to the track.



STOP

(ii) Swung in a circle at right angle to the track at a speed in proportion to the speed required.

MOVE BACKWARD

(iii) Raised and lowered at a speed in proportion to the speed required.

MOVE FORWARD

(iv) Raised and swung horizontally above the head, at right angle to the track when standing.

APPLY AIR BRAKES

(v) Raised and held at arm's length above the head when standing.

RELEASE AIR BRAKES

(vi) Held horizontally at arm's length.

REDUCE SPEED

(vii) Any object waved violently by anyone on or near the track is a signal to stop.

(b) A signal given to move forward or move backward must be given in relation to the front of the controlling locomotive.

(c) A signal must be given in sufficient time before the required action to permit compliance. It must be given from a point where it can be plainly seen, and in such a manner that it cannot be misunderstood. If there is doubt as to the meaning of a signal, or for whom it is intended, it must be regarded as a stop signal.

(d) Whenever practicable, when switching is being performed, required signals shall be given directly to the locomotive engineer.

(e) When moving under the control of hand signals, the disappearance from view of either the crew member or lights by which signals controlling the movement are being given, must be regarded as a stop signal.

(f) A crew member, whose movement is clear of the main track, must not give an approaching movement a hand signal to move forward.

(g) Where radio is used in lieu of hand signals, employees will be governed by Rule 123.1.

13. ENGINE BELL

(a) The engine bell must be rung when:
- (i) an engine is about to move, except when switching requires frequent stopping and starting after the initial move;
- (ii) passing any movement standing on an adjacent track;
- (iii) approaching, passing or moving about station facilities or shop track areas; and
- (iv) one-quarter of a mile from every public crossing at grade (except within limits as may be prescribed in special instructions) until the crossing is fully occupied by the engine or cars. At crossings where engine whistle signal 14(l) is applicable the engine bell need not be rung.

(b) Should the engine bell fail on the lead locomotive in the consist, repairs must be made as quickly as possible. If repairs cannot be made the movement may proceed to the first point where repairs can be made. The engine bell if available on another locomotive in the consist will be rung continuously or operated by another member of the crew, when available, under the direction of the locomotive engineer.

14. ENGINE WHISTLE SIGNALS

NOTE:

(i) Wherever the words “engine whistle” appear in these rules they also refer to “engine horn”. Signals prescribed by this rule are illustrated by “o” for short sounds; “___” for longer sounds.

(ii) Engine whistle signals must be sounded as prescribed by this rule, and should be distinct, with intensity and duration proportionate to the distance the signal is to be conveyed. Unnecessary use of the whistle is prohibited.

(iii) Radio must not be used in lieu of engine whistle signals for indications prefixed by the symbol (#).

(a) o

When standing - braking system is equalized; angle cock may be closed.

(b) o o

Note: Not applicable when switching.

- (i) Answer to a “stop” signal (except a fixed signal).
- (ii) Answer to any signal not otherwise provided for.

(e) o o o o o o o

To notify track forces of fire on or near the right of way (to be repeated as often as required).

(f) Succession of short sounds

(#) Alarm for persons or animals on or near the track.

(l) ___ ___ o ___

- (i) (#)At public crossings at grade:
  A whistle post will be located 1/4 mile before each public crossing where required. Whistle signal must be sounded by movements:
  - exceeding 44 MPH, at the whistle post
  - operating at 44 MPH or less, in order to provide 20 seconds warning prior to entering the crossing.

  Whistle signal must be prolonged or repeated until the crossing is fully occupied.
  EXCEPTION: Not applicable when manual protection is to be provided or when shoving equipment other than a snow plow over a crossing protected by automatic warning devices.
- (ii) (#) At other whistle posts indicated in special instructions.
- (iii) (#) At frequent intervals when view is restricted by weather, curvature or other conditions.
- (iv) Special instructions will govern when such signal is prohibited in whole or in part.

(r) In case of engine whistle failure the engine bell must be rung continuously;

(i) approaching and moving through curves; and
(ii) approaching and passing station facilities, yards and public crossings at grade. In addition, the movement must not exceed 25 MPH entering each public crossing at grade which is not protected by automatic warning devices, until such crossing is fully occupied.

(t) When a snow plow is operated ahead of an engine, the employee in charge of the snow plow must sound engine whistle signals 14(f) and 14(l). All other engine whistle signals must be sounded by the locomotive engineer as prescribed by the rule.

17. HEADLIGHT

Movements headed by equipment equipped with a headlight must display the headlight:

(a) at full power in the direction of travel approaching all public crossings at grade until such crossings are fully occupied;
(b) at full power in the direction of travel while moving on the main track;
(c) on both ends of the engine while moving on non-main track but may be extinguished on the end coupled to cars.

Exceptions: When not approaching a public crossing at grade the headlight may be extinguished or dimmed:

(i) approaching or being approached by an opposing movement;
(ii) on a passenger carrying train, approaching a location where passengers will entrain or detrain;
(iii) facing oncoming vehicles at night which may be affected on adjacent roadways; or
(iv) when weather conditions cause the vision of the operating crew to be impaired.

18. HEADLIGHT FAILURE

(a) If the headlight on a movement fails and repairs cannot be made, ditch lights will be used in lieu of the headlight and the movement may proceed.
(b) If all headlights and ditch lights have failed, such lights as are available must be used proceeding to the first point where repairs can be made. At public and private crossings at grade not protected by automatic warning devices, movements must not exceed 10 MPH entering the crossing unless it is known to be clear of traffic and will remain clear until occupied.

19. DITCH LIGHTS

A train must have ditch lights displayed continuously in the direction of travel when the headlight is required to be displayed full power.

If ditch light(s) fail en route, the movement may proceed to the next point where repairs can be made.

26. BLUE SIGNAL PROTECTION

(a) A blue flag by day, and in addition a blue light by night or when day signals cannot be plainly seen, displayed at one or both ends of equipment indicates that workmen are in the vicinity of such equipment. On a track which permits entry of a movement from one end only, a blue signal displayed between the equipment and the switch permitting entry indicates that workmen are in the vicinity of such equipment. When such signals are displayed the equipment must not be coupled to or moved. The removal of the signal from one or both ends of equipment indicates that no workmen are in the vicinity of the equipment and such equipment may be coupled to or moved.

EXCEPTION: When repairs must be undertaken on a manned movement, the locomotive engineer must be notified before repair work is commenced. When so notified, the movement must not be moved nor the brakes applied or released until the workmen have advised that they are in the clear.

(b) Other equipment must not be placed on the same track which will block a clear view of the blue signal(s) without first notifying the workmen. When equipment is placed on the same track, the movement placing such equipment must remain on that track until the workmen have relocated the blue signal(s) to include the additional equipment.
(c) Each class of workmen will display the blue signal(s) and the same class of workmen only are authorized to remove them.
(d) Special instructions will govern the use of other approved methods of protecting workmen performing equipment repairs or inspections.
(e) When protection is required on a track where the kicking of equipment is permitted per Rule 113.5(a):
    (i) lock switch(es) with a special lock, in a position to prevent a movement from entering the working limits; or
    (ii) a blue signal displayed per (a) and a derail locked in the derailing position with a special lock.

27. SIGNAL IMPERFECTLY DISPLAYED

(a) Except as provided in paragraph (b), a fixed signal which is imperfectly displayed, or the absence of a fixed signal where one is usually displayed, must be regarded as the most restrictive indication that such signal is capable of displaying. An imperfectly displayed signal must be communicated to the proper authority as soon as possible.
(b) Where a block or interlocking signal is observed with one or more lights extinguished, and at least one light remains displaying either green or yellow, movements may proceed reducing to SLOW speed through turnouts, when practicable, preparing to stop at the next signal.
EXCEPTION**:** Where a signal displays a solid yellow on the bottom position and one or all of the remaining positions are extinguished, a movement approaching such signal operating:
- at restricted speed;
- prepared to stop; or
- prepared to comply with restricted or reduced speed;

must consider the signal as displaying RESTRICTING.
(c) When a signal is known or suspected of being damaged, it must be regarded as displaying the most restrictive indication that can be given by that signal.
(d) When a block or interlocking signal displays an indication that is in other than the normal progression in relationship to the indication of the advance signal to that signal, the movement must stop immediately consistent with safe train handling practices and contact the RTC or signalman for further instructions.
(e) Repairs to damaged signals must not be made by other than qualified employees. Signals that have been knocked over must not be re-erected by other than an authorized employee. If it is known or suspected that a signal bungalow has been damaged, such fact must be reported to the RTC immediately.

33. SPEED COMPLIANCE

If speed requirements for their movement are exceeded, crew members must remind one another of such requirements. If no action is then taken, or if the locomotive engineer is observed to be non-responsive or incapacitated, other crew members must take immediate action to ensure the safety of the movement, including stopping it in emergency if required.

34. FIXED SIGNAL RECOGNITION AND COMPLIANCE

(a) The crew on the controlling engine of any movement and snow plow foremen must know the indication of each fixed signal (including switches where practicable) before passing it.
(b) Crew members within physical hearing range must communicate to each other, in a clear and audible manner, the indication by name, of each fixed signal they are required to identify. Each

signal affecting their movement must be called out as soon as it is positively identified, but crew members must watch for and promptly communicate and act on any change of indication which may occur.

The following signals/operating signs must be communicated:

(i) Block and interlocking signals;
(ii) Rule 42 and 43 signals;
(iii) One mile sign to interlocking;
(iv) One mile sign to hot box detector;
(v) Stop sign;
(vi) OCS begins sign;
(vii) Red signal between the rails;
(viii) Stop signal displayed by a flagman;
(ix) A switch not properly lined for the movement affected;
(x) One mile to Cautionary Limit Sign;
(xi) Cautionary Limit Sign**;**
(xii) Advance Permanent Slow Order (PSO) Signs; and
(xiii) Zone speed Signs where there is a reduction in speed from the previous zone.

(c) If prompt action is not taken to comply with the requirements of each signal indication affecting their movement, crew members must remind one another of such requirements. If no action is then taken, or if the locomotive engineer is observed to be incapacitated, other crew members must take immediate action to ensure the safety of the movement, including stopping it in emergency if required.

35. EMERGENCY PROTECTION

This rule does not authorize main track occupancy or track work.

(a) Any employee discovering a hazardous condition, which may affect the safe passage of a movement, must by the use of flags, lights, fusees, radio, telephone, or other means, make every possible effort to stop and/or provide necessary instructions to any movement that may be affected. Flag protection must be provided on main track unless or until otherwise relieved of the requirement.

(b) A flagman must go the required distance from the condition, and in each direction when possible, to ensure that an approaching movement will have sufficient time and distance to be able to stop before the condition. Unless otherwise provided, a flagman must go at least two miles from the condition to a location where there will be an unobstructed view of the flagman from an approaching movement.

When a movement is observed approaching, the flagman must display a stop signal using a red flag by day or a lighted red fusee by night or when day signals cannot be plainly seen. The flagman must continue to display a stop signal until the movement being flagged has:

(i) acknowledged the stop signal with engine whistle signal 14 (b) (two short);
(ii) come to a stop; or
(iii) reached the location of the flagman.

(c) A movement stopped by a flagman must not proceed until so instructed by the flagman.

(d) A flagman must be equipped with a red flag and eight red fusees. The presence of an unbroken seal verifies that a flagging kit is properly supplied.

36. DECREASED FLAGGING DISTANCE

On a subdivision specified in special instructions where maximum speed for movements is not greater than 30 MPH, in the application of Rules 35, 42/842 or 43/843 the distance of at least two miles is decreased to at least one mile.

PROTECTION OF TRACK WORK AND TRACK CONDITIONS

40. GENERAL

(a) Special instructions will specify when Rules 42/842, 43/843 and 849 are applicable on non-main track.

(b) When designated by time table footnotes or special instructions that TGBO and/or DOB are applicable on a track that is non-main track, protection of track work and track conditions may be provided as prescribed by Rules 42/842 and 43/843.

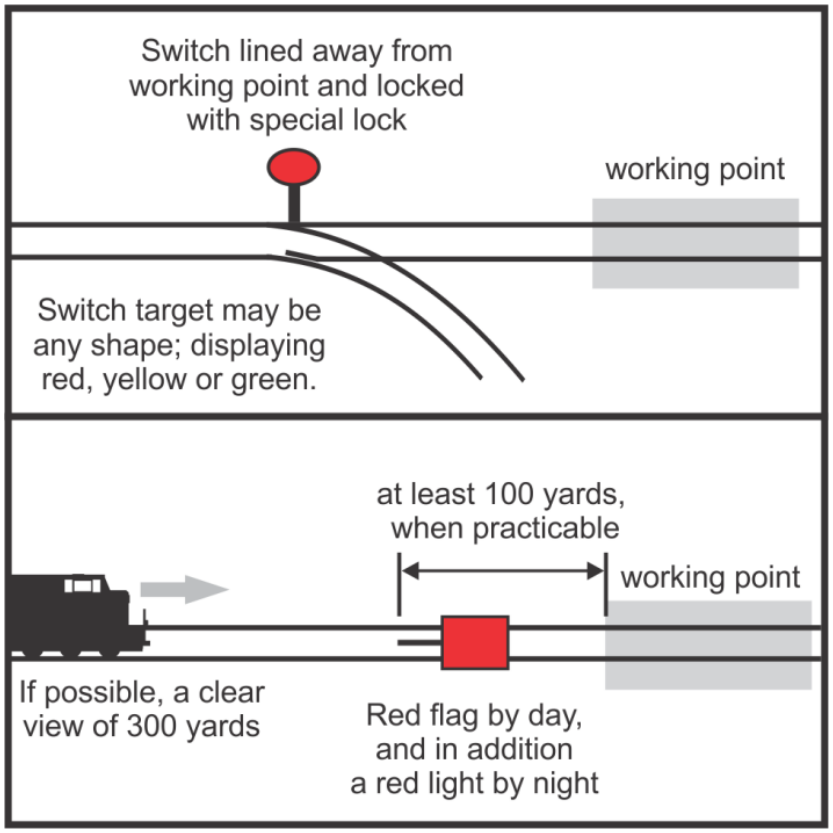
41. PROTECTION OF TRACK WORK ON NON-MAIN TRACK AND IN CAUTIONARY LIMITS

This rule is not applicable on main tracks outside of cautionary limits, signalled sidings and other signalled tracks, or on other tracks specified in special instructions.

(i) A movement required to operate on a track protected by a red signal between the rails or a switch locked with a special lock must be stopped before passing it and be governed by any instructions from the foreman.

(ii) Only the foreman or an employee authorized by the foreman may remove the red signal and/or special lock.

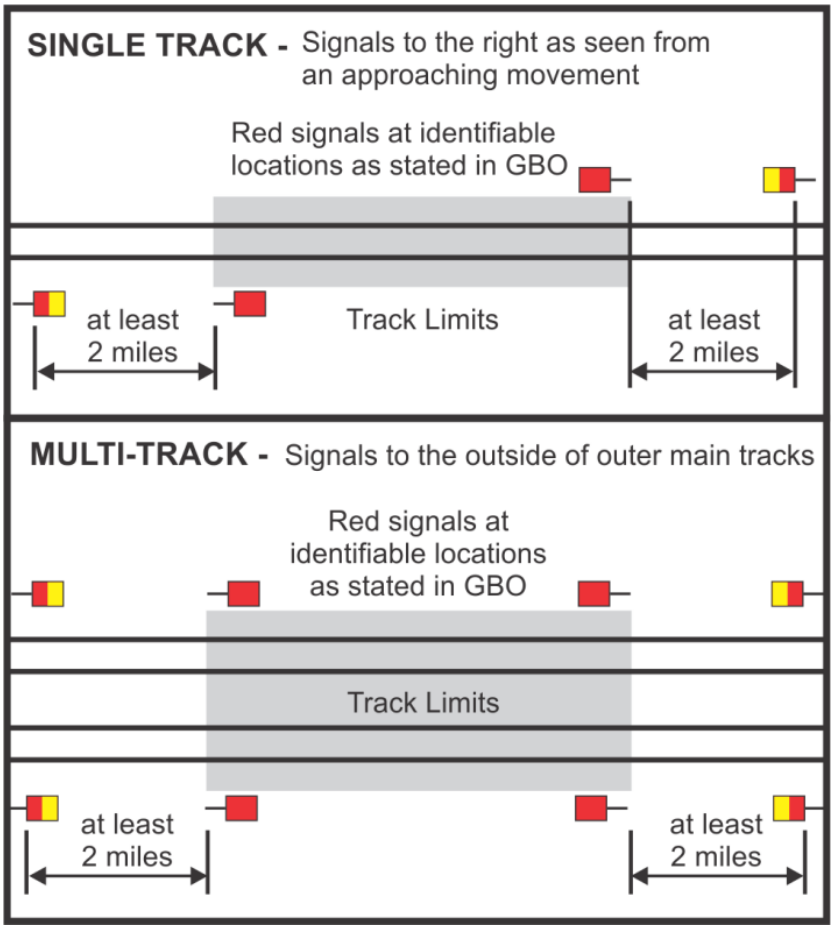
(iii) Equipment must not be left on the same track that will block a clear view of any red signal.



NOTE: Foreman must refer to Rule 841

42. PLANNED PROTECTION

(a) Rule 42 signals must not be in place more than 30 minutes prior to or after the times stated in the GBO unless provided for in the GBO.



Note: Foreman must refer to Rule 842

(b) A movement in possession of the Form Y must not proceed beyond the red signal located at the identifiable location stated in the GBO, enter the track limits stated in the GBO, or make a reverse movement within such track limits until instructions have been received from the foreman named in the GBO.

When a specific track is to be used, instructions from the foreman must specify the track upon which the instructions apply.

(c) The instructions must be repeated to, and acknowledged by, the foreman named in the GBO before being acted upon.

(d) When a signalled turnout is within two miles of Rule 42 protection which does not apply on all tracks, every movement must approach such location prepared to comply with the requirements of Rule 42 until it is known which route is to be used.

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43. SLOW TRACK PROTECTION

Form V GBO slow track protection will be marked in the field by a**:**

(i) yellow signal to the right of the track as seen from an approaching movement at least two miles in each direction from the outermost limits indicated in the GBO, and

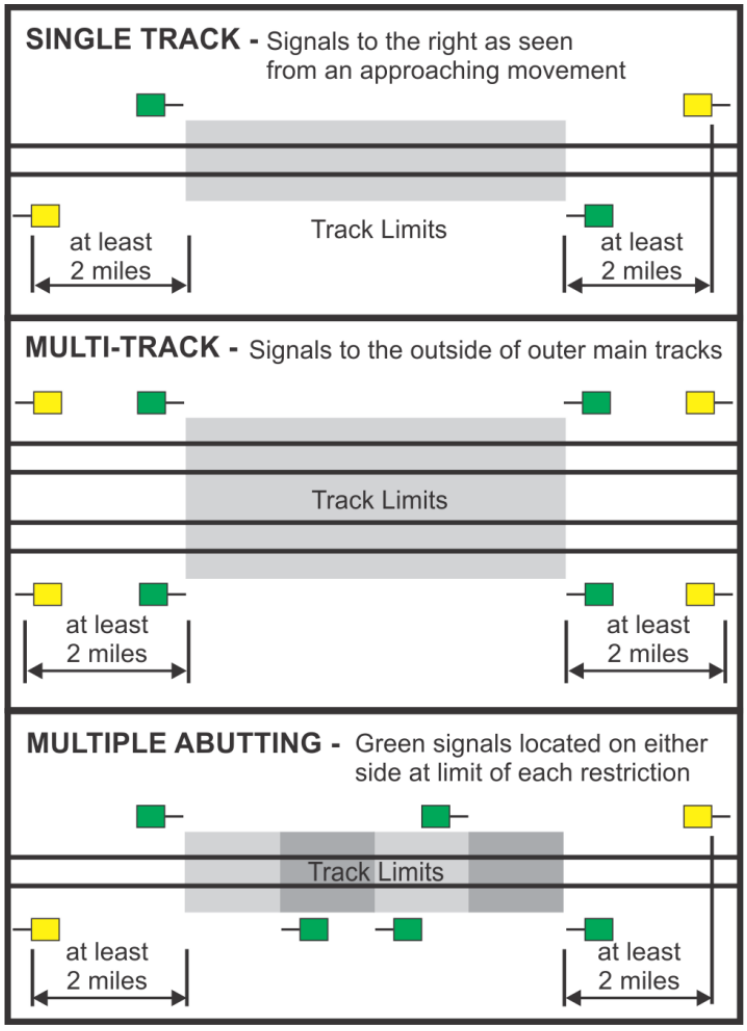
(ii) green signal to the right of the track as seen from an approaching movement in each direction, immediately beyond the defect.

Exception: When there are abutting limits contained within a single GBO, a single green signal will be displayed to either side of the track to identify each restriction within the limits.

When a Rule 43 restriction is located at a single mile point, one green signal will be displayed to identify the restriction and may be displayed to either side of the track.

When the placement of signals as prescribed by Rule 43 is delayed, the following will be added to the Form V: “Signals may not be in place.”

(a) A movement must not exceed the speed requirement of the GBO while at/or between opposing green signals.



Note: Foreman must refer to Rule 843.

(b) When a signalled turnout is within two miles of a speed restriction which does not apply on all tracks, every movement must approach such location prepared to comply with the speed restriction until it is known which route is to be used.

44. UNUSUAL TRACK SIGNAL CONDITIONS

(a) In the absence of any of the signals prescribed by Rule 42, between the times stated in a Form Y, a movement must be governed as though the signals are properly placed. Such condition must be communicated to the RTC as quickly as possible.

(b)

(i) A movement that encounters a yellow over red signal within the 30 minutes provided for in Rule 42(a), may proceed on the instructions received from the foreman named in the GBO. If the foreman cannot be contacted, the movement must be prepared to stop at a red signal and, if no red signal is encountered at the location stated in the GBO, the RTC must be advised.

(ii) A movement that encounters a red signal within the 30 minutes provided for in Rule 42(a), must stop, unless authorized to proceed on the instructions received from the foreman named in the GBO. If the foreman cannot be contacted, a crew member must communicate with the RTC as quickly as possible and be governed by instructions received.

(iii) A movement that encounters a yellow over red signal or red signal, outside the 30 minutes provided for in Rule 42(a) or without being in possession of a Form Y requiring the placement of such signal, must stop.
A crew member must communicate with the RTC as quickly as possible and be governed by instructions received.

(iv) If the TGBO/DOB system and the engineering supervisor for the territory indicate that Rule 42 is not or will not be in effect within the limits of the signal, the RTC may authorize the movement to resume normal speed. The engineering supervisor will arrange for removal of the signals that may include having the crew on a movement pick up the signals.

(c) A movement within the track limits of a Form Y, at the time such protection takes effect, must be stopped unless a crew member is otherwise instructed by the foreman named in the GBO.

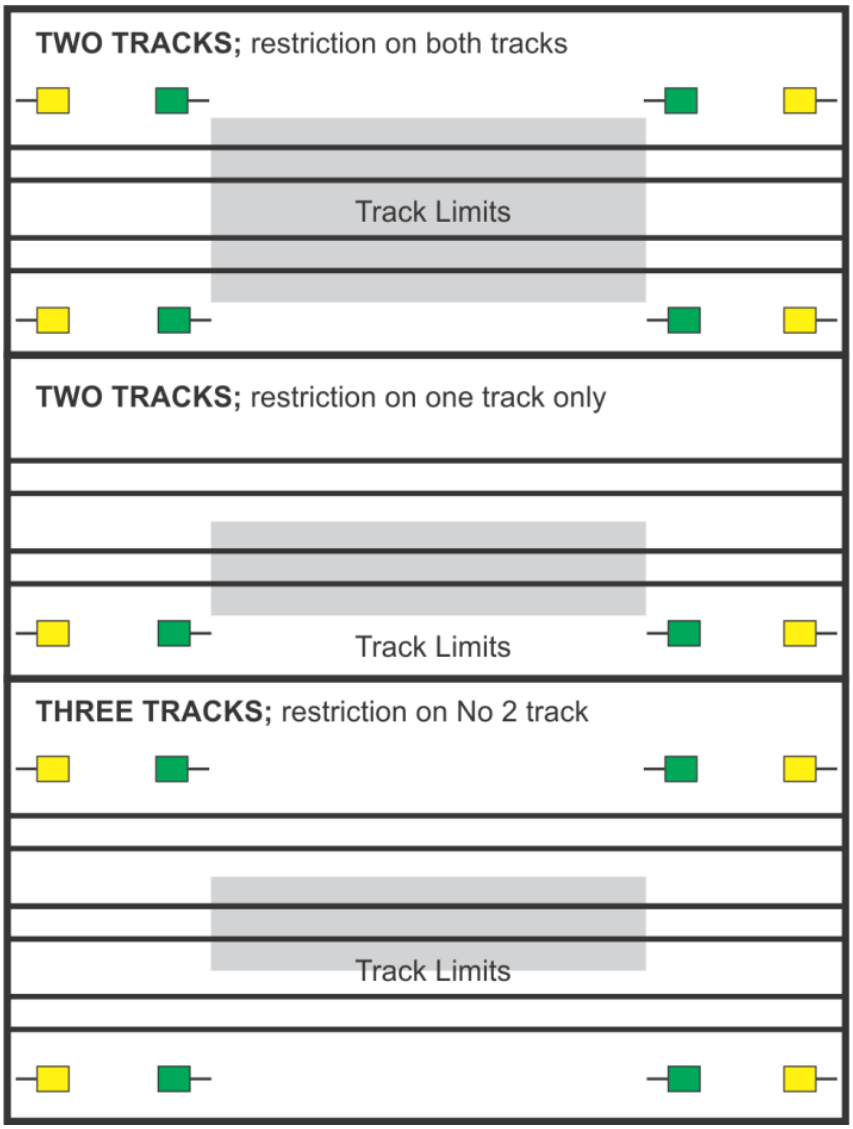
(d) In the absence of one or more of the signals prescribed by Rule 43, the movement will be governed by the requirement of the Form V. Such condition must be communicated to the RTC as quickly as possible.

(e) A movement that encounters a yellow or green signal without a GBO requiring the placement of such signal, must reduce speed to 10 MPH and immediately communicate with the RTC. The movement will be governed by instructions received from the RTC. If the TGBO/DOB system and the engineering supervisor for the territory indicate that Rule 43 is not or will not be imminently in effect within the limits of the signal, the RTC may authorize the movement to resume normal speed. The engineering supervisor will arrange for removal of the signals that may include having the crew on a movement pick up the signals.

(f) When a rail break has been detected by an engineering employee and it is safe to operate over the break at a speed less than posted speed, the RTC will provide GBO protection to affected movements stating the authorized speed over the break and how such location is marked in the field, by either a Rail Break Sign or foreman, at the break. Signals required by Rule 43 will not be in place.

45. SIGNAL PLACEMENT MULTI-TRACK

Except on a subdivision designated in special instructions, signals required by Rules 42/842 and 43/843, must be placed to the outside of the outermost track(s) and not between the main tracks.



OPERATION OF MOVEMENTS

62. UNATTENDED ENGINES

When an engine is left unattended outside of an attended yard or terminal:
(a) the cab of the engine must be secured to prevent unauthorized entry; and
(b) subject to (c), the reverser must be removed from the engine;
(c) during subzero temperatures, an engine that does not have a high idle feature is exempt from (b).

63. FREIGHT TRAIN REQUIREMENTS

Freight trains with cars must operate with TIBS or a manned caboose.
Exception: A freight train that must be separated in order to double, set off or lift cars, cut a crossing or for other similar situations may operate without a TIBS or manned caboose to the extent necessary to perform these tasks, at a speed not exceeding 25 MPH while handling cars.

64. TRANSFER REQUIREMENTS

(i) Transfers must have air applied throughout the entire equipment consist. The last three cars, if applicable, must be verified to have operative brakes.
(ii) The locomotive engineer must verify that there are sufficient operative brakes to control the transfer, confirmed by a running test as soon as possible.
(iii) Remote control locomotives in transfer service must be operated with two operative operator controlled units (OCU).

65. ENGINE IN YARD SERVICE REQUIREMENTS

An engine in yard service that is required to enter main track to double over, take head room or cross over a main track will not be considered a train or transfer except in application of Rules 301-315 and 560-578.

66. SECURING EQUIPMENT AFTER AN EMERGENCY BRAKE APPLICATION ON GRADE

(a) When a train experiences an emergency brake application on a heavy or mountain grade, the operating crew must immediately provide details of the situation to the proper authority, and be governed by any additional instructions received from the proper authority.

(b) When a train experiences an emergency brake application and any portion of the train is located on a mountain grade, the entire train must be considered to be on mountain grade.

(c) In the event of a derailment or a train separation on heavy grade or mountain grade, the portion of the train at greatest risk of unintended movement must be secured first.

(d) When a train experiences an emergency brake application on a mountain grade, the hand brakes must be immediately applied as per (f) before attempting to recover the air brake system.

(e) When a train experiences an emergency brake application on a heavy grade

i. the train must be secured immediately per (f) if any of the following conditions exist:
   - ambient temperature is -20 degrees Celsius or colder;
   - ambient temperature is between -15 and -19 degrees Celsius, and snow is three inches or greater above the top of rail;
   - the crew has experienced unusual braking conditions or difficulty controlling speed;

- doubt exists as to the ability to safely recover and control the movement;
- more than one emergency brake application has occurred on the grade; or
- operating conditions do not permit a recovery attempt

ii. If none of the conditions in (e) (i) apply, attempt to recover from the emergency brake application. If air does not recover, the train must be immediately inspected for cause. If cause cannot be determined or immediately corrected, so that air can recover, the train must be secured per (f).

(f) When securing the train using the hand brake requirement table, the following apply

i. If less equipment is present in the movement than required by the following table, hand brakes must be applied on all equipment.
ii. The retarding force of locomotive(s) is not included in the following hand brake requirements, and must not be used to diminish these requirements.

Total Tons:	Minimum Required Number of Handbrakes							
	Heavy Grade (%)				Mountain Grade (%)			
	1.01-1.2	1.21-1.4	1.41-1.6	1.61-1.8	1.81-2.0	2.01-2.2	2.21-2.4	> 2.4
0 - 2000	4	5	6	7	8	9	11	11
2001 - 4000	8	11	13	15	16	18	20	23
4001 - 6000	14	16	19	23	25	28	31	34
6001 - 8000	19	23	26	30	34	37	41	45
8001 - 10000	25	28	33	38	41	47	52	57
10001 - 12000	28	35	40	46	50	57	62	68
12001 - 14000	34	40	47	53	59	66	73	79
14001 - 16000	39	47	53	61	68	75	83	91
16001 - 18000	45	52	60	69	77	85	94	102
18001 - 20000	50	59	68	77	85	95	105	113
20001 - 22000	53	64	74	84	93	104	115	125
22001 - 24000	59	71	82	92	102	114	126	136
24001 - 26000	64	77	89	100	111	124	136	147
26001 - 28000	70	83	95	107	119	134	147	159
28001 - 30000	75	89	102	116	128	143	157	170

70. REMOTE CONTROL OPERATION

(a) Where a remote control operation is comprised of two or more employees, two operative OCU must be used.

(b) Should one OCU become inoperative:
  (i) Repairs must be made as soon as possible.
  (ii) The tour of duty may continue with one operative OCU.
  (iii) The movement may operate on main track in order to proceed to the first point where repairs can be made, provided an employee other than the one with the operative OCU is positioned to operate the emergency brake valve.
(c) Any crew member other than the employee with the controlling OCU must not foul the equipment without first obtaining verbal confirmation of positive protection.
(d) OCU must not be operated while moving on other than the movement the employee is controlling.
(e) When an engine begins to move, a crew member must visually verify the direction the movement is travelling in.
(f) Movements must not exceed 15 MPH.
(g) When coupling to equipment, the employee protecting the leading end of the movement must have the controlling OCU.
(h) Prior to stopping or coupling to equipment, the OCU must be set to its lowest speed.

80. MAIN TRACK AUTHORIZATION

(a) A movement must not foul or enter a main track without authority. Authority is conveyed in:

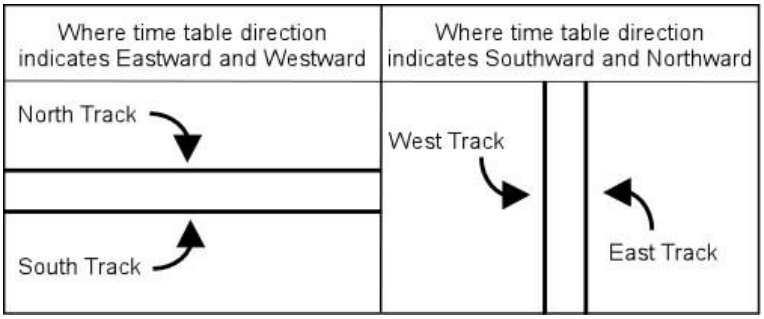
CTC	By signal indication, RTC permission or written authority.
OCS	Clearance
Cautionary Limits	Rule 94
SCS	Special Instructions

(b) If a movement occupies or fouls a main track or siding controlled territory without authority, or passes a block or interlocking signal indicating stop without authority to pass such signal; it must be stopped and protection as required by Rules 35 and 125 initiated. The RTC or

signalman must be advised as soon as practicable.
  (i) The RTC or signalman will issue instructions as necessary.
  (ii) If the instructions include the authority to proceed or reverse direction, unless relieved of the requirement by the RTC or signalman:
    - any dual control or power-operated switches occupied by the movement must be examined to ensure that the switch points are properly lined for the route to be used and no part of the switch is damaged or broken.
    - Rule 104.2(b) must be complied with at dual control switch(es). In application of Rule 104.2(b), the movement may be moved before the dual control switch is operated by hand, but only sufficient distance to clear the wheels from the actual switch points.

81. DESIGNATION OF MULTI-TRACK

(a) Where two main tracks are in service, unless otherwise directed in special instructions, they must be designated as;



(b) Where more than two main tracks are in service they must be numbered. Unless otherwise specified in the time table, where time table directions are eastward and westward, tracks will be numbered from the north as, “No 1 track”, “No 2 track” and so on; where time table directions are northward and southward, tracks will be numbered from the east as, “No 1 track”, “No 2 track”, and so on.

82. LIMITS OF AUTHORITY

Specific limits contained in written authorities must be defined by identifiable locations. These may include station names, station name signs, switches, signals, mile posts and other signs or infrastructure that are identified with a specific mileage.

(a) When a switch or signal is used to define the limits, the authority extends only to the fouling point of the switch or to the signal location.

(b) When mile posts or specific mileages are used to define the limits, the authority extends only to the specific mileage indicated.

(c) When station names are used to define the limits, the authority does not include the use of the main track between the siding switches at either station named. Where there is no siding, authority extends to the station name sign.

83. OPERATING BULLETINS

(a) Operating bulletins will be issued by the proper authority and in the prescribed format. Employees responsible for posting or displaying operating bulletins must record on each bulletin the time and date it is posted or displayed. Operating bulletins will only contain information or instructions pertaining to the operation of movements. Duplicate bulletin numbers must not be in effect at the same time.

(b) Before commencing work at their home location where operating bulletins are posted or displayed, every employee responsible for the operation or supervision of movements must read and understand the operating bulletins that are applicable to the territory that they will operate on.

(c) A Summary bulletin, containing the number, date and contents of, or reference to, each operating bulletin remaining in effect, will be issued at intervals indicated in special instructions. Operating bulletins of a previous date, which are not included or referred to in the Summary bulletin, become void. Summary bulletins may also contain full content of operating bulletins that take effect on or after the effective date of the Summary bulletin and will not be posted or displayed. All employees responsible for the operation or supervision of movements must have a copy of the current Summary bulletin accessible while on duty.

84. REPORTING DELAYS

The conductor must ensure that the RTC is promptly advised of any known condition which may delay their train or transfer.

85. TRACK RELEASE REPORTS

(a) The conductor will ensure the RTC is promptly advised of the time their movement has arrived, left or cleared a location or at a time specified by the RTC or after clearing the limits of the last proceed clearance for that subdivision.
(b) Prior to making such report, the conductor must confirm with other crew members the accuracy of the information to be provided.
(c) When a track release report is transmitted to the RTC, the RTC must, as it is transmitted, verify the movement identification and record the location into the computer assisted system. If correct the locomotive engineer must confirm correctness of the report to the RTC.

85.1 LOCATION REPORTS (OPTIONAL TO EXISTING)

(a) An employee must ensure the RTC is promptly advised when their movement has arrived, left or cleared a location or at a time specified by the RTC or after clearing the limits of the last proceed clearance for that subdivision.
(b) Prior to making such report, the employee providing the report must confirm with other crew members the accuracy of the information to be provided.
(c) When a location report is transmitted to the RTC, it must be entered in the computer system by the RTC as it is received; repeated from the computer screen by the RTC to the movement. If correct, the employee who provided the report must confirm correctness of the report to the RTC.

94. CAUTIONARY LIMITS

This rule is not applicable in CTC and does not authorize track work.
(a) A movement or track unit is authorized to use the main track within cautionary limits.
(b) Movements must comply with the provisions of Rule 105(c), and in addition must also be prepared to stop short of the red signal prescribed by Rule 41 or a switch not properly lined**.**
(c) Each cautionary limit sign and advance sign will be reflectorized. An advance sign will be placed at least one mile in advance of each cautionary limit sign. At locations where the placement of an advance sign or signs is not practicable at the required distance, it will be so indicated in special instructions.

101. PROTECTION AGAINST EXTRAORDINARY CONDITIONS

(a) A movement must be fully protected against any known or suspected condition that may interfere with its safe passage.
(b) A movement must stop at once and be fully inspected when it is known or suspected to have struck any object that may interfere with its safe operation. The RTC must be notified as quickly as possible.
(c) When a portion of a movement is left on the main track, precautions must be taken by the crew to protect the remaining portion against the return move.

101.1 DIMENSIONAL TRAFFIC

When the dimensions of traffic require that special arrangements be made to permit moving past other movements, the wide traffic will be protected by the RTC against other main track movements. Advice of such protection will be provided to the crew in writing or verbally.
The RTC will not provide protection against equipment on non-main tracks. The crew handling the wide traffic must protect it from such equipment.

101.2 EQUIPMENT LEFT ON MAIN TRACK

Equipment may be left on the main track when protected by:

(i) clearance;
(ii) Form T GBO; or
(iii) cautionary limits.

Communication to the RTC must include the location of the equipment and the outer limits of the Form T protection must be expressed in whole miles or by other identifiable locations. In CTC and controlled interlockings, once the RTC has been advised, Form T protection need not be provided. The RTC must inform each movement, required to enter the occupied track, of the location of the unattended equipment.

102. EMERGENCY STOP PROTECTION

(a) The crew of a movement stopping as a result of an emergency brake application, or other abnormal condition, which may cause an adjacent main track to be obstructed, must:
  (i) immediately transmit a radio broadcast on the standby channel in the following manner: "EMERGENCY, EMERGENCY, EMERGENCY, (movement) on (designated track), stopped (stopping) in emergency between mile _____ and mile_____ (subdivision)";
  (ii) as soon as possible, advise the RTC of the movement's emergency stop location, indicating whether adjacent tracks and tracks of other railways are liable to be obstructed;
  (iii) repeat the emergency broadcast outlined in (i) at intervals not exceeding 90 seconds until advised by the RTC that all affected movements on other tracks have been secured, stopped or advised of the emergency stop, or it is known that adjacent tracks or tracks of other railways are safe and clear for movements;
  (iv) if unable to comply with (i), (ii), (iii), the adjacent track must be protected as per Rule 35(b) EMERGENCY PROTECTION.
  (v) When tracks of other railways may be obstructed the emergency radio broadcast must be transmitted on their standby channel if practicable.

(b) Other movements must;
  (i) stop at once if closely approaching the location stated in the emergency broadcast; or
  (ii) stop prior to reaching the location stated in the emergency broadcast; and
  (iii) after stop has been made, proceed prepared to stop short of an obstruction until it is known that the track is safe and clear.

(c) The RTC must:
  (i) immediately secure and advise affected movements on other tracks of the location of the movement in an emergency stop;
  (ii) by use of a dedicated emergency communication system, alert the RTC controlling adjacent tracks of other railways liable to be obstructed, providing the location of the emergency stop; and
  (iii) advise the crew of the movement involved in the emergency stop when all other affected movements have been advised of the condition.

(d) Rule 102 is applicable to a movement operating on a track that is adjacent to a siding where siding control territory rules (SCT) are applicable.

103. PUBLIC CROSSINGS AT GRADE

(a) Where a railway track and a public road share the same roadbed and there is no fence or other barrier between them, moving rail cars not headed by an engine or when headed by a remotely controlled engine must be protected by a crew member on the leading car or on the ground, in a position to warn persons standing on, or crossing, or about to cross the track.

(b) When required by special instruction or when cars not headed by an engine, snow plow or other equipment equipped with a whistle and headlight, are moving over a public crossing at grade, a crew member must provide manual protection of the crossing until the crossing is fully occupied.

EXCEPTION: Manual protection of the crossing is not required provided the crossing is equipped with automatic warning devices and a crew member is on the leading car to warn persons standing on, or crossing, or about to cross the track. This exception does not modify the application of Rule 103.1 (a).

(c) Crew members must not give vehicular traffic a hand signal to proceed over a crossing.

(e) Equipment must not be left standing within 100 feet of the travelled portion of a public or private crossing at grade, except where it is necessary to leave such equipment for loading or unloading.

(f) Before switching or operating a remote control locomotive over an unprotected public crossing at grade where the view of the crossing by the locomotive engineer is obscured, arrangements must be made for a crew member or other employee to be in position to observe the crossing and give signals and instructions to the locomotive engineer as necessary.

(g) When providing manual protection of a crossing, a crew member or other qualified employee must be on the ground ahead of the movement, in a position to stop vehicular and pedestrian traffic before entering the crossing. A hand signal by day and a light or a lighted fusee by night will be used to give a signal to stop vehicular and pedestrian traffic over such crossing. The movement must not enter the crossing until a signal to enter the crossing has been received from the employee providing the manual protection.

When the crossing is known to be clear of traffic, and will remain clear until occupied, manual protection need not be provided.

103.1 PUBLIC CROSSINGS AT GRADE WITH WARNING DEVICES

(a) When a movement passes over any public crossing at grade equipped with automatic warning devices, it will be necessary, before reversing over the crossing, for a crew member to provide manual protection of the crossing.

(b) Unless otherwise directed by special instructions, a main track movement over a public crossing at grade, equipped with automatic warning devices, which;

(i) has stopped or is switching, on the main track in the vicinity of the crossing; or

(ii) is entering the main track in the vicinity of the crossing; or

(iii) has been authorized to pass a block or interlocking signal indicating Stop which is located within 300 feet of the crossing;

must not exceed 10 MPH from a distance of 300 feet from the crossing until the crossing is fully occupied by the movement. In addition, unless manually protected, the crossing must not be occupied until the warning devices are known to have been operating for at least 20 seconds.

Applicable to item (iii): At all other crossings within the block, movements must not exceed 15 MPH entering the crossing unless the warning devices are known to have been operating for at least 20 seconds prior to occupancy.

(c) Unless otherwise directed by special instructions, a movement on non-main track over a public crossing at grade, equipped with automatic warning devices, must not exceed 10 miles per hour from a distance of 300 feet until the crossing is fully occupied.

(d) At a public crossing at grade where special instructions require that warning devices be operated by pushbutton, or other appliances, or that movements stop at stop signs, movements affected must not occupy the crossing until the warning devices have been operating for at least 20 seconds. Pushbutton boxes must be closed and locked when not in use.

(f) When advised by special instructions that rusty rail or other conditions may exist, occupancy of crossings with automatic warning devices must be manually protected unless it is known that warning devices have been operating for at least 20 seconds.

(g) At crossings equipped with automatic warning devices indicated in special instructions, movements must not accelerate by more than 5 MPH unless automatic warning devices are known to have been operating for at least 20 seconds.

(h) Employees observing the improper operation of any automatic warning device must notify the RTC or person responsible for the territory by the quickest available means. The person notified must immediately notify those charged with repair and/or responsibility.

(i) On track which the RTC can prevent movements from accessing the crossing must be protected by the RTC using blocking or other methods of securement until all affected movements are advised in writing to apply Rule 103(g).
EXCEPTION: A movement may be provided instructions verbally when:
- within two controlled blocks of the crossing; or
- there is no controlled block prior, within 25 miles.

(ii) On track which the RTC cannot prevent access, the person responsible for the territory must instruct all affected movements to apply Rule 103(g).

(i) A movement following another movement within 1500 feet may not properly activate crossing warning devices and therefore, must not obstruct any public crossing at grade equipped with automatic warning devices until:

- the warning devices are known to have been operating for at least 20 seconds;
- gates, if any, are in horizontal position; or
- a crew member applies Rule 103(g) at the crossing.

SWITCHES

104. HAND OPERATED SWITCHES

General

(a) **Operation of Switches** - semi-automatic, spring, dual control or auto-normal switches operated by hand are considered hand operated switches, and all rules governing hand operated switches apply.

(b) Except while being turned, each switch must be secured with an approved device. When a switch has been turned, the points must be examined and the target, reflector or light, if any, observed to ensure that the switch is properly lined for the route to be used.

(c) A switch must not be turned while any part of a car or engine is between the switch points and the fouling point of the track to be used, except when making a running switch or in the application of the exception to Rule 114.

(d) Handling of main track hand operated switches by other than a crew member.
When arrangements are made for an employee to take charge of a switch(es), the movement must receive verbal confirmation that the switch has been restored to normal position.
Verbal advice of switch position may be provided to a movement by an employee. The approaching movement must not act on such information unless advised that the employee is at the switch and will remain in charge of the switch.

(e) If it is known or suspected that either of the points or any part of a switch is damaged or broken, the switch must be protected until it can be made safe for use. A report must be made to the RTC or employee responsible for the territory by the quickest available means.

(f) When a switch point lock is provided, it must be locked when the switch is left in normal position. Employees must familiarize themselves with the location of switch point locks.

Main Track Hand Operated Switches

Notes:

(i) A main track hand operated switch must display a reflectorized target, or light and target except in CTC or on a subdivision specified in special instructions.

(ii) At an electrically locked hand operated switch, instructions posted at the switch or in special instructions, will govern the operation of the switch and entry to the main track or interlocking route.

(h) Unless otherwise specified by special instructions, the normal position for a main track switch is for the main track route. Except as provided in paragraph (i), main track switches must be left lined and locked in normal position.

(i) **Left in Reverse Position**

A main track switch may be left in the reverse position when;

1. directed by GBO, clearance or special instructions, and protection has been provided against all affected movements,
2. attended by an employee, who must be in position to restore the switch to normal before it is occupied by an approaching movement on the main track,
3. occupied by equipment,
4. required in the application of Rule 41/841,
5. in OCS or Cautionary Limits;
   (i) equipment is left on the main track,
   (ii) the equipment is left as close as practical to the switch, and
   (iii) operation over the same switch is required when returning to such equipment,
6. in CTC, equipment is left within the same controlled block. When this cannot be done, RTC permission must be obtained.

Notes:

(i) Except when switching, main track switches when left in the reverse position, must be left locked.

(ii) Unless authorized to leave a main track switch in reverse position or so instructed by the RTC, an employee encountering a main track switch in reverse position must restore the switch to normal position and comply with the requirements of (iii).

(iii) An employee encountering a main track switch in normal position after having a warning that the switch is in reverse position must;

- communicate to other crew members or employee that the switch is restored to normal, and
- report to the RTC from the location of the switch i.e. physically situated at or having the switch in sight, or the switch at the time is occupied by a portion of the movement.

If the RTC cannot be contacted, the employee may leave that location, leaving the switch lined and locked in the normal position.

(iv) The RTC must not act on any report of switch position that was not received from the switch location. Additionally, the RTC must not remove protection for the reverse switch until it can be confirmed that there are no other movements authorized to leave the switch in the reverse position.

(j) Except when switching, when a movement is closely approaching or passing over a main track switch, other than a dual control switch, employees must keep at least 20 feet from the switch stand, and must, when practicable, on single track, stand on the opposite side of the track.

(k) On single track, a crew member of a movement stopped on the main track to meet or to be passed by another movement, will, when practicable, reverse the switch for the approaching movement and protect it unless relieved by a crew member of the other movement.

(l) Unless otherwise directed by special instructions, the normal position for a main track junction switch is when set for through movement on one subdivision.

(m) When a movement diverges from a main track, the switch used must not be restored to normal position until the fouling point has been cleared.

(n) The switches at both ends of a crossover are normal when set for a through movement on the other tracks. When a crossover is to be used, the switch in the track on which the movement is standing must be reversed first. Both switches must be reversed before crossing over. Before either switch is restored to normal position the movement must be clear of the crossover.

Hand Operated Non-Main Track Switches

(o) Unless otherwise specified by special instructions, non-main track switches, when equipped with a lock, must be lined in normal position and locked after having been used.

Main Track Switches in OCS Territory

(p) Unless or until the switch is seen to be in normal position, movements approaching a main track hand operated switch in a facing point direction in OCS territory, unless otherwise governed by signal indication, must not exceed the following speeds from one-quarter of a mile of the switch;

PASSENGER	50 MPH
FREIGHT	45 MPH
FREIGHT handling Special Dangerous Commodities	40 MPH

(q) The employee handling a main track hand operated switch in non-signalled territory must, from the location of the switch, communicate with another employee to confirm the position in which the switch has been left, lined and locked. The employee receiving this report must repeat it back to the employee who handled the switch. Communication may be achieved by personal contact, radio or telephone. A lone employee unable to communicate with any employee other than the RTC, must communicate with the RTC.

This rule also applies where ABS signals do not govern movements in both directions.

104.1 SPRING SWITCHES

(a) A spring switch will be identified by a spring switch sign bearing the letters “SS”.

(b) Employees must keep clear of the switch handle while it is being lifted or released.

(c) When trailing through a spring switch, a movement that stops must not be reversed, nor slack taken, until the switch has been properly set by hand.

(d) When ice or snow conditions warrant, all movements must stop before trailing through a spring switch and examine the switch points, cleaning them if necessary.

(e) When a movement is required to operate over a spring switch in the facing point direction at RESTRICTED speed, a stop must be made before the leading wheels are on the switch points, and the switch points must be examined from a position on the ground.

(i) If the points are found to be properly closed the movement will be governed by the indication of the signal, if any.

(ii) If the switch points are not properly closed and cannot be closed by use of the switch handle, the points must be spiked in the proper position and the movement will be governed by the indication of the signal, if any.

After operating over a spiked spring switch, the spike must be removed and the RTC or employee in charge notified as quickly as possible.

104.2 DUAL CONTROL SWITCHES

(a) Except as required by rule, a dual control switch must not be placed in hand position without permission from the RTC or signalman.

(b) When a movement is required to operate over a dual control switch under a Stop indication, unless relieved of the responsibility by the RTC or signalman, the movement must not proceed until;

(i) the selector lever is placed in “hand” position;

(ii) the hand throw lever is operated until the switch points move in both directions with the action of the hand throw lever; and

(iii) the switch is lined by hand for the route to be used. The selector lever must be restored to “power” position and locked, but not before the movement has occupied the switch points.

(c) The RTC or signalman must not relieve a crew of the requirements of paragraph (b) until it has been determined, from the office control devices and indications, that dual control switches in the route to be used are properly lined. When so relieved, a crew member must observe that the switch points are lined for the authorized route.

(c) **OPTIONAL (to above with approved system)**

The RTC or signalman may relieve a crew of the requirements of paragraph (b) when automated office control devices confirm that dual control switches are properly lined for the route generated on the authority that will be issued to the movement.

(d) When switching is to be performed over a dual control switch, in conjunction with Rule 566.1 or 577.1, the switch may be operated by hand after authority has been obtained as prescribed by Rule 566, 567 or 577. The selector lever must be placed in “hand” position. The hand throw lever must be operated until the switch points move in both directions with the action of the hand throw lever. The selector lever must be left in “hand” position until switching is completed. The RTC must be advised when the selector lever has been restored to the “power” position and locked.

104.3 POWER-OPERATED SWITCHES AT A STOP SIGNAL

When the crew of a movement is authorized to pass a stop signal to move over a power-operated switch, a crew member must observe that the switch points are lined for the authorized route.

104.4 SEMI-AUTOMATIC SWITCHES

(a) A semi-automatic switch will be equipped with reflectorized targets.

(b) When ice or snow may affect the ability of the switch points on a semi-automatic switch to close properly when operated by wheel flange, a member of the crew must manually line the switch and ensure the points are properly lined before a trailing move is commenced over the switch. Movements operating in a facing point direction must observe the position of the points in addition to the target indication before proceeding over a semi-automatic switch.

(c) After coupling to equipment at a semi-automatic switch, or when reversing direction through such switch, a facing point move must not be made, unless one unit of equipment has trailed entirely through the switch, or it is known that the points are properly lined for the movement.

104.5 DERAILS

(a) The location of each derail will be marked by a sign, unless otherwise directed by special instructions. Employees must be familiar with the location of each derail.

(b) A movement or track unit must stop short of a derail set in the derailing position.

(c) Each derail, other than a Special Derail or a Blue Flag Derail, must be left in the derailing position.

(d) The location of SPECIAL DERAILS will be indicated in the time table or special instructions, will be switch stand operated and identified in the field with a reflective red letter “D” on a reflective yellow target, or a sign indicating “Special Derail” which will be visible when in the derailing position.

The following requirements govern their use:

- they will only be in the derailing position when unattended equipment is present;
- equipment to be left must be coupled together except when required to clear a crossing or on account of a mechanical defect; and
- movements required to move at RESTRICTED speed on a track where a SPECIAL DERAIL is located must, in addition to the requirements of RESTRICTED speed, approach such derail prepared to find it in the derailing position.

(e) All derails must be left secured with a locking device.

(f) Derails used in conjunction with blue flags will be in the derailing position only when protection for personnel is required. When protection is no longer required, they will be locked in a non-derailing position.

(g) Where hand operated switch point derails are in use, the points must be examined and the target observed to ensure that the derail is in the proper position.

105. OPERATION ON NON-MAIN TRACK

Special instructions will indicate when this rule is not applicable on a specific track.

Unless otherwise provided by signal indication, a movement using non-main track must operate at REDUCED speed and be prepared to stop short of the end of track or the red signal prescribed by Rule 41.

(a) In CTC, movements may only enter a siding by signal indication or with permission from the RTC.

(b) Unless otherwise provided by signal indication or special instructions, movements operating on non-main tracks must not exceed fifteen (15) MPH.

(c) In addition to moving at REDUCED speed, a movement using a non-signalled siding or using other non-main tracks so designated in special instructions, must operate at a speed that will allow it to stop within one-half the range of vision of a track unit.

105.1 EQUIPMENT LEFT ON SIDING

(a) Unless otherwise provided, the RTC must be advised prior to leaving equipment on a siding. The RTC will notify other movements affected as soon as practicable.

(b) When occupied service equipment is placed on a siding, a GBO will be issued specifying the location of such equipment. If the switches of the siding are locked with special locks, the GBO will so state.

106. CREW RESPONSIBILITIES

All crew members are responsible for the safe operation of movements and equipment in their charge and for the observance of the rules. Under conditions not provided for by the rules, they must take every precaution for protection.

A utility employee becomes a crew member when working with any movement.

107. RESTRICTIONS AT PASSENGER TRAIN STOPS

Unless otherwise directed by special instructions, a movement must operate with extreme care when passing along side a train carrying passengers that is discharging or receiving traffic.

It must not pass between such train and the station or platform, unless the movement is properly protected.

Passengers shall be allowed to entrain and detrain only after positive protection has been provided against movements approaching on any main track they must cross when moving between the station and the train.

108. PRECAUTIONS WHILE SWITCHING (OPTIONAL)

When switching is performed, precautions must be taken by crew members to prevent unintended rollbacks and/or fouling of other tracks and equipment.

109. LOCOMOTIVE ENGINEER PRECAUTIONS

When duties require the locomotive engineer to temporarily exit the controlling locomotive cab on a standing movement, the locomotive engineer must:

(a) fully apply the independent brake;

(b) apply the automatic brake, if required;

(c) remove the reverser, unless the locomotive is not equipped with a high idle feature;

(d) immediately after stepping away from the control stand, visually verify that:

(i) the gauges do not indicate a possible release of the air brakes; and

(ii) the independent and automatic brake valve handles remain in the selected positions; and

(e) verbally confirm with another employee the measures taken above.

110. INSPECTING PASSING TRAINS AND TRANSFERS

(a) When duties and terrain permit, at least two crew members of a standing train or transfer and other employees at wayside must position themselves on the ground on both sides of the track to inspect the condition of equipment in passing trains and transfers. When performing a train or transfer inspection, the locomotive engineer will inspect the near side. When a group of wayside employees is present, at least two employees must perform the inspection.
EXCEPTION: Crew members of passenger trains are exempted from the above requirements except when standing at meeting points in single track territory. However, every effort must be made to stop a train or transfer when a dangerous condition is noted.

(b) Employees inspecting the condition of equipment in a passing freight train or transfer must, when possible, broadcast the results of the inspection.

(c) Every effort must be made to stop a passing train or transfer if a dangerous condition is detected. Each crew member of a train or transfer must be alert at all times for a stop signal or

communication given by an employee. The report to the train or transfer being inspected must state only the location of the dangerous condition and what was observed and not speculate as to the cause.

(d) When a crew member is located at the rear of a train or transfer, a front crew member must, when practicable, notify the rear crew member of the location of employees in position to inspect their train or transfer.

111. TRAIN AND TRANSFER INSPECTION

(a) The crew must know that equipment in their train or transfer is in good order before starting and inspect it whenever they have an opportunity to do so. Equipment added to a train or transfer en route must be inspected with extra care to ensure it is in good order.

(b) When crew members are on the rear of a moving train or transfer they must inspect, at every opportunity, the track to the rear for evidence of dragging or derailed equipment.

(c) All crew members on a moving train or transfer must make frequent inspections of both sides to ensure that it is in order.

(d) On completion of crew-planned inspections and at locations where inspection is required by special instructions, crew members will, when possible, voice communicate to each other the results of such inspections.

(e) **OPTIONAL:** The conductor first arriving at a meeting point will arrange for a walking inspection of their freight train or transfer, inspecting as much as time and conditions permit.

112. SECURING UNATTENDED EQUIPMENT

When equipment is left unattended, it must be secured to prevent it from moving unintentionally.

In the application of this rule:

(i) For the purpose of paragraphs (b) to (g), equipment is considered unattended when an employee is not in close enough proximity to take effective action to stop the equipment should it move unintentionally.

(ii) Parking brakes are considered to be hand brakes.

(iii) Application of hand brakes must not be made while equipment is being pulled or shoved.

(iv) Before leaving equipment, the employee securing such equipment must confirm with another employee the manner in which it has been secured.

(v) When one or more locomotives are coupled to one or more cars, hand brakes must be applied on all locomotives in the lead consist of the unattended movement. In the application of (g), the number of hand brakes applied on each locomotive in the lead consist must not be included in determining the number of hand brakes required on the cars.

(vi) **Testing Hand Brake Effectiveness**

When testing the effectiveness of hand brakes, ensure all air brakes are released and:

(a) allow the slack to adjust. It must be apparent when slack runs in or out, that the hand brakes are sufficient to prevent the equipment from moving; or

(b) apply sufficient tractive effort to determine that the hand brakes prevent the equipment from moving when tractive effort is terminated.

If the effectiveness of hand brakes is not sufficient to prevent the equipment from moving, apply one or more additional hand brakes and re-test.

(a) **Main Track, Subdivision Track, Siding or High Risk Locations**

Equipment shall be considered unattended and must be secured unless:

- The equipment is coupled to a controlling locomotive; **and**
- The brake pipe of the controlling locomotive is coupled to the equipment and the brake pipe is open; **and**
- A qualified employee is on the controlling locomotive and able to operate the air brake system. Alternatively, a locomotive engineer can be located on the ground in accordance with CROR 109 and within arm's reach of the locomotive to complete passing train/transfer inspections.

(i) When equipment not connected to an air source is left unattended, at least the minimum number of hand brakes as indicated in (g) must be applied, tested for effectiveness, and at least one of the following additional securement methods must be used:

- derail(s);
- track where rail physically ends;
- bowled terrain as identified in special instructions; or
- air brakes up to 2 hours.

When air brakes are used as an additional method of securement:

- the air brake system must be sufficiently charged to ensure proper brake application;
- the brake pipe must be fully vented at a service rate or has an emergency brake application; and
- on freight equipment, the angle cock is left fully open.

If required to be left longer, an employee must observe that the equipment has not moved, the air brake pistons remain extended, and the hand brakes are still applied. Such results must be communicated to another employee. This observation must be carried out at consecutive intervals of 2 hours or less. If any change in the condition of the above three items is observed, additional hand brakes must be applied as indicated in (g), using the next grade column which requires an increased number of hand brakes.

(ii) When equipment connected to an air source is left unattended, where air pressure is maintained by continuous operation or auto start:

- at least the minimum number of hand brakes as indicated in (g) must be applied and tested for effectiveness;
- the air brake system must be sufficiently charged to ensure proper brake application;
- the equipment must be left with air brakes applied; and
- the independent brake on the controlling locomotive must be fully applied.

In addition, at least one of the following securement methods must be used:

- derails;
- track where rail physically ends;
- a Mechanical Emergency Device;
- bowled terrain as identified in special instructions; or
- a locomotive equipped with roll-away protection.

When rollaway protection is used as an additional means of securement, the proper authority must be notified. One of the following means of verification must be used to ensure the rollaway protection remains operational:

- When automatic notification is used, it must notify the proper authority when rollaway protection has been activated, who must arrange for prompt inspection.
- In the absence of the above, an employee must verify that air pressure is maintained, and a penalty brake application has not occurred. This verification must be carried out at consecutive intervals of 18 hours or less.

If air pressure cannot be maintained, notify the proper authority, and secure the equipment per (a)(i).

(b) **Non-Main Tracks (Excluding Subdivision Track, Sidings, Yards and High Risk Locations)**
When equipment is left unattended, a sufficient number of hand brakes must be applied and tested for effectiveness. Unless otherwise indicated in special instructions, apply a minimum number of hand brakes as indicated in (g).

(c) **Yard Tracks**
When equipment is left unattended in a yard track, to prevent equipment from moving unintentionally, it must be secured by using at least one of the following:

- hand brakes; unless otherwise indicated in special instructions, a minimum number applied as indicated in (g) and tested for effectiveness;
- bowled terrain;
- retarders;
- wheel chocks or skates;
- air brakes, not connected to an air source, for up to 2 hours when:
  (i) there are 10 or more cars;
  (ii) the air brake system is sufficiently charged to ensure proper brake application;
  (iii) the brake pipe is fully vented at a service rate or has an emergency brake application; and
  (iv) on freight equipment, the angle cock is left fully open.
  If required to be left longer, an employee must observe that the equipment has not moved, the air brake pistons remain extended, and the hand brakes (when used) are still applied. Such results must be communicated to another employee. This observation must be carried out at consecutive intervals of 2 hours or less. If any change in the condition of the above items is observed, hand brakes must be applied as indicated in (g); or
- air brakes, connected to an air source, where air pressure is maintained by continuous operation or auto start, and a Mechanical Emergency Device is used.

(d) Exceptional weather situations, such as high winds or other unusual conditions, must be factored when determining securement requirements. In addition, previously secured equipment may require additional means of securement. Special instructions may contain location specific requirements where extreme weather events are prevalent.

(e) When advised that trespasser(s) or emergency responder(s) have been in contact with unattended equipment, the person responsible for the territory must make arrangements to have an employee verify the equipment remains secured without delay.

(f) When sudden or unforeseen circumstances do not permit the full application of the requirements of paragraphs (a) or (b), the proper authority must be promptly advised of what

action was taken to secure the equipment, and to determine if additional action can be taken prior to leaving equipment unattended.

(i) These circumstances are limited to when:
- a mechanical defect is encountered enroute;
- equipment is derailed or coupled to derailed equipment; or
- separation is required for clearing a crossing for emergency vehicles.

(ii) Additional actions:
- When equipment with a mechanical defect is required to be left, and does not permit the full application of the requirements of paragraph (a) or (b), add one operative hand brake to the minimum number required, for each defective piece of equipment.
- When a mechanical defect requires equipment to be left, and does not permit the full application of the requirements of paragraph (a) or (b); or cannot be conducted safely, the equipment must be secured by applying hand brakes as indicated in (g), using the next grade column which requires an increased number of hand brakes. Additional hand brakes must be applied if those applied do not prevent the equipment from moving.

The railway company must notify Transport Canada of the time, date, and reason for any application of (f) within 48 hours.

(g) **Minimum Number Requirements for Hand Brakes**

A single piece of equipment must always be left with the hand brake applied and tested for effectiveness. For two or more pieces of equipment, the following table applies:

Total Trailing Tons:	Average Grade is Equal To or Less Than												
	0.2%	0.4%	0.6%	0.8%	1.0%	1.2%	1.4%	1.6%	1.8%	2.0%	2.2%	2.4%	> 2.4%
0 - 2000	2	2	2	4	6	6	8	10	10	12	12	14	
> 2000 - 4000	2	2	4	6	8	12	14	16	18	20	22	26	
> 4000 - 6000	2	6	6	10	14	16	20	24	28	30	34	38	
> 6000 - 8000	4	6	8	12	18	22	26	32	36	42	46	52	
> 8000 - 10000	4	6	10	16	22	28	34	40	46	52	58	66	
> 10000 - 12000	4	8	12	20	26	34	40	48	56	64	72	80	
> 12000 - 14000	6	8	14	22	30	40	48	58	66	76	84	96	
> 14000 - 16000	6	10	16	26	36	46	56	66	76	88	98	110	
> 16000 - 18000	6	10	18	28	40	50	62	74	86	100	112	126	
> 18000 - 20000	8	12	20	32	44	58	70	84	98	112	128	146	
> 20000 - 22000	8	12	22	36	50	64	78	94	110	100% Hand Brakes			
> 22000 - 24000	8	12	24	38	54	70	86	104	122				
> 24000 - 26000	10	14	26	42	58	76	94	112	134				
> 26000 - 28000	10	14	28	46	64	82	104	124	148				
> 28000 - 30000	12	16	30	50	68	90	110	136	162				
> 30000	12	16	34	52	74	96	120	148	172				

113.0 COUPLING TO EQUIPMENT

(a) Before coupling to equipment, precautions must be taken to prevent the equipment from moving unintentionally.

(b) When riding the side of equipment, other than a locomotive, detrain prior to making the coupling.

(c) Before coupling to equipment, ensure at least one knuckle is open.

(d) Unless otherwise specified in special instructions, before coupling to or moving equipment being loaded or unloaded, all persons in or about such equipment must be notified. Vehicles and loading or unloading devices must be clear.

(e) Before coupling to or moving service equipment, employees occupying such equipment must be notified and any attachments secured.

(f) When coupling to passenger equipment, a stop must be made not less than 6 nor greater than 12 feet from the coupling and a speed of 2 MPH must not be exceeded.

(g) To prevent by-pass couplers when coupling to equipment on other than tangent track, a stop must be made not less than 6 nor greater than 12 feet from the coupling. Extreme caution must then be used, ensuring couplers are properly aligned prior to the coupling being made.

(h) Coupling must be performed at the lowest speed necessary to make the coupling, not exceeding 6 MPH.

(i) Prior to leaving, a coupling made with equipment not released under its own momentum must be stretched using sufficient tractive effort to ensure a proper coupling.

113.1 UNCOUPLING FROM EQUIPMENT

(a) Equipment is considered to be uncoupled once the uncoupling lever has been lifted.
(b) In a yard, before uncoupling from standing equipment, a sufficient number of hand brakes must be applied, unless one of the methods prescribed by Rule 112 (c) is used.
(c) Once uncoupled, unless released under its own momentum, the equipment must be observed to ensure it remains where intended.

113.2 MOVING EQUIPMENT AFTER COUPLING

(a) Equipment must be stretched.
(b) After stretching, and prior to moving, the equipment must be checked:
  (i) to ensure it is coupled; and
  (ii) for applied hand brakes as may normally be expected to be present.
(c) Unless unintentional movement of the equipment can be prevented with the locomotive brakes, hand brakes must not be released until the air brake system is sufficiently charged and an effective Automatic Brake application made to prevent movement while the hand brakes are being released.

113.3 SWITCHING WITH AIR BRAKES

(a) Operative air brakes, in addition to the locomotive(s), must be used when switching:
  (i) on a grade greater than 0.4%; and
  (ii) with more than 2000 tons.
(b) Special instructions must indicate:
  (i) locations where (a)(i) is applicable; and
  (ii) the minimum number of pieces of equipment, in addition to the locomotive(s), with operative air brakes.

113.4 RESTRICTIONS

Kicking, running switch, and gravity drop are prohibited:
(a) on a main track;
(b) on a subdivision track;
(c) on a siding;
(d) at a high risk location;
(e) on any main shop, diesel shop, or car shop track; and
(f) onto, or with, passenger equipment.

113.5 KICKING EQUIPMENT

(a) On tracks not listed in Rule 113.4, unless otherwise indicated in special instructions, the kicking of equipment is prohibited. At locations where kicking is permitted:
  (i) The walking surface of the area where equipment is uncoupled must be clear of obstacles.
  (ii) The track(s) to be used beyond the area where equipment is uncoupled must be flat, and/or descend in grade, to prevent equipment from rolling back and fouling a track previously cleared.
  (iii) Equipment must be prevented from exiting the intended track at either end.
  (iv) Routing must prevent equipment kicked from fouling a main track, siding, subdivision track, or a high risk location. This may include the use of switches, derails, switching leads, or other controlled means.
  (v) Special instructions will indicate the maximum tonnage that may be kicked at one time, as determined by a Company approved process.
(b) When hand brakes will be used to control the speed of equipment kicked, such hand brakes must first be verified operational.

(c) Equipment kicked must not be left foul of the intended route.
(d) Once equipment is kicked, no additional equipment may be kicked until it has been confirmed that:
  (i) the route to be used is properly lined, and
  (ii) equipment previously kicked is clear of the fouling point of the intended route.
(e) Precautions must be taken to ensure that equipment kicked remains clear.
(f) When kicking is completed, equipment must be secured per Rule 112(b) or (c).

113.6 RUNNING SWITCH

(a) It must be verified that the switch and hand brakes are in working order before the move is commenced.
(b) A running switch must not be made;
  (i) with or onto occupied equipment;
  (ii) with or onto equipment placarded to indicate it contains or contained dangerous goods;
  (iii) where the switch to be used is a dual control, power-operated or spring switch; or
  (iv) within interlocking limits of a drawbridge or railway crossing at grade.
(c) At least 3 employees must be utilized when performing a running switch.

113.7 GRAVITY DROP

(a) It must be verified that the hand brakes, when used, are in working order before the move is commenced.
(b) A gravity drop must not be made with or onto occupied equipment.

114. FOULING OTHER TRACKS

(a) Equipment must not be allowed to move foul of another track unless properly protected.
(b) A movement must not foul a track until the switches connected with the move are properly lined, or in the case of semi-automatic or spring switches, the conflicting route is known to be clear.
  EXCEPTION: A movement may foul a track connected by a hand operated switch provided that:
  (i) neither the track occupied nor the track to be fouled are main tracks;
  (ii) the conflicting route is known to be clear; and
  (iii) the switch is properly lined before the movement passes over it.
(c) Equipment must not be left foul of a connecting track unless the switch is left lined for the track upon which such equipment is standing.

115. SHOVING EQUIPMENT

(a) When equipment is shoved by an engine or is headed by an unmanned remotely controlled engine, a crew member must be on the leading piece of equipment or on the ground, in a position to observe the track to be used and to give signals or instructions necessary to control the move.
  EXCEPTION: A crew member need not be so positioned when the portion of the track to be used is known to be clear. However, equipment not headed by an engine must not approach to within 100 feet of any public, private or farm crossing unless such crossings are protected as described in Rule 103 paragraph (b) or (g).
(b) Known to be clear is defined as seeing the portion of the track to be used as being clear and remaining clear of equipment and as having sufficient room to contain equipment being shoved. This determination must be made by a qualified employee who can observe the track and has radio contact with the employee controlling the movement. Where a track that has been seen to be clear and no access to that track is possible by another movement, the track may be considered as “known to be clear”.

Note: When it can be determined that other movements are not on duty or will not be performing work in the track to be used, the requirement of "known to be clear" can be considered to be fulfilled continuously.

(c) On main track, when equipment is shoved by an engine or is headed by an unmanned remotely controlled engine, unless protected by a crew member as described in paragraph (a), this move must:
  (i) have the required authority;
  (ii) not exceed the overall length of the equipment;
  (iii) not exceed 15 MPH; and
  (iv) not be made while the leading car is within cautionary limits.

(d) Unless the route is known to be clear, when reversing with a locomotive consist and visibility is restricted, a member of the crew must be on the leading end and in position from which signals necessary can be properly given.

RADIO

117. RELIABILITY TESTS

The crew of a movement when equipped with radios must carry out an intra-crew test of such

radios before leaving their initial terminal, change-off or starting point. When a movement is equipped with a single radio, it must be voice tested as soon as practicable after the crew commences duty.

118. DEVICES USED IN LIEU OF RADIO

When a communication device is used in lieu of a radio, all radio rules are applicable.

119. CONTINUOUS MONITORING

(a) When not being used to transmit or receive a communication, receivers must be set to the appropriate standby channel and at a volume which will ensure continuous monitoring. When required to use another channel to perform other duties, at least one radio, when practicable, should be set to the designated standby channel to receive emergency communications.

(b) The volume of a radio receiver should be kept at a level that will avoid annoyance to the public in passenger cars and station facilities.

(c) Foremen named in Form Y GBO, TOP or clearance must set their radio to "scan mode" when not being used to communicate with another employee and must otherwise have their radio set to monitor the applicable designated standby channel.

120. RADIO TERMS

(a) In radio communication the following terms when used will denote:
  "STAND BY" - Monitor this channel for my next transmission.
  "OVER" - Transmission is ended and a response is expected.
  "OUT" - Transmission is ended and no response is expected.

(b) **OPTIONAL**:
  Except when radio communication relates to switching operations, when a transmission is complete and a response is expected or required, the transmitting employee must end each transmission with the spoken word "OVER".

121. POSITIVE IDENTIFICATION

(a) The person initiating a radio communication and the responding party must establish positive identification. The initial call must commence with the railway company initials of the person

being called.
In addition, when a non-railway company person is calling on a company's channels, they must use their company's name to identify themselves within the initial transmission.

(b) The person initiating the radio communication must end the initial call with the spoken word "OVER."

(c) Each party to a radio communication must end their final transmission with the spoken word "OUT."

(d) When an authority is requested from the RTC or signalman, communication must include the information required for the issuance of the authority.
E.g. name, location, movement designation, required limits, signal number and/or track(s) to be used or entered.

122. CONTENT OF RADIO COMMUNICATIONS

Radio communications must be brief and to the point and contain only essential instructions or information.

123. VERIFICATION PROCEDURES

(a) When necessary, a repetition, acknowledgement or other response required from a crew member may be checked and confirmed to the RTC by another crew member.

(b) When GBO, clearances, other authorities or instructions, required to be in writing, are received by radio, they must be verified by the procedures prescribed by their specific rules.

(c) Except when transmitted by an automated device, or as otherwise provided, when verbal instructions or information affecting the safety of a movement are received by radio, such information must be repeated to the sender.

123.1 RADIO OR HAND SIGNALS

Before changing between radio or hand signals, a definite understanding as to the method of communication must be established between crew members giving or receiving instructions. In case of an emergency, either method may be used in addition to that previously arranged.

123.2 SWITCHING BY RADIO

When radio is used to control switching, and after positive identification has been established, the following procedures are required:

(i) direction in relation to the front of the controlling locomotive must be given in the initial instruction and from then on whenever the direction is to change;

(ii) distance to travel must be given with each communication and increments of less than two car lengths need not be repeated;

(iii) when the movement has travelled one-half the distance required by the last instruction and no further communication is received, the movement must stop;

(iv) the indication of block and interlocking signals affecting their movement, must be communicated between crew members while switching;

(v) doubt as to the meaning of an instruction or for whom it is intended must be regarded as a stop signal; and

(vi) when car lengths are used to communicate distance, unless otherwise arranged, the distance referred to is 50 feet per car length.

125. EMERGENCY COMMUNICATION PROCEDURES

(a) An employee will transmit the word "EMERGENCY" three times at the beginning of the transmission to indicate the report of;
  (i) an accident involving injury to employees or others;
  (ii) a condition which may constitute a hazard to employees or others;

(iii) a condition which may endanger the passage of movements; or
(iv) a derailment which has occurred on, or is fouling, a main track.

(b) When an emergency communication, which is directed to a specific person or movement, has not been acknowledged, any other employee hearing it will, if practicable, relay the communication by any means available. Other employees must not interfere with such communication.

(c) An emergency communication has absolute priority over other transmissions.

126. RESTRICTED USE OF RADIO

In addition to the restrictions in Rules 14 and 602, radio must not be used to;

(i) give advance information with respect to the indication of a block or interlocking signal; or

(ii) give information which may influence a crew to consider that speed restrictions are diminished.

127. CONDUCTING EMERGENCY RADIO TEST

(a) In order to ensure emergency communication channels are in operation, and to ensure employees are familiar with the emergency procedures, the RTC may contact a crew member of any movement or an engineering field employee and direct them to initiate an emergency test call on their respective RTC channel.

(b) These tests will be made randomly and employees receiving a request for an emergency test will initiate it on the applicable RTC channel, using the following example for wording: “Emergency test, Emergency test, Emergency test. ABC 1234 East at mile 12 Canada Sub, testing the Emergency call.”

(c) Upon completion of the test, the RTC will inform the employee if the test was successful. Employees will then return to their designated standby channel.

GENERAL PROCEDURES

131. RECORDING

(a) The RTC must maintain indelibly in a book provided for the purpose, or a computer assisted system, a complete record of each GBO, clearance, TOP, authority, instruction and other information that is required to be in writing. The record must be made prior to or during the transmission and never from memory or memoranda, and if required to be sent again, it will be transmitted from the original record. Such records must include original date of issue and acknowledgement(s), when applicable.

(b) When issuing by voice communication, if an error is detected in the record of a GBO, clearance, TOP, or other authority, and before it has been completed to any employee, the RTC must direct that all copies be immediately destroyed. The record must be marked void. If re-issued, those which require numbering must be given a new number.

(c) In copying and recording, the spelling of each station name must be exactly as shown in the time table. The RTC, when recording addresses, may use standard station identity letters. Underscoring will be recorded except when verified by a computer assisted system.

(d) Where a computer assisted system is not in use, all movements authorized by a clearance and all TOP limits must be recorded on a train sheet.

131.1 ELECTRONIC TRANSMISSION AND CANCELLATION

When a GBO, clearance, TOP, other authority, instruction or information is transmitted or cancelled using an ECM and not by voice communication, it will not be repeated to the RTC. When transmitted in this manner, the word “complete” and the initials of the RTC will be generated by the ECM. When cancelled, the initials of the RTC are not required.

132. BREVITY, CLARITY, PRONUNCIATION AND RETENTION

(a) A GBO, clearance, TOP, authority, instruction and its record shall contain only essential information. It must be brief, but clear in its meaning, in the prescribed form when applicable, and without erasure or any condition which may render it difficult to read or understand.

(b) In transmitting and repeating by voice communication, all words and numbers must be clearly pronounced. When the communication is required to be in writing, numbers will be pronounced in full, then repeated stating each digit separately. Numbers represented by a single digit must be pronounced, then spelled.

(c) The employee transmitting or repeating communications required to be in writing must regulate the speed of transmission to allow compliance with this rule.

(d) When an accident or incident occurs, all authorities, GBO or written instructions must be retained until relieved of this requirement by a supervisor.

(e) When a clearance, TOP or other written instruction or authority is fulfilled, cancelled or superseded;

(i) where applicable, other employees must be advised; and

(ii) except when displayed electronically:

- an “X” must be immediately drawn across it to avoid further use; or
- when contained within a book, must be marked with a single diagonal line drawn across the page to indicate that it is no longer active and a second diagonal line forming an “X” will be drawn across the page when there are no preceding active items.

133. NUMBERING

Except where numbering is controlled by computer, each RTC desk in a multiple desk office and desks controlling adjacent territories will use a separate series from other desks for numbering a

GBO, clearance, TOP, authority, instruction or other information which requires numbering. Unless otherwise provided each series must be numbered consecutively using whole numbers. All numbers in a series may be preceded or followed by a letter(s). Duplicate numbers must not be in effect at the same time.

134. DESIGNATION OF MOVEMENTS

(a) GBO, clearance or other authority, will be addressed to those who are to execute and observe them. Addresses will be clear and concise and leave no doubt as to whom they are addressed.
(b) In the body of a GBO or other authority where positive identification is required, the engine number must be included in the designation.
(c) When the locomotive number is used in the designation, it must, when practicable be the leading locomotive. The number lights of the designated locomotive only will be illuminated at all times.

135. EMPLOYEES ADDRESSED

A GBO, clearance or other authority addressed to a movement must be regarded as being addressed to the conductor and locomotive engineer and also to the pilot or snow plow foreman, if any. A crew member copying a GBO or clearance must ensure that those addressed receive a copy.

OPTIONAL A single copy may be made when all crew members are located in the same operating cab and such authority is visible and accessible to all crew members.

136. COPYING, REPEATING, COMPLETING AND CANCELLING

(a) The employee copying a GBO, clearance, TOP or other authority from the RTC or the cancellation of same, must copy as it is transmitted and repeat from the copy received all applicable written and pre-printed portions. The spelling of each station name must be exactly as shown in the time table.
(b) GBO, authorities or instructions must not be copied by the employee operating moving equipment or track units, if it will interfere with the safe operation of such equipment or track unit.
(c) The RTC must verify each written word and digit each time it is repeated. If correct, the RTC will respond “complete” and the initials of the RTC, which will be recorded and acknowledged by the employee copying. The employee copying must acknowledge by repeating “complete” and the initials of the RTC to the RTC.
(d) When transmitted by voice communication direct to the crew of a movement, it must not be completed until each crew member copying has correctly repeated it.

137. FOREMAN’S INSTRUCTIONS

Instructions from a foreman must be in writing except when the instructions permit unrestricted operation through the entire limits.

138. FOREMAN’S INSTRUCTIONS (OPTIONAL)

Instructions from a foreman must be in writing.

139. BECOMING EFFECTIVE

A GBO, clearance, TOP or other authority becomes effective at the moment the word “complete” and initials of the RTC are given by the RTC. However, the RTC must not take further action if there is a restriction contained therein until acknowledged by the employee copying.

140. CHANGES AFTER BECOMING EFFECTIVE

Changes must not be made to a GBO, clearance, TOP or other authority after becoming effective, except when;

(i) an address is added to a GBO, the number and the applicable portion of the GBO address must be repeated to and verified by the RTC;

(ii) a time or location to call the RTC is indicated on a clearance, TOP or other authority, such time or location may be changed as required. When so changed, the employee copying must draw a line through the previous time or location;

(iii) a computer assisted system is used to issue GBO, the effective time and/or date may be removed from the GBO in the system after the effective time, and in the application of Rule 43 instructions in the GBO stating “signals may not be in place” may be removed after the foreman confirms that signals have been placed**;**

(iv) speed is changed, the employee copying must draw a line through the current and replace with the revised. The GBO number and revised speed must be repeated to and acknowledged by the RTC; and

(v) a computer-assisted system is used, the limit(s) of a TOP may be changed as required, the employee copying must draw a line through the current location(s) and replace with the revised. The TOP number and revised limits must be repeated to and acknowledged by the RTC.

141. MAKING ADDITIONAL COPIES

(a) When additional copies of a GBO, clearance, TOP or other authority are required, they may be received from the RTC or made from one previously completed. Such copies must be repeated to the RTC from the new copy except when received from an ECM or reproduced by a duplicating device.

(b) An employee producing or reproducing a copy for delivery to another employee must check each copy to ensure legibility.

142. UNDERSTANDING BETWEEN CREW MEMBERS

(a) Every conductor, locomotive engineer, pilot and snow plow foreman must read and have a proper understanding of all GBO and clearances as soon as possible after they have been received. Each must be made available to other crew members, as soon as practicable, ensuring that each crew member has read and understands them and, when required, the arrangements for protection between crews and between foremen and crews.

(b) Crew members within physical hearing range are required to remind one another of the restrictions contained in GBO and clearances in sufficient time to ensure compliance.

143. GBO NUMBERS ON CLEARANCE

When specified in special instructions, the number of each GBO in effect at the time the clearance is issued, which will affect the movement on each subdivision or on the entire trip, will be shown on the first clearance sent to that crew. When there are no GBO for that movement, the word “nil” will be shown.

147. TRANSFER BETWEEN CREWS

(a) When a conductor, locomotive engineer or both are changed off, or relieved, all GBO, DOB, clearances, authorities, TGBO and other written instructions and all necessary information still in effect must be transferred personally to the relieving crew. The transfer of information must be known to be understood by the relieving employee(s).

(b) When it is not practicable to carry out a personal transfer, crews relieved of duty on line must contact the RTC as to the disposition of all documentation and authorities held for their movement. If documentation is to be left at any point for the relieving crew, a list of the items

transferred must be prepared and signed by the crew member(s) going off duty. The relieving crew must compare all pertinent information with the RTC before proceeding.

(c) The relieving crew of a movement that has been tied up on line must contact the RTC to ensure that there are no restrictions against moving any portion of their movement. In addition when taking control of a movement occupying a CTC controlled track, if unable to ascertain the last signal indication for their movement, RESTRICTED speed applies to the next signal.

(d) Verbal instructions received from a foreman must not be transferred between crews. The relieving crew must contact the foreman and obtain the necessary authority and/or instructions.

148. PERSONAL TRANSFER BETWEEN RTC

(a) Where an ECM is used or where a computer assisted system generates a list as defined in paragraph (b), the relieving RTC must sign into the system in the presence of the on-duty RTC, and receive verbal and/or written transfer of other necessary instructions and information.

(b) Except as prescribed in paragraph (a), before being relieved, an RTC must make an indelible list in a book provided for the purpose, of GBO, TOP, clearances, and other authorities in effect:

(i) Each such record must have been read, understood and initialled by the relieving RTC.

(ii) Other necessary instructions and information must also be transferred.

(iii) Both RTC must sign the transfer and the relieving RTC will record the time the transfer is completed.

GENERAL BULLETIN ORDER (GBO)

151. IDENTICAL MEANING TO ALL

The body of each GBO must be given in the same words and figures to each employee and movement addressed.

152. DELIVERY OF GBO

The RTC must ensure that movements affected by a GBO are issued a copy of the GBO, or are otherwise secured.

153. CONFIRMATION TO A FOREMAN

Confirmation of protection must not be given to a foreman until all movements affected have received a copy of the GBO or are otherwise secured.

154. REMAIN IN EFFECT

GBO remain in effect for the entire tour of duty unless cancelled. GBO must be retained at away from home locations to be available, if required, for the return trip.

155. CANCELLING GBO

(a) To cancel an item of a GBO, the RTC will use the following:
Item _____ of GBO _____ is cancelled _____ (RTC).

(b) To cancel a GBO, the RTC will use the following:
GBO _____ is cancelled _____ (RTC).

(c) The cancellation must be repeated to, and acknowledged by, the RTC.

156. DAILY OPERATING BULLETIN (DOB)

(a) Except as provided for in paragraph (b), a movement must not move on any track where DOB is applicable unless it is in possession of:
  (i) the current DOB; or
  (ii) a TGBO which is applicable within the portion of the limits of the DOB over which the movement will operate.

(b) The DOB will take effect at the time specified and will remain in effect until the same time the following day. A crew of a movement within DOB limits unable to clear the limits before the DOB expires, or unable to obtain a copy of the next current DOB, must contact the RTC. In such circumstances, the DOB may be extended by the RTC with any necessary changes. If unable to communicate with the RTC, the movement must be stopped.

(c) All crew members must verify that the DOB is properly dated, and it contains the correct number of pages.

(d) The RTC will ensure that the information or instructions contained in each GBO, pertaining to track or other conditions within such limits, is correct and placed in the appropriate DOB.

157. TABULAR GENERAL BULLETIN ORDER (TGBO)

(a) A movement must not move on any track where TGBO is applicable, unless it is in possession of a TGBO addressed to them.

OPTIONAL: Overlapping TGBO and DOB Limits. Movements required to operate outside of DOB limits must operate their entire trip with a TGBO addressed to them unless authorized by the RTC or by special instructions.

(b) All crew members must ensure that their movement is properly designated on their TGBO, it contains the correct number of pages and that the limits cover the specific routing. If an incorrectly designated TGBO is received or there is no TGBO for that movement the RTC must be contacted immediately.

(c) When designated using the movement identification number, the train journal, list or other acceptable document may be used for verification. If the designation on the TGBO is incorrect, a change of designation must be issued by the RTC. If the designation of the train journal, list or other acceptable document is incorrect while the TGBO designation is correct, the designation on the train journal, list or other acceptable document may be changed when authorized by the RTC, a company officer or other employee who has access to the correct information. When a train journal, list or other acceptable document is not available, a member of the crew may obtain the correct designation of the movement for comparison to the TGBO from the RTC, Company Supervisor or other employee who has access to this information.

(d) A crew of a movement within TGBO limits with a TGBO that includes an item that cancels the TGBO at a specific time, must communicate with and be governed by instructions of the RTC before the expiry time. If unable to communicate with the RTC and unable to clear TGBO limits, the movement must be stopped.

FORMS OF GBO

The following examples of GBO will be used where applicable. Times, mileages and speeds shown in MPH will be in numbers only.

FORM S - MAIN TRACK OUT OF SERVICE

(1) ***Main track out of service between siding switches at Whitney. Switches lined and secured for siding. Movements will operate through siding in accordance with Rule 105.***

(2) ***Main track out of service between main track switches at mile 11.3 and mile 12.1 Canada Sub, Baker Industrial Track. Switches lined and secured for this track. Movements will operate through Baker Industrial Track in accordance with Rule 105.***

When a foreman has received confirmation in writing that the GBO is in effect, impassable main track, between the switches of the siding or other tracks, may be protected in the manner prescribed by Rule 841. Before Form S is issued, any derail on such track must be secured in the non-derailing position or removed from the rail.

FORM T - EQUIPMENT LEFT ON MAIN TRACK

(1) ***Unattended equipment occupying main (No 4) track between mile 9 and mile 11 Maple Leaf Sub****.*

Example (1) will be used to provide permission to leave and provide protection for equipment occupying the main track between the designated points. Equipment must be left between the designated points.

(2) ***Derailed equipment obstructing main (east) track (No 1 track and No 2 track) between mile 28 and mile 29 Beaver Sub.***

Example (2) will be used to protect derailed equipment on the main track or obstructing a main track.

The crew of a movement receiving examples (1) or (2) must proceed prepared to stop short of such equipment.

FORM V - SPECIFYING SPEED

(1) ***Do not exceed 10 MPH between mile 15 and mile 20 (at mile 19.4) (on east track) Canada Sub.***

This example will be used with Rule 43 protection, or for other conditions requiring a reduction in movement speed not covered by example (2) or (3). When required, the GBO must specify the track, or tracks, upon which the restriction applies.

(2) ***Do not exceed 30 MPH while handling _____.***

This example may be used when it is necessary to restrict the speed of specific equipment.

(3) ***Do not exceed 20 MPH entering public crossing at grade mile 43.5 Beaver Sub until crossing fully occupied.***

This example must be used to restrict the speed of movements entering a public crossing at *grade.*

FORM Y - PLANNED PROTECTION

Form Y will be used to provide protection as prescribed by Rule 42.

Be governed by Rule 42 on Nov 30th from 0800 until 1700 between mile 10 and mile 12(on east track) Canada Sub Foreman _____.

Note: This form may be modified for daily or other exceptional usage. E.g. daily from 0800 until 1700.

When required, the GBO must specify the track, or tracks, upon which the restriction applies.

OCCUPANCY CONTROL SYSTEM (OCS) RULES

301. APPLICATION AND SUPERVISION

(a) On subdivisions, portions of subdivisions or other tracks specified in special instructions, movements will be governed by Occupancy Control System (OCS) Rules.
(b) The RTC will supervise OCS territory by means of clearances, TOP, GBO and other instructions as may be required.

302. CLEARANCE REQUIRED

(a) Except within cautionary limits, a train or transfer must be authorized by a clearance to foul or enter a track where OCS rules are applicable.
(b) A clearance will be sent direct to the crew of the train or transfer addressed. Before the clearance is acted upon the conductor and locomotive engineer must, as soon as possible, ensure that each is in possession of the clearance and their train or transfer is correctly designated. Engine number must be verified visually to ensure correctness.

302.1 CLEARANCE IN EFFECT

A clearance remains in effect until fulfilled, superseded or cancelled.
Clearances that authorize a train or transfer to proceed, unless cancelled, must be fulfilled in the order in which they are issued on that subdivision.

302.2 SUPERSEDING A CLEARANCE

(a) A clearance may be issued superseding a clearance already in possession of the crew of the train or transfer addressed.
(b) When superseding a clearance that includes limits the train or transfer is occupying, the superseding clearance must include that section of track and must not include a requirement to wait until the arrival of an opposing train or transfer.
(c) If a superseding clearance restricts the authority already in possession of the train or transfer addressed, the RTC must not take further action until it has been acknowledged by the conductor and locomotive engineer.

302.3 CANCELLING CLEARANCE

(a) Before a clearance is cancelled, the train or transfer addressed must be;
  (i) clear of the limits;
  (ii) protected by Form T GBO; or
  (iii) within cautionary limits.
(b) When a clearance is cancelled, the cancellation does not take effect until it has been acknowledged by the conductor and locomotive engineer. These employees must acknowledge by repeating the clearance number, “cancelled” and initials of the RTC to the RTC.

303. PROTECTION AGAINST FOLLOWING TRAINS OR TRANSFERS

(a) A combination of trains or transfers to a limit of two may each be authorized to proceed in the same direction, within the same limits, provided that each is instructed on its clearance to protect against the other. Before either moves within the limits stated, the conductor and locomotive engineer of each train or transfer must have a thorough understanding, in writing, as to the specific operation of each train or transfer and the protection to be provided. If communication fails between the trains or transfers affected, no moves shall be made other than those which were last arranged.

(b) WITHIN ABS TERRITORY
With the protection of at least two block signals to the rear, two or more trains or transfers may be authorized to proceed in the same direction within the same limits governed by block signal indications.

303.1 RADIO PROTECTION AGAINST FOLLOWING TRAINS AND TRANSFERS

(Not applicable to trains or transfers in possession of a work clearance)

Where specified in special instructions, protection against following trains and transfers will be provided as follows:

(a) The RTC must not authorize a train or transfer to follow a preceding train or transfer until the crew of the following train or transfer has been restricted by its clearance as follows; "Protect against (preceding train or transfer) from (location)".

(b) Except as provided in paragraph (d), a train or transfer so restricted must not leave the location named nor leave any identifiable location until the preceding train or transfer has reported that it has left an identifiable location ahead. This report must be recorded in writing by a crew member of the following train or transfer. Such information may be received from the RTC. Identifiable locations as listed in Rule 82 must be used. Under circumstances in which a report is not received from the preceding train or transfer, the following may operate at REDUCED speed to a maximum speed of 25 MPH.

(c) A train or transfer so restricted must not pass the preceding train or transfer.

(d) When the preceding train or transfer has stopped, arrangements may be made with the following train or transfer to "close up". These arrangements must be made in writing between the crews of both trains or transfers. When the preceding train or transfer resumes moving, the following train or transfer will be governed by paragraph (b).
When the preceding train or transfer has left the location to which the following train or transfer is authorized, Rule 303.1 no longer applies.

304. RESTRICTION BEFORE LEAVING

When a train or transfer has been restricted by clearance, such train or transfer must not leave the point named until it is positively known that the opposing train(s) or transfer(s) named on the clearance have arrived.

A train or transfer has not arrived until its designated engine and marker have arrived.

Trains or transfers operating without a marker have not arrived until confirmed by direct communication with a member of the crew of such train or transfer.

If unable to observe the arrival of a train or transfer, or unable to communicate with a member of the crew, the RTC must be contacted.

304.1 STOPPING CLEAR OF FOULING POINT

A train or transfer required to stop at a meeting, clearing or waiting point, or at the end of authority, must be stopped clear of the route to be used by another train or transfer.

305. BEFORE ISSUING CLEARANCE AUTHORITY

Before issuing clearance authority, the RTC must provide protection against all conflicting trains, transfers and TOP within the limits stated.

306. TRACK USE

In multi-track OCS, a clearance must specify the track(s) to be used.

308. WORK CLEARANCE AUTHORITY

(a) When authorized to work by clearance a train or transfer may move in either direction within the limits named in the clearance.

(b) A work clearance remains in effect until superseded or cancelled.

308.1 CHANGING DIRECTION – PROCEED CLEARANCE

Unless otherwise provided by rules or special instructions, when authorized to proceed by clearance, a train or transfer must move only in the specified direction.
Provided the track to be operated over has not been released or a block in ABS is not re-entered, a train or transfer authorized by clearance to proceed may reverse a distance of 300 feet or less. In ABS a crew member must be in position to see the section of track to be used is clear and will remain clear of equipment or a track unit.

309. MOVING THROUGH WORKING LIMITS

(a) To enter or move within the working limits of one or more trains or transfers, a train or transfer must be restricted by its clearance as follows: “Protect against Work 5748 (and Work 9460) between Exeter and Jasper.”
(b) A train or transfer must not enter nor move within the working limits until a thorough understanding is established with the conductor and locomotive engineer of each work train or transfer. Such understanding must be in writing and include information with respect to the specific operation of each train and transfer and the protection to be provided. Such protection must be provided until the train or transfer has left the working limits.

310. MULTIPLE WORK AUTHORITIES

(a) Two or more work authorities may be issued within the same or overlapping limits. Each train or transfer must be restricted by its clearance to protect against each other.
(b) Conductors and locomotive engineers authorized to work must have a thorough understanding, in writing, as to the specific operation of each work train or transfer and the protection to be provided.

311. PROTECTING AGAINST A FOREMAN

(a) A train or transfer must not be authorized to enter or move within the limits of a TOP until it has been restricted as follows:
“Protect against foreman (name) between (location) and (location).”
(b) The train or transfer must not enter, nor move within, the TOP limits until instructions have been obtained from the foreman named on the clearance. These instructions must be repeated to, and acknowledged by, the foreman before being acted upon.

314. OPTIONAL TO 309 AND 310: PROCEEDING THROUGH OR WORKING WITHIN WORK TRAIN OR TRANSFER LIMITS

(a) A train or transfer may be authorized to proceed through or work within the limits of one or more trains or transfers authorized to work, provided such train or transfer is restricted by its clearance as follows;
“Protect against work (number) between (location) and (location)”
(b) A train or transfer must not enter nor move within the working limits until a thorough understanding is established with the conductor and locomotive engineer of each train or transfer authorized to work. Such understanding must be in writing and include information with respect to the intended operation of each train or transfer and the protection to be provided. Such protection must be provided until the train(s) or transfer(s) has left the working limits.

315. RADIO BROADCAST REQUIREMENTS

(a) A member of the crew on all trains and transfers must initiate a radio broadcast to the airwaves on the designated standby channel 1 to 3 miles from the next station or interlocking. This

broadcast must include the next requirement to protect against another train, transfer or foreman if the restriction is between the upcoming station and the next station or interlocking.

(b) A member of the crew located on other than the engine must confirm that the radio broadcast has been made in accordance with (a). If unable to contact the engine crew to ascertain this information, immediate action must be taken to stop the movement before it will reach the next point of restriction.

SPECIAL CONTROL SYSTEM (SCS) RULES

351. APPLICATION
On portions of the railway so specified by special instructions, the use of the main track will be governed by the Special Control System.

352. SUPERVISION
Movements and track work protection will, unless otherwise provided, be supervised by the RTC who will issue instructions as may be required.

353. SCS SPECIAL INSTRUCTIONS
Special instructions necessary to govern this method of operation will be issued. Except as affected by such instructions and Rules 351 and 352, all Operating Rules remain in force.

SIDING CONTROL TERRITORY (SCT) RULES

360. APPLICATION
Where specified by special instructions, the use of non-signalled sidings within CTC will be governed by the Siding Control Territory rules.

361. SUPERVISION
Movements, protection of track work and operation of track units will, unless otherwise provided, be supervised by the RTC who will issue instructions as may be required.

362. CLEAR OF EQUIPMENT
(a) Sidings will be considered as clear of equipment unless otherwise informed by the RTC.
(b) Before permitting a movement to enter a siding occupied by other equipment, the RTC must advise a member of the crew that other equipment occupies such siding.

363. HAND OPERATED SWITCHES
Hand operated switches in sidings may be considered lined for the normal position unless advised otherwise by the RTC, GBO or special instruction.

364. PROTECTION OF TRACK WORK AND OPERATION OF TRACK UNITS
A foreman must be in possession of a TOP for the protection of track work and operation of track units. Rule 41/841 is not applicable.

GENERAL DESCRIPTION AND LOCATION OF FIXED SIGNALS

401. LOCATION

Wherever practicable, fixed signals other than switches will be located above, or to the right of, the track they govern. Where circumstances require that signals be otherwise placed, such conditions will be indicated by GBO or special instructions.

EXCEPTION: A block or interlocking signal that is required to be placed to the left of the track it governs need not be indicated by GBO or special instructions, provided that such location does not place the signal to the right of another signalled track.

401.1 SIGNAL DISPLAYED

The indications displayed on block and interlocking signals govern operation to the next signal or block end sign. Except as otherwise specified in special instructions, a signal to leave the main track to enter non-main track applies to the block end sign or until the leading end of the movement has passed entirely through the controlled location and entered non-main track. Speed requirements protecting turnouts must be complied with until the entire movement has cleared the turnout.

401.2 NO ADVANCE SIGNAL

At locations where there is no advance signal to the signal governing movements into CTC or movements are re-entering CTC from a siding, all movements must approach the governing signal preparing to stop until it can be observed as displaying a more favourable indication than Stop.

402. POSITIONING

Where conditions allow, block and interlocking signal heads will be positioned with respect to the tracks on which they affect movements. Bridges, cantilevers, dummy masts and other structures will be used and must be illustrated in company instructions to ensure proper understanding or signal intent.

403. APPEARANCE OF COLOUR LIGHT SIGNALS

(a) Block and interlocking signal aspects will be displayed by the colour, position, flashing of lights, or combinations thereof.

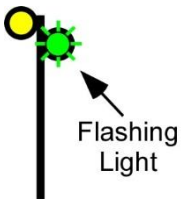
(b) The indications of any such signal may be qualified or modified by an attached arrow and/or plate(s).

(c) Lights may be attached to either side of the signal mast and number plates may be provided for the purpose of identifying the location.

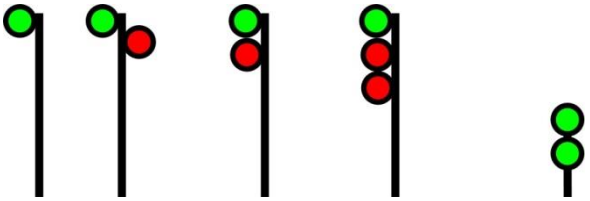
404. STANDARD INDICATIONS

The illustrations in Rules 405-440 are standard aspects and indications. Other signal aspects and indications necessary will be illustrated in special instructions.

BLOCK AND INTERLOCKING SIGNALS

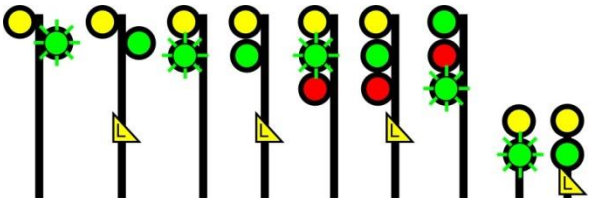


405.



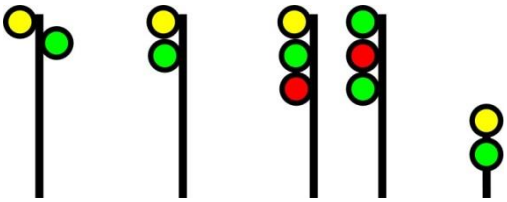
Clear - Proceed.

406.



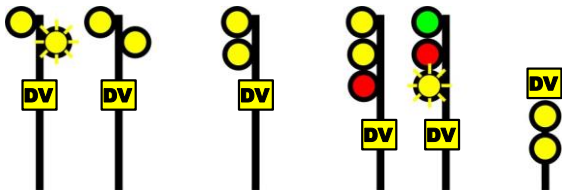
Clear to Limited - Proceed, approaching next signal at LIMITED speed.

407.



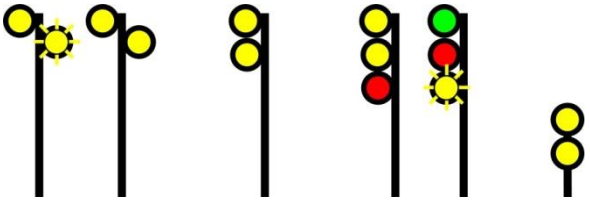
Clear to Medium - Proceed, approaching next signal at MEDIUM speed.

408.



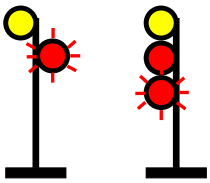
Clear to Diverging - Proceed, approaching next signal at DIVERGING speed.

409.



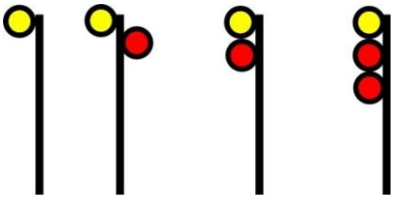
Clear to Slow - Proceed, approaching next signal at SLOW speed.

410.



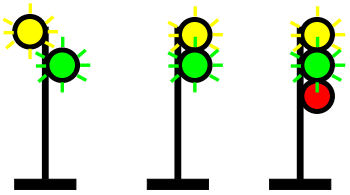
Clear to Restricting - Proceed, next signal is displaying restricting signal.

411.



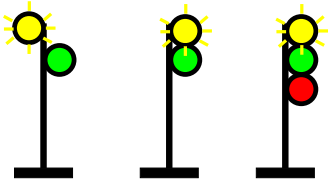
Clear to Stop - Proceed, preparing to stop at next signal.

412.



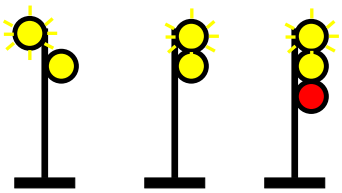
Advance Clear to Limited - Proceed, approaching second signal at LIMITED speed.

413.



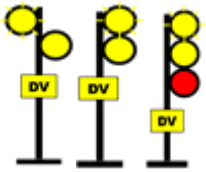
Advance Clear to Medium - Proceed, approaching second signal at MEDIUM speed.

414.



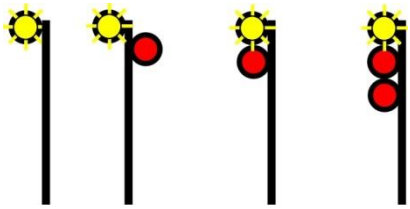
Advance Clear to Slow - Proceed, approaching second signal at SLOW speed.

414A.



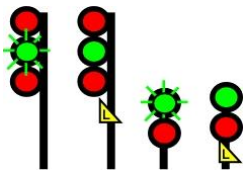
Advance Clear to Diverging - Proceed, approaching second signal at DIVERGING speed

415.



Advance Clear to Stop - Proceed, prepared to Stop at second signal.

416.



Limited to Clear - Proceed, LIMITED speed passing signal and through turnouts.

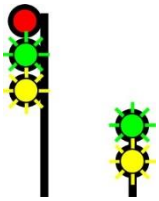
417.

Limited to Limited - Proceed, LIMITED speed passing signal and through turnouts, approaching next signal at LIMITED speed.

418.

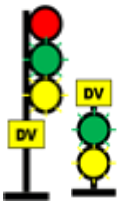
Limited to Medium - Proceed, LIMITED speed passing signal and through turnouts, approaching next signal at MEDIUM speed.

419.



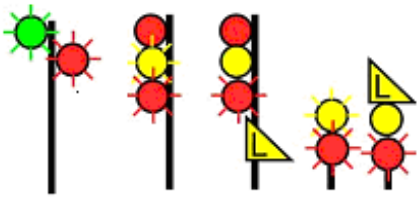
Limited to Slow - Proceed, LIMITED speed passing signal and through turnouts, approaching next signal at SLOW speed.

419A.



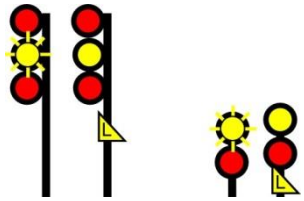
Limited To Diverging - Proceed, LIMITED speed passing signal and through turnouts, approaching next signal at DIVERGING speed.

420.



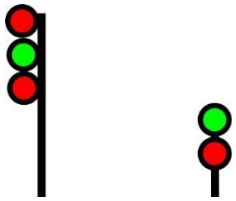
Limited to Restricting - Proceed, LIMITED speed passing signal and through turnouts, next signal is displaying restricting signal.

421.



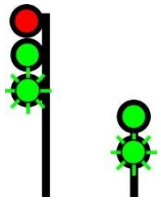
Limited to Stop - Proceed, LIMITED speed passing signal and through turnouts, preparing to stop at next signal.

422.



Medium to Clear - Proceed, MEDIUM speed passing signal and through turnouts.

423.

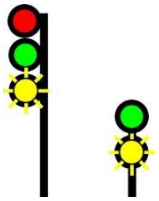


Medium to Limited - Proceed, MEDIUM speed passing signal and through turnouts, approaching next signal at LIMITED speed.

424.

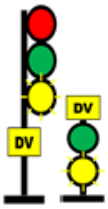
Medium to Medium - Proceed, MEDIUM speed passing signal and through turnouts, approaching next signal at MEDIUM speed.

425.



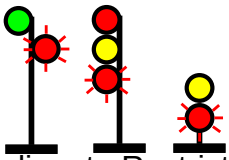
Medium to Slow - Proceed, MEDIUM speed passing signal and through turnouts, approaching next signal at SLOW speed.

425A.



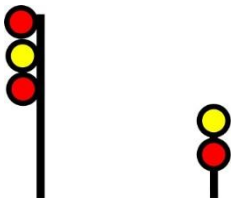
Medium to Diverging - Proceed, MEDIUM speed passing signal and through turnouts, approaching next signal at DIVERGING speed.

426.



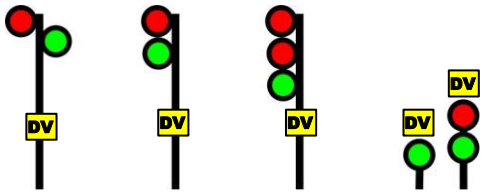
Medium to Restricting - Proceed, MEDIUM speed passing signal and through turnouts, next signal is displaying restricting signal.

427.



Medium to Stop - Proceed, MEDIUM speed passing signal and through turnouts, preparing to stop at next signal.

428.

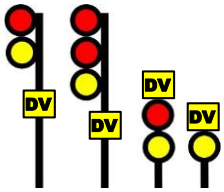


Diverging to Clear - Proceed, DIVERGING speed passing signal and through turnouts.

429.

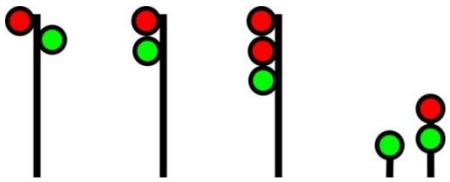
Diverging to stop - Proceed, DIVERGING speed passing signal and through turnouts preparing to stop at next signal.

430.



Diverging - Proceed at REDUCED speed, not exceeding DIVERGING speed passing signal and through turnouts.

431.



Slow to Clear - Proceed, SLOW speed passing signal and through turnouts.

432.

Slow to Limited - Proceed, SLOW speed passing signal and through turnouts, approaching next signal at LIMITED speed.

432A.

Diverging to Limited - Proceed, DIVERGING speed passing signal and through turnouts, approaching next signal at LIMITED speed.

433.

Slow to Medium - Proceed, SLOW speed passing signal and through turnouts, approaching next signal at MEDIUM speed.

433A.

Diverging to Medium - Proceed, DIVERGING speed passing signal and through turnouts, approaching next signal at MEDIUM speed.

434.

Slow to Slow - Proceed, SLOW speed passing signal and through turnouts, approaching next signal at SLOW speed.

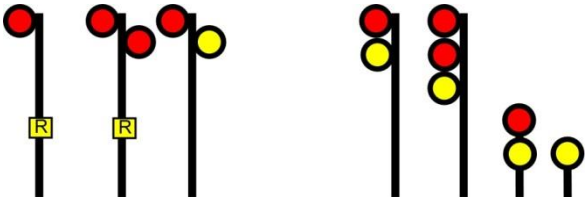
434A.

Diverging to Diverging - Proceed, DIVERGING speed passing signal and through turnouts, approaching next signal at DIVERGING speed.

435.

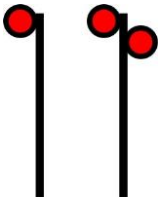
Slow to Stop - Proceed, SLOW speed passing signal and through turnouts, preparing to stop at next signal.

436.



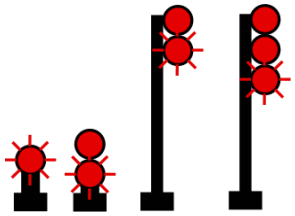
Restricting - Proceed at RESTRICTED speed.

437.



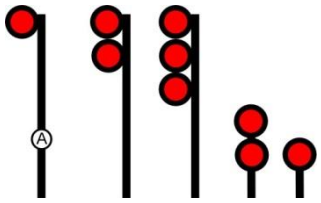
Stop and Proceed - Stop, then proceed at RESTRICTED speed.

438.



Take or Leave Siding or Other Track
Indications will be specified in special instructions for each specific application of this signal.

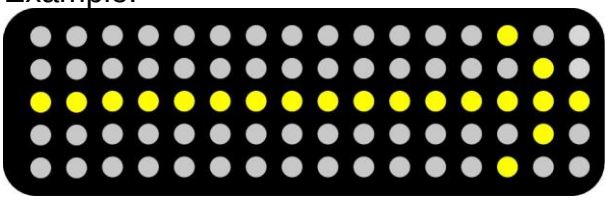
439.



Stop - Stop.
OPTIONAL: Unless required to clear a switch, crossing, controlled location, or spotting passenger equipment on station platforms, a movement not authorized by Rule 564 must stop at least 300 feet in advance of the STOP signal.

440. DIRECTION INDICATOR
Flashing arrow indicators used in conjunction with block signals when illuminated, identify that the route at the next controlled location is displaying a permissive signal and the route is lined and secured as indicated by the direction of the arrow.

Example:



AUTOMATIC BLOCK SIGNAL SYSTEM (ABS) RULES

505. APPLICATION

Block signals govern the use of the blocks. They do not dispense with the use or observance of other signals whenever and wherever required and do not authorize main track occupancy.

507. WITHDRAWAL OF SIGNALS

When signals in ABS are withdrawn from service, movements will be governed by instructions from the RTC or special instructions.

509. INSTRUCTIONS TO PASS SIGNAL INDICATING STOP

(a) A movement must have instructions from the RTC to pass a block signal indicating Stop. If stopped at the signal indicating Stop, and no conflicting movement is evident, a crew member must immediately communicate with the RTC.
EXCEPTION: Instructions are not required when a movement is required to re-enter a block occupied by a portion of their movement, however, the movement must proceed at REDUCED speed.

(b) When able to, the RTC will inform the crew member in writing:
"There is no conflicting movement" After complying with Rule 513 where applicable, the movement need not stop at the signal but must positively identify the signal by number and the movement may proceed at RESTRICTED speed to the next signal or Block End sign.

(c) When unable to obtain the information that there is no conflicting movement in the block, and no conflicting movement is evident, the movement may, after complying with Rule 513 where applicable, move forward and must stop where its leading wheels are 100 feet past the Stop signal. After waiting 10 minutes and if there is still no evidence of a conflicting movement, the movement may proceed at RESTRICTED speed to the next signal or Block End sign.

513. ENTERING MAIN TRACK

(a) Before entering or fouling a main track and no movement is observed approaching on the main track, a crew member must reverse the switch and wait five minutes, unless a greater period is specified in special instructions before allowing the movement to move foul of the main track. The crew member must remain at the switch until the movement has entered the track. The switch must be quickly restored to its normal position should an approaching movement on the main track become evident.
When entry is to be made through a crossover, the switch in the track on which the movement is standing is the only crossover switch to be reversed for the required waiting period.
EXCEPTION: The required waiting period need not be observed within cautionary limits or when:

- an opposing movement has passed the switch and is still occupying the block;
- the crew entering the main track is in possession of a clearance to work; or
- the crew is relieved in writing by the RTC.

Before relieving a crew, the RTC must ensure that there are no movements operating in the block that will approach the switch. The switch must be opened within 5 minutes after receiving permission from the RTC.

(b) A movement entering a block between signals, must move at RESTRICTED speed to the next signal, unless or until the track is seen to be clear to the next signal and the indication of such signal permits movement at other than RESTRICTED speed.

515. DELAYED IN THE BLOCK

When a movement, which has entered a block on signal indication permitting operation at other than RESTRICTED speed, is stopped or otherwise delayed in the block, it must move at REDUCED speed to the next signal:

(i) unless there are no switches between such movement and the next signal; or
(ii) until the track is seen to be clear to the next signal.

The movement must approach the next signal prepared to stop and be governed by the indication displayed.

CENTRALIZED TRAFFIC CONTROL SYSTEM (CTC) RULES

560. SUPERVISION AND APPLICATION

CTC is applicable in limits specified in the time table or special instructions and will be supervised by the RTC. Block signals will govern the operation of trains or transfers. The RTC will issue instructions as required.

561. CTC SUSPENDED

When all or part of the CTC is withdrawn from service, trains and transfers will be governed by special instructions.

563. CLEARING OPPOSING SIGNALS INTO NON-SIGNALLED SIDINGS

(a) When two opposing train(s) or transfer(s) are to be lined into the same non-signalled siding, each locomotive engineer must be advised of the fact before the signal to permit operation of either train or transfer into the siding is requested.
(b) At meeting points, the RTC must not line a train or transfer into a siding until the switch at the opposite end of the siding is set for main track.
Note: This rule is not applicable where automated office control devices will not permit opposing train(s) or transfer(s) to enter a non-signalled siding and at sidings where SCT is in effect.

564. AUTHORITY TO PASS STOP SIGNAL

(a) A train or transfer must have authority to pass a block signal indicating Stop.
(b) The RTC may authorize the train or transfer to pass the signal but before doing so must:
(i) ensure that there are no conflicting trains or transfers within, or authorized to enter, the controlled block affected (other than one authorized by Rule 567, 567.3 or 577); and
(ii) provide protection against all opposing trains or transfers.
(c) When signal blocking devices are used, they may be removed after the authorized train or transfer has entered the controlled block affected. The RTC must not permit any opposing trains or transfers to enter the controlled block until the authorized train or transfer has cleared such block.
(d) The train or transfer so authorized need not stop at the signal but must positively identify the signal by number; operate at RESTRICTED speed to the next signal or Block End sign, and must be governed by Rule 104.1 at spring switches, Rule 104.2 at dual control switches, Rule 104.3 at power-operated switches and Rule 611 at automatic interlockings.
(e) When a known condition prevents clearing of controlled signals into an affected block, the RTC may authorize operation at REDUCED speed to the next signal or Block End sign. The train or transfer will be advised whether or not equipment is present in the block.
REDUCED speed remains applicable unless the block is known to be clear of equipment.
REDUCED speed commences when the leading piece of equipment has passed entirely through the controlled location.

The train or transfer must approach the next signal prepared to stop and there be governed by the indication displayed.

(f) The authority granted and instructions must be in writing and, where applicable, specify the route to be used. The locomotive engineer must be made aware of the route to be used before moving.

565. STOP SIGNAL CTC TO ABS

A train or transfer leaving CTC and entering ABS, if required to move past a signal indicating Stop, will be governed by Rule 564 within CTC and Rule 509 within ABS.

566. WORK AUTHORITY

(a) A train or transfer may be given work authority that permits moving in either direction within specified limits.

(b) Before issuing such authority the RTC must;

(i) ensure that there are no other trains or transfers within, or authorized to enter, the required limits; and

(ii) block at Stop all devices controlling signals governing other trains or transfers into such limits.

(c) The RTC must maintain signal blocking against all trains or transfers and must not authorize any other trains or transfers to enter the affected limits except as provided by Rule 567.3 or until the work authority has been cancelled.

(d) If work authority is cancelled while the train or transfer is within the affected limits, the conductor or locomotive engineer must inform the RTC of their intended direction. The RTC must maintain signal blocking against opposing trains or transfers until the protected train or transfer has cleared the controlled block.

(e) When the authority specifies: “Call RTC _____” the conductor or locomotive engineer must communicate with the RTC as instructed.

(f) The authority granted and instructions must be in writing. The locomotive engineer must be aware of the track limits before moving.

(g) Controlled signals within the limits other than the entry and exit signals of the authority that are indicating STOP may be considered as indicating “proceed at RESTRICTED speed”.

566.1 SIGNAL INDICATION SUSPENDED WHILE SWITCHING

(a) A crew may be authorized to manually operate specific dual control switches at a controlled location, as prescribed by Rule 104.2, paragraph (d). Such authority must be included with work authority, as prescribed by Rule 566 or 567. The indications of signals governing operation over such switches may be considered suspended while switches are in the “hand” position, but only while switching is being performed at the designated controlled location. Signal indication or Rule 564 must authorize the train or transfer into the controlled location, before being issued the Rule 566/566.1 authority.

Verbal permission may be given to manually operate specific dual control switches within the limits of Rules 566 or 567 authority that did not include Rule 566.1 authority for those switches.

(b) When switching is to be performed over a spring switch, which is included in the limits of a work authority prescribed by Rule 566 or 567, the indication of the signal governing operation over such switch may be considered suspended, if the switch is properly lined.

(c) When switching is to be performed at a controlled location that includes only a hand operated switch, which is included in the limits of a work authority prescribed by Rule 566 or 567, the indication of the signal governing operation through the controlled location may be considered suspended but only when switching is being performed through that switch.

567. JOINT WORK AUTHORITY

(a) More than one train or transfer may be given joint work authority that permits operation in either direction within the specified limits. Each such train or transfer must be instructed: “Protecting against each other.” The conductor and locomotive engineer of each train or transfer must have a thorough understanding in writing with respect to the intended operation of each train or transfer and the protection to be provided.

(b) Before issuing joint authority, the RTC must;
   (i) ensure that there are no trains or transfers in the affected limits, other than the trains or transfers which are to be authorized; and
   (ii) block at Stop all devices controlling signals governing trains and transfers into the affected limits.

(c) The RTC must maintain signal blocking against all trains or transfers and must not authorize any train or transfer, other than one which is thereby protected, to enter the affected limits until the work authority has been cancelled. Each train or transfer must be clear of the affected limits before the work authority is cancelled.
   EXCEPTION: If the work authority remains to be cancelled to only one train or transfer, it may be cancelled while that train or transfer is within the affected limits. In such case, the conductor or locomotive engineer must inform the RTC of their intended direction. The RTC must maintain signal blocking against conflicting trains or transfers until the protected train or transfer has cleared the controlled block.

(d) When the authority specifies: “Call RTC _____,” the conductor or locomotive engineer of each train or transfer so instructed must communicate with the RTC as instructed.

(e) The authority granted and instructions from the RTC must be in writing. The locomotive engineer of the train or transfer so authorized, must be made aware of the track limits before moving.

567.1 PROTECT AGAINST A FOREMAN

(a) A train or transfer may be authorized to enter or move within the limits of a TOP when instructed to protect against the foreman within specified limits.
   “Protect against foreman (name) between (location) and (location).”

(b) The conductor and locomotive engineer must be made aware of the authority granted and have received instructions from the foreman before moving. The instructions must be repeated to, and acknowledged by the foreman before being acted upon.

(c) The RTC must not authorize another train or transfer or issue another TOP to apply, within the protected limits granted under this rule until it has been fulfilled by the train or transfer having cleared the limits, or the authority has been cancelled.

(d) In addition to the permission and instructions received from a foreman to enter and/or move within the limits, trains or transfers must also be authorized to enter the TOP limits under the provisions of Rule 105(a), Rule 564 or Rule 568, or to reverse within the TOP limits under the provisions of Rule 566.

567.2 OPTIONAL: ENTERING FOREMAN'S LIMITS

Trains or transfers may be authorized to enter or move within the limits of a TOP.

(a) Each time a train or transfer is so authorized, the train or transfer must be restricted as follows: "Protect against foreman (name) between (location) and (location)".
Such restriction must be provided to the train or transfer when it is within:
(i) two controlled blocks of the limits; or
(ii) 25 miles of the limits when there is no controlled block prior.
The RTC must ensure that the authorized train or transfer is the only one that will encounter the signal indication to enter the limits.

(b) No entry into TOP limits may be made until both the conductor and locomotive engineer are aware of the authority and limits granted and have received instructions from the foreman named in the authority. Such instructions must be repeated to and acknowledged by the foreman before being acted upon.

567.3 PROCEEDING THROUGH WORK LIMITS

Trains or transfers may be authorized to enter or move within work limits of other trains or transfers.

(a) Each time a train or transfer is so authorized, the train or transfer must be restricted as follows: "Protect against work (number) between (location) and (location)".

(b) A train or transfer authorized as outlined in paragraph (a) must not enter or move within the working limits until a written understanding has been established with the conductor and locomotive engineer or each train or transfer. This understanding must include information with respect to the intended operation of each train or transfer and remain in place until the affected train or transfer has left the working limits.

(c) Prior to entering the limits, the train or transfer must also be authorized by signal indication or under the provisions of rules 564 or 568.

(d) When entry is to be provided by signal indication, the restriction may only be issued when the train or transfer is within:
(i) two controlled blocks of the limits; or
(ii) 25 miles of the limits when there is no controlled block prior
The RTC must ensure the authorized train or transfer is the only one which will encounter the signal governing entry into the limits.

568. SIGNAL OR PERMISSION TO ENTER MAIN TRACK

(a) A train or transfer must not foul or enter a main track, nor re-enter one after having cleared it, except by signal indication or until permission has been received from the RTC.

(b) When entry to the main track is to be made at a non-electrically locked hand operated switch, or at a switch where the seal on the electric switch lock is broken, such permission from the RTC must include the direction and route to be taken and must be in writing. The locomotive engineer must be made aware of the circumstances before moving.
Before issuing such permission the RTC must;
(i) ensure that there are no conflicting trains or transfers within, or authorized to enter, the controlled block affected; and
(ii) block at Stop all devices controlling signals governing trains or transfers into the affected controlled block.

(c) The RTC must maintain signal blocking and not permit any opposing train or transfer to enter the controlled block until the protected train or transfer has cleared the controlled block. Signal blocking against following trains or transfers must not be removed nor may following trains or transfers be permitted to enter the controlled block until the conductor or locomotive engineer, of the train or transfer being protected, has reported that the train or transfer has entered the main track and is moving in the authorized direction.

EXCEPTION: Permission is not required to enter or re-enter the main track at a hand operated switch within the limits when authorized by Rule 566, 567 or 577.

569. CANCELLING AUTHORITIES

(a) Authority or permission granted by Rules 564, 567.3 or 568 may be cancelled provided the train or transfer has not entered the controlled block affected.

(b) When authority granted by Rules 564, 566, 567, 567.1, 567.2, 567.3 or 577 or the permission in writing granted by Rule 568 is cancelled, the cancellation does not take effect until it has been correctly repeated and acknowledged by the conductor and locomotive engineer of the train or transfer affected. These employees must acknowledge the cancellation by repeating the authority number, “cancelled” and initials of the RTC to the RTC.

570. ENTERING BETWEEN SIGNALS

(a) A train or transfer that has entered a block between signals at a hand operated switch, equipped with an electric switch lock, must approach the next signal prepared to stop, unless or until the track is seen to be clear to the next signal and such signal displays a more favourable indication than Stop or Stop and Proceed.

(b) When entry to a block is made at a switch not equipped with an electric switch lock, or one where the seal on the electric switch lock is broken, a train or transfer must operate at RESTRICTED speed to the next signal, unless or until the track is seen to be clear to the next signal, and the indication of such signal permits operation at other than RESTRICTED speed.

(c) A train or transfer that has entered a block, where it has been necessary to activate the emergency release of an electric switch lock, must move at RESTRICTED speed to the next signal.

571. RESTORING SIGNALS TO STOP

(a) Signals must not be restored to indicate stop when the train or transfer for which signals were first cleared is less than three blocks distant from the first of such signals, unless the locomotive engineer has acknowledged that they are stopped or able to stop their train or transfer without passing the controlled signal to be restored.

(b) In case of emergency, a signal may be restored to stop at any time.

573. REVERSING DIRECTION

(a) A train or transfer, having passed beyond the limits of a block, must not back into that block until the RTC has been informed, and such train or transfer is authorized by;

  (i) the indication of a block signal, other than a Restricting Signal equipped with a plate displaying the letter “R”, or a Stop and Proceed Signal;

  (ii) Rule 564 or 567.3; or

  (iii) Rule 566, 567 or 577.

  NOTE: (iii) does not dispense with the requirements of Rule 564 at a Stop Signal except in the application of Rule 566(g) or 577(f).

(b) When a train or transfer has entered a controlled location on signal indication, and stops with its trailing end within such controlled location, it may only move in the opposite direction within the controlled location with permission from the RTC. Unless relieved by the RTC, the movement must comply with Rule 104.2(b). RTC permission does not authorize occupancy outside of the controlled location.

(c) Provided it will not re-enter a block it has cleared, a train or transfer may reverse direction within a block without Rule 566, 567 or 577 protection as follows:
   (i) to reverse a distance of 300 feet or less, a crew member must take up a position to see the section of track to be used is clear and will remain clear of equipment or a track unit; or
   (ii) to reverse a distance greater than 300 feet, a flagman must take up a position beyond the farthest point to which the train or transfer may extend. Stop signals must be given by the flagman from a point where they can be plainly seen from an approaching train or transfer from not less than 300 yards.

576. SWITCHING AT A CONTROLLED LOCATION

(a) **Signal Indication** - The preferred method of switching at a controlled location is with the use of the signal system by having the RTC signal the train or transfer over the controlled location with directional signals. If unable to clear the controlled location when switching is completed, the RTC will authorize departure by issuing a Rule 566 or 577 to the train or transfer. If the first move into the block was authorized by Rule 564, operation to the next signal must be made at RESTRICTED speed.

Rule 566 or 577 would not be required when the RTC verbally authorizes the train or transfer to pull ahead to the next signal where there are no dual control switches to be encountered.

(b) **Switching Signals** - A member of the crew will request the switching signal so that multiple moves may be made through the controlled location on a specific route. When switching is completed, the RTC must be advised to ensure the signal will be cancelled. Before doing so, the member of the crew requesting the cancellation must advise all other crew members and receive their assurance that they are and will remain clear of the switching signal limits. If unable to clear the controlled location, the RTC will verbally authorize departure. The RTC will then cancel the switching signal. The train or transfer may then proceed to the next signal at RESTRICTED speed.

To avoid having to proceed at RESTRICTED speed, trains or transfers should attempt to back clear of the switching signal on the final move and leave on a more permissive signal indication.

(c) **Rule 566.1 and 577.1 Signals Suspended** - The train or transfer must be authorized to enter the block before Rule 566/566.1 or 577/577.1 authority is issued by the RTC. If the train or transfer is unable to be clear of the limits when switching is completed, they must advise the RTC before leaving the location. If Rule 564 authorized the first move into the block, the train or transfer must operate to the next signal at RESTRICTED speed.

(d) **Taking Head-Room** - Provided that the trailing end remains within non-main track territory, a train or transfer may accept a signal to enter a controlled location, where the intent of the move is to subsequently reverse direction so as to be completely in the clear in the non-main track territory. The RTC must be informed of the intended head-room move when the signal is requested. The crew may request one or more head-room moves but each time the signal provides a permissive indication, it is for one head-room move only.

577. OPTIONAL to 566/567 with system: WORK AUTHORITY

(a) A train or transfer may be given work authority in writing which permits moving in either direction within specified limits. Before issuing such authority, the RTC must:
  (i) ensure that there are no other trains or transfers within, or authorized to enter, the required limits, and;
  (ii) block at Stop all devices controlling signals governing other trains or transfers into such limits.

(b) Other trains or transfers may be authorized to work within the limits of one or more trains or transfers authorized to work provided such trains or transfers are restricted on their authority as follows: “Protect against work (number) between (location) and (location)”.

(c) When entry is to be provided by signal indication, the signal may only be requested when the train or transfer is within:
  (i) two controlled blocks of the limits; or
  (ii) 25 miles of the limits when there is no controlled block prior

  The RTC must ensure the authorized train or transfer is the only one which will encounter the signal governing entry into the limits.

(d) Trains or transfers so authorized as outlined in paragraph (b) must not enter or move within the working limits until a written understanding has been established with the conductor and locomotive engineer of each train or transfer. This understanding must include information with respect to the intended operation of each train or transfer and remain in place until the affected train(s) or transfer(s) has left the working limits.

(e) The RTC must maintain signal blocking against trains or transfers and must not authorize any train or transfer, other than one authorized by Rule 567.3 or as outlined in paragraph (b), to enter the affected limits until the work authority has been cancelled. Each train or transfer must be clear of the affected limits before its work authority is cancelled.
  EXCEPTION: If the work authority remains to be cancelled to only one train or transfer, it may be cancelled while that train or transfer is within the affected limits. In such case, the conductor or locomotive engineer must inform the RTC of the intended direction of operation. The RTC must maintain signal protection against opposing trains or transfers until the protected train or transfer has cleared the controlled block.
  The locomotive engineer of a train or transfer so authorized must be made aware of the track limits before moving.

(f) Controlled signals within the limits other than the entry and exit signals of the authority that are indicating STOP may be considered as indicating “proceed at RESTRICTED speed”. Not applicable at automatic interlockings or interlockings controlled by a foreign railway. Rule 104.2(b) is not applicable when advised by the RTC that dual control switch(es) are lined for the route to be used.

577.1 (OPTIONAL to 566.1 with system) SIGNAL INDICATION SUSPENDED WHILE SWITCHING

(a) A train or transfer may be authorized to manually operate specific dual control switches at a controlled location as prescribed by Rule 104.2, paragraph (d). Such authority must be included with work authority, as prescribed by Rule 577. The indications of signals governing operation over such switches may be considered suspended while switches are in the “hand” position, but only while switching is being performed at the designated controlled locations.
  Note: Verbal permission may be given to manually operate specific dual control switches within the limits of Rule 577 authority that did not include Rule 577.1 authority for those switches.

(b) When switching is to be performed over a spring switch, which is included in the limits of a work authority prescribed by Rule 577, the indication of the signal governing operation over such switch may be considered suspended if the switch is properly lined.

578. RADIO BROADCAST REQUIREMENTS

(a) Within single track, a member of the crew on all trains or transfers must initiate a radio broadcast to the airwaves on the designated standby channel stating the name of the signal displayed on the advance signal to the next controlled location, controlled point or interlocking.

(b) A member of the crew located on other than the engine must confirm that the radio broadcast has been made in accordance with (a). If unable to contact the engine crew to ascertain this information, immediate action must be taken to stop the train or transfer before it will reach the next controlled location, controlled point or interlocking.

INTERLOCKING RULES

601. APPLICATION

A movement will be governed by interlocking rules within interlocking limits. Interlocking signal indications govern the use of the routes within interlocking limits. Instructions may be issued by a signalman when necessary.

602. PROPER SIGNAL INDICATIONS REQUIRED

(a) Except in case of emergency, radio or hand signals must not be used when the proper indication can be displayed by the interlocking signals.

(b) A movement stopped by the signalman, other than by means of signal indication, while approaching, or within an interlocking, must not move in either direction until the proper signal or instructions have been received from the signalman.

(c) When a movement stops with its trailing end within interlocking limits, it must not reverse direction without the proper interlocking signal indication, or permission from the signalman.

604. ESTABLISHING AND CHANGING ROUTES

(a) Signals for an approaching movement must not be restored to indicate stop unless the locomotive engineer has acknowledged that they are stopped or able to stop their movement without passing the interlocking signal to be restored.

(b) In case of emergency, a signal may be restored to Stop at any time.

(c) No part of a route may be changed, nor signals cleared for a movement on a conflicting route, unless the locomotive engineer of the movement for which the route was cleared has acknowledged that they are able to comply with the new routing.

605. DELAYED IN TIMING CIRCUIT

A movement approaching an automatic interlocking, equipped with a timing circuit, must approach the interlocking signal prepared to stop if occupying the timing circuit in excess of the time specified in special instructions.

At automatic interlockings not equipped with a timing circuit, a movement occupying the track between the advance signal and the interlocking signal in excess of 5 minutes must approach the interlocking signal prepared to stop.

606. APPROACHING INTERLOCKING LIMITS

At a location not protected by an advance signal, a movement must approach interlocking limits prepared to comply with a signal indicating Stop.

607. RULE APPLICABLE AT A STOP SIGNAL

When an interlocking signal indicates Stop and no conflicting movement is evident, the following will apply:

TYPE OF INTERLOCKING (as indicated in special instructions)	APPLICABLE RULE
Manual	608
Locally-Controlled	609
Remotely-Controlled	610
Automatic	611

608. MANUAL INTERLOCKING

Movements operating through the limits of a manual interlocking will be governed by special instructions.

609. LOCALLY-CONTROLLED INTERLOCKING SIGNAL INDICATING STOP

(a) A movement must have authority to pass a locally-controlled interlocking signal indicating Stop. When no conflicting movement is evident**:**
   (i) the signalman may authorize such movement to pass the signal, but before doing so, the signalman must provide protection against all conflicting movements; and
   (ii) the movement so authorized need not stop at the signal but must positively identify the signal by number. It must move at RESTRICTED speed to the next signal or Block End sign and will be governed by Rule 104.1 at spring switches, Rule 104.2 at dual control switches and Rule 104.3 at power-operated switches.

(b) Before moving, the locomotive engineer must be informed of the situation.

(c) When the signalman is off duty at a locally-controlled interlocking, a movement stopped by an interlocking signal indicating Stop will be governed by special instructions.

610. REMOTELY-CONTROLLED INTERLOCKING SIGNAL INDICATING STOP

(a) A movement must have authority to pass a remotely-controlled interlocking signal indicating Stop. The signalman may authorize the movement to pass the signal but before doing so must ensure that there is no conflicting movement in the route to be used, and that all devices controlling signals governing conflicting movements are blocked at Stop. The authorization must specify the route to be used, and must be in writing.

(b) The movement so authorized need not stop at the signal but must positively identify the signal by number. It must move at RESTRICTED speed to the next signal or Block End sign and will be governed by Rule 104.1 at spring switches, Rule 104.2 at dual control switches and Rule 104.3 at power-operated switches. If there is a railway crossing at grade equipped with a box marked “switches” within the interlocking, the provisions of Rule 611 apply.

(c) The locomotive engineer must be made aware of the route to be used before moving.

611. AUTOMATIC INTERLOCKING SIGNAL INDICATING STOP

When a movement is stopped by an automatic interlocking signal indicating Stop:

- paragraphs (a), (b) and (c) apply when no other movement or track work is evident; or
- paragraph (d) applies when track work is evident.

(a) When no other movement or track work is evident;
   (i) a crew member, after opening the box marked “switches”, will observe panel lights, where provided. If those of the conflicting route(s) are lighted and no conflicting movement is evident, the crew member will open the knife switch and may then allow the movement to proceed;

(ii) (MULTI-TRACK) in the box marked “switches” where lights are provided to indicate the approach of a movement, if those of the conflicting route and those of the same railway on the adjacent track are lighted and no other movement is seen approaching, the crew member will open the knife switch and may then allow the movement to proceed;

(iii) where lights are not provided, or where those of the conflicting route(s) are not lighted, the crew member, after opening the knife switch, must wait five minutes, unless a greater period is specified in special instructions and posted in the box marked “switches”, before permitting the movement to proceed;

(MULTI-TRACK) - When the lights of the same railway on the adjacent track are not lighted and no other movement is seen approaching, the crew member will contact the RTC before opening the knife switch, to ascertain whether or not a movement is closely approaching on that adjacent track to prevent displaying STOP indications to such movement.

(iv) after complying with (i), (ii) or (iii) the movement must then operate at RESTRICTED speed to the next signal or Block End sign; and

(v) after the movement has occupied the crossing, the switch must be closed and the box marked “switches” locked.

(b) Where a pushbutton is provided, to enable a reverse move to be made over the crossing, the crew member will open the box, depress the pushbutton and be governed by signal indication. If the signal fails to clear, the instructions contained in paragraph (a) must be complied with.

(c) A movement required to switch within or into automatic interlocking limits must, after complying with (a)(iii) leave the knife switch open until switching is completed. When the knife switch is in the open position, signals governing the switching may be considered suspended but only while switching.

(d) When track work is evident; i.e. when encountering a “840.3 Protection” visible indicator or a special lock on the box marked “switches”; after stopping at the signal, the movement must not proceed beyond the signal until instructions have been received from the foreman. When so authorized by the foreman to proceed, the movement must move at RESTRICTED speed to the next signal or Block End sign.

612. STOPPED FOUL OF SIGNAL

When a movement, which has accepted an indication of an interlocking signal permitting it to proceed, stops before the leading locomotive or car has completely passed such signal, it may then proceed only after receiving permission from the signalman or under the provisions of Rule 611.

614. LEAVING INTERLOCKING IN ABS OR CTC

When an interlocking is located in ABS or CTC, the indication of the last interlocking signal, in the direction of travel, also governs the movement to the next signal or Block End sign. If necessary to pass such signal in accordance with Rule 609, 610 or 611, unless otherwise specified in special instructions, Rule 509 or 564 also applies beyond the interlocking limits.

615. SINGLE UNIT OF EQUIPMENT RESTRICTED

A single unit of equipment must not be left standing on the movable portion of an interlocked drawbridge or within the interlocking limits of a railway crossing at grade.

616. DAMAGE TO INTERLOCKING

When it is known or suspected that:

(i) a derailment has occurred; or

(ii) track, appliances or signals are damaged or malfunctioning;

the signalman must block all controls for signals governing movements over the affected routes at Stop. No move may then be permitted until the signalman has established that they may pass safely.

617. DISCONNECTING TRACK PARTS OR LOCKING DEVICES

Before any movement is permitted to pass over any movable track part or locking device which has been disconnected, all movable track parts affected must be spiked or secured in the required position and their controls blocked to prevent them from being operated.

618. PROTECTING AGAINST A FOREMAN

(a) A movement may be authorized to enter or move within the limits of a TOP when instructed to protect against the foreman within specified limits.
"Protect against foreman (name) between (location) and (location)."

(b) The conductor and locomotive engineer must be made aware of the authority granted and have received instructions from the foreman before moving. The instructions must be repeated to, and acknowledged by, the foreman before being acted upon.

(c) The signalman must maintain signal blocking against all other movements and must not authorize any other movement, or issue another TOP to apply, within the protected limits until the authority granted under this rule has been cancelled. Other members of the crew must immediately be advised of the cancellation and all copies of the cancelled authority must be destroyed.

618.1 OPTIONAL: TO 618 WITH SYSTEM. PROTECTING AGAINST A FOREMAN

Movements may be authorized to enter or move within the limits of a TOP.

(a) Each time a movement is so authorized, the movement must be restricted as follows:
"Protect against foreman (name) between (location) and (location)".
Such restriction must be provided when the movement is within:

(i) two controlled blocks of the limits; or

(ii) 25 miles of the limits when there is no controlled block prior.

The RTC must ensure that the authorized movement is the only one that will encounter the signal indication to enter the limits.

(b) No entry into TOP limits may be made until both the conductor and locomotive engineer are aware of the authority and limits granted and have received instructions from the foreman named in the authority. Such instructions must be repeated to, and acknowledged by, the foreman before being acted upon.

(c) In addition to the permission and instructions received from a foreman to enter and/or move within the limits, trains or transfers must also be authorized to enter the TOP limits by signal indication or the provisions of Rules 609, 610 or to reverse within the TOP limits under the permission of the signalman.

619. TRANSFER BY SIGNALMEN

(a) Where an ECM is used or where a computer assisted system generates a list as outlined in (b), the relieving signalman must sign into the system in the presence of the on-duty signalman, and receive verbal and/or written transfer of other necessary instructions and information.

(b) Except as prescribed in paragraph (a), before being relieved, the signalman must make a transfer in a book or on a form provided for that purpose, of TOP and other authorities in effect. The transfer must include the time and other necessary information and must be signed by both the relieved and the relieving signalman.

620. NON-INTERLOCKED DRAWBRIDGES AND RAILWAY CROSSINGS AT GRADE

A movement must stop before any part of it passes the governing stop sign at a non-interlocked drawbridge or at a non-interlocked railway crossing at grade. If no conflicting movement is evident and the route is properly lined, the movement may resume. Special instructions will govern when there is an attendant in charge.

PROTECTION OF TRACK UNITS AND TRACK WORK

NOTICE

Wherever the term RTC appears herein, it also applies to signalman.

801. OCS CLEARANCE IN LIEU OF TOP

A clearance may be issued in lieu of TOP and the provisions of Rules 80(b), 82, 85, 302, 308.1, 311, 803(c) and 849 apply.

802. SPEED

Unless otherwise authorized, track units must always be operated at track unit speed.

803. TRACK UNIT AND TRACK WORK AUTHORIZATION

Refer to Rules 805 to 813 for rules applicable within interlocking limits and non-interlocked railway crossings at grade and non-interlocked drawbridges.

(a) Track occupancy by a track unit is permitted as follows:

Territory	Rule or Authority
OCS	Rule 842, TOP or Clearance
CTC	Rule 842 or TOP
Signalled Track	Rule 842 or TOP
Cautionary Limits	Rule 94
NMT	Rule 841
	Rule 105(c) or where it is not applicable, it must be known that there is no conflicting movement(s)
	TOP when SCT is applicable or specified by special instructions
	Other forms of protection when specified by special instructions
	On tracks where kicking is permitted per Rule 113.5(a), track must be protected by Rule 841(c)(i) or (iii).

(b) Track work is permitted as follows:

Territory	Rule or Authority
OCS	Rules 842, TOP or Clearance
CTC	Rules 842 or TOP
Signalled Track	Rules 842 or TOP
Cautionary Limits	Rules 841, Rule 842 or TOP
NMT	Rule 841
	TOP when SCT is applicable or specified by special instructions
	Other forms of protection when specified by special instructions
	On tracks where kicking is permitted per Rule 113.5(a), track must be protected by Rule 841(c)(i) or (iii).

(c) When no longer required, the foreman must promptly cancel or remove the protection and advise any person responsible for the track.

(d) Prior to the removal, cancellation or expiration of protection, or providing instructions to a movement; the foreman must ensure, unless otherwise protected:
   (i) the track is safe for movements at normal speed; and
   (ii) employees or track units for which the foreman is responsible are clear of the track.

TRACK WORK AND TRACK UNITS AT RAILWAY CROSSINGS AT GRADE, DRAWBRIDGES, INTERLOCKINGS AND NON-INTERLOCKINGS

805. MANUAL AND OTHER INTERLOCKINGS NOT SPECIFIED IN THESE RULES – PROTECTION OF TRACK UNITS AND TRACK WORK

See special instructions.

806. AUTOMATIC INTERLOCKINGS – RAILWAY CROSSINGS AT GRADE

(a) Track Work:

Rule 840.3 applicable.

(b) Track Units:

If no conflicting movement is evident, the track unit may proceed but must stop clear of the conflicting route, where the foreman must then unlock the box marked “switches”, and open the switch at the interlocking. The switch must not be closed until the track unit has cleared the conflicting route(s).

EXCEPTION: A track unit that affects the signal system must stop before passing the interlocking signal.

Before permitting the track unit to proceed the foreman must wait five minutes or such greater time as may be posted in the box or indicated in special instructions. The required waiting period need not be observed when occupancy indication lights on the conflicting route(s) are illuminated.

MULTI-TRACK - When the lights of the same railway on the adjacent track are not lighted and no movement is seen approaching, the foreman will contact the RTC before opening the switch, to ascertain whether or not a movement is closely approaching on that adjacent track to prevent displaying STOP indications to such movement.

807. LOCALLY-CONTROLLED INTERLOCKING – RAILWAY CROSSING AT GRADE

(a) Track Work:

Separate TOP for the interlocking or other written instructions issued by the signalman.

(b) Track Units:

Operation beyond the interlocking signal must not be made until verbal authority, hand signal or separate TOP for the interlocking has been received from the signalman.

If the control office is closed or all attempts to communicate with the signalman fail, the foreman must;

(i) if no conflicting movement is evident, unlock the box marked “switches” located at the interlocking and, after opening the switch must wait five minutes or such greater time as may be specified in the box before permitting the track unit to proceed;

(ii) not close the switch until the track unit clears the interlocking limits; and

(iii) where switches are not provided, follow the instructions posted in the box or contained in special instructions.

808. LOCALLY-CONTROLLED INTERLOCKING – DRAWBRIDGES

(a) Track Work:

Separate TOP for the interlocking or other written instructions issued by the signalman.

(b) Track Units:

Operation beyond the interlocking signal must not be made until verbal authority, hand signal or separate TOP for the interlocking has been received from the signalman.

If there is no signalman on duty, the track unit may proceed after the foreman has ascertained that the route is properly lined.

809. REMOTELY-CONTROLLED INTERLOCKING – RAILWAY CROSSING AT GRADE

(a) Track Work:
Separate TOP for interlocking unless in possession of other protection encompassing all routes which provide access to the working limits.

(b) Track Units:
Operation beyond the interlocking signal must not be made until a separate TOP for the interlocking has been received from the signalman.
Unless otherwise specified in special instructions, the signalman may provide verbal authority for the foreman to occupy the interlocking limits.

810. REMOTELY-CONTROLLED INTERLOCKING – DRAWBRIDGES

(a) Track Work:
Separate TOP for interlocking.

(b) Track Units:
Operation beyond the interlocking signal must not be made until a separate TOP for the interlocking has been received from the signalman.

811. SIGNALMAN REQUIREMENTS – CONTROLLED INTERLOCKINGS

Before giving verbal authority or a hand signal to proceed, a signalman must;
(a) ensure there are no conflicting movements within or authorized to enter the authorized route;
(b) block at STOP all devices controlling signals governing movements into the authorized route; and
(c) maintain the blocking until the foreman has reported clear of the authorized route.

812. NON-INTERLOCKED RAILWAY CROSSINGS AT GRADE

(a) Track Work:
Rule 841 applicable.

(b) Track Units:
Operation beyond the governing stop sign must not be made until it is ascertained that no conflicting movement is evident.
Special instructions will govern, when there is an attendant in charge.

813. NON-INTERLOCKED DRAWBRIDGES

(a) Track Work:
Rule 841 applicable.

(b) Track Units:
Operation beyond the governing stop sign must not be made until it has been ascertained that the route is properly lined.
Special instructions will govern, when there is an attendant in charge.

TRACK UNITS OPERATING OVER POWER-OPERATED AND DUAL CONTROL SWITCHES

814. POWER-OPERATED SWITCHES

When a track unit(s) is required to move over a power-operated switch;

(a) the switch must be lined by the RTC, except where the RTC gives permission to the foreman to have it operated by a qualified employee; and

(b) when a power-operated switch is operated by a qualified employee, and after the track unit has cleared the switch points, the foreman must immediately advise the RTC.

815. DUAL CONTROL SWITCHES

When a track unit(s) is required to move over a dual control switch;

(a) the switch must be lined by the RTC, except where the RTC gives permission to the foreman to operate such switch in the “hand” position; and

(b) when a dual control switch is operated by the foreman in the “hand” position, and after the track unit has cleared the switch points, the foreman must ensure that the selector lever has been restored to the “power” position and locked and immediately advise the RTC.

816. FOREMAN REQUIREMENTS - IDENTIFYING ARRIVAL AND/OR DEPARTURE OF MOVEMENTS

When a foreman has been authorized to perform track work behind or has authorized a movement(s) to pass through working limits, the foreman or sub-foreman must not enter the track at a location within the limits until it has been positively ascertained that the movement(s) have arrived and/or left that location. Such information must be received from the RTC or a crew member or by the foreman or a sub-foreman identifying that a movement has arrived by visually identifying the designated engine and marker. Movements operating without a marker must be identified by the foreman or a sub-foreman by direct communication with a member of the crew of such or by the foreman through the RTC.

OPTIONAL – ONLY REQUIRED FOR THOSE USING RULES 862 and 863

This requirement is also applicable to an employee providing arrival and departure information to the RTC from a field location.

840.3 PROTECTION OF TRACK WORK AT AUTOMATIC INTERLOCKINGS RAILWAY CROSSINGS AT GRADE

Foreman must also refer to Rule 611(d).

When the foreman is in possession of other protection encompassing all routes within the interlocking limits, protection as per Rule 840.3 is not required.

Track work may be performed within the limits of an automatic interlocked railway crossing at grade after protection has been provided as follows:

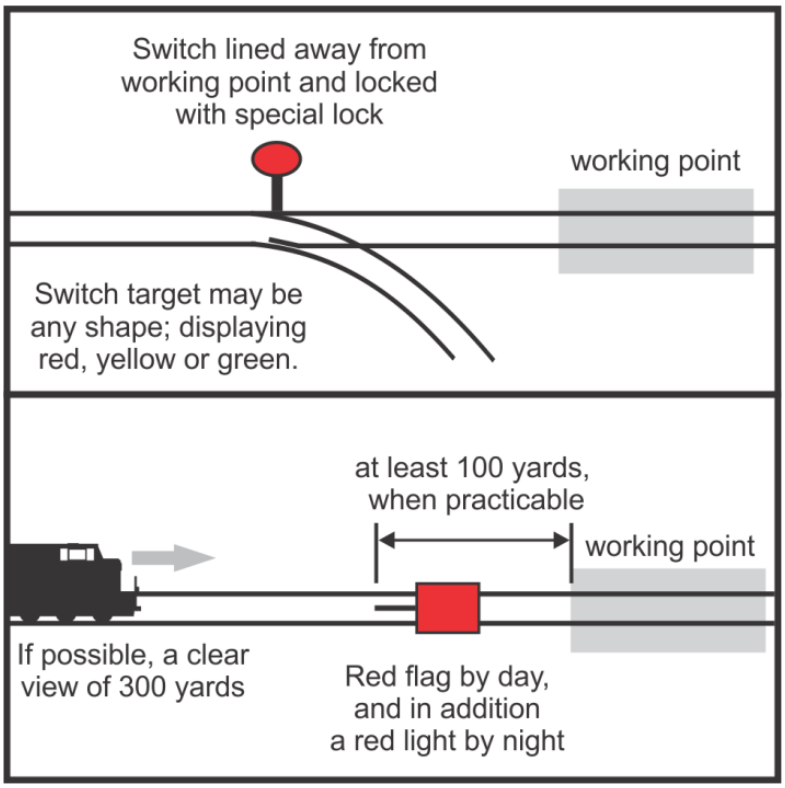
(a) Permission must be obtained from the RTC of both railways (where applicable).

(b) After permission has been obtained and before any track work is started, the foreman must open the box marked “switches”, open the knife switch and must wait five minutes or such greater time as may be posted in the box. The switch must be left open until track work is completed.

(c) In addition, a visible indicator marked “840.3 Protection” or special lock must be secured to the box marked “switches” to indicate that track work is ongoing.

(d) After track work is completed the RTC of both railways (where applicable) must be notified.

841. PROTECTION OF TRACK WORK ON NON-MAIN TRACK AND IN CAUTIONARY LIMITS



(a) Before applying protection the employee responsible, if any, for the track must be advised.

(b) When working limits are on a track where the kicking of equipment is permitted per Rule 113.5(a), protection must be provided by (c)(i) or (iii).

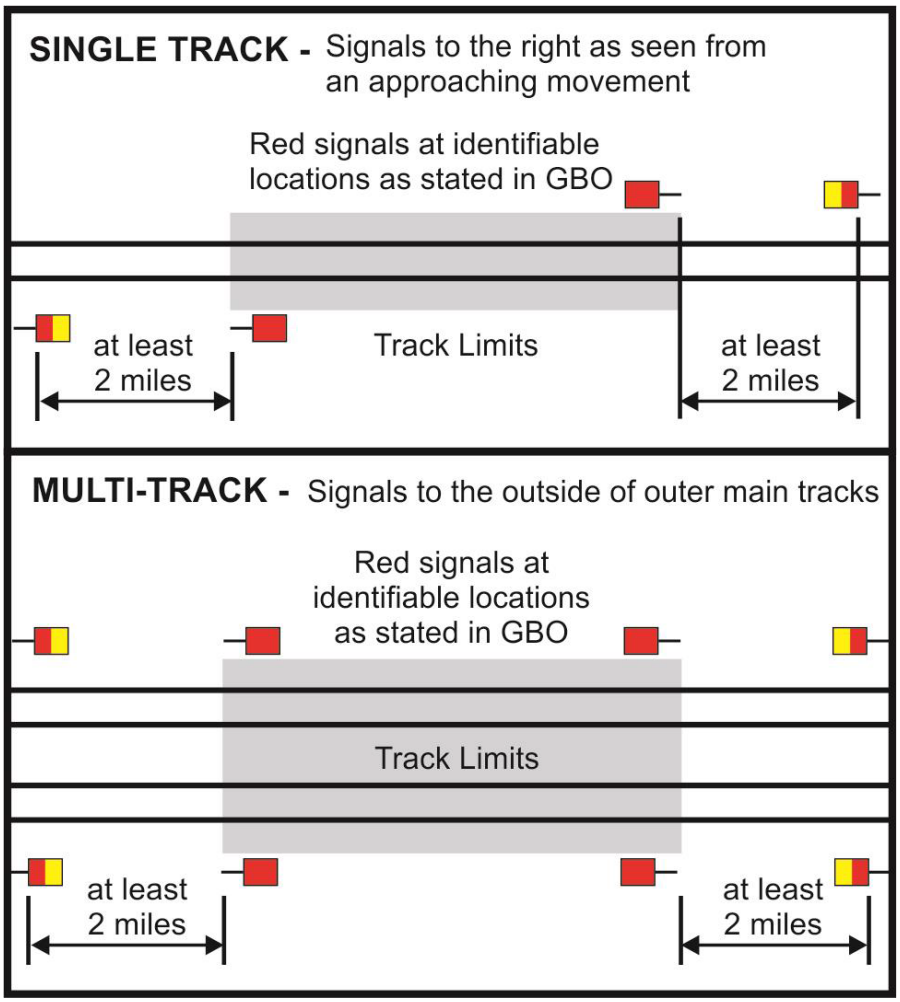
(c) The foreman must provide protection to prevent access to the working limits using one or more of the following methods:

(i) lock switch(es) with a special lock, in a position to prevent a movement from entering the working limits;

(ii) place a red flag by day, and in addition, a red light by night, or when day signals cannot be plainly seen, between the rails to prevent a movement from entering the working limits. Such signal(s) must be placed at least 100 yards from the working point where practicable, where there will be a clear view of the signal(s) from an approaching movement of at least 300 yards. If there is equipment on the track which will prevent a clear view of 300 yards, the red signals must be placed to include such equipment; or

(iii) a red signal displayed per (ii) and a derail locked in the derailing position with a special lock.

842. PLANNED PROTECTION – RULE 42



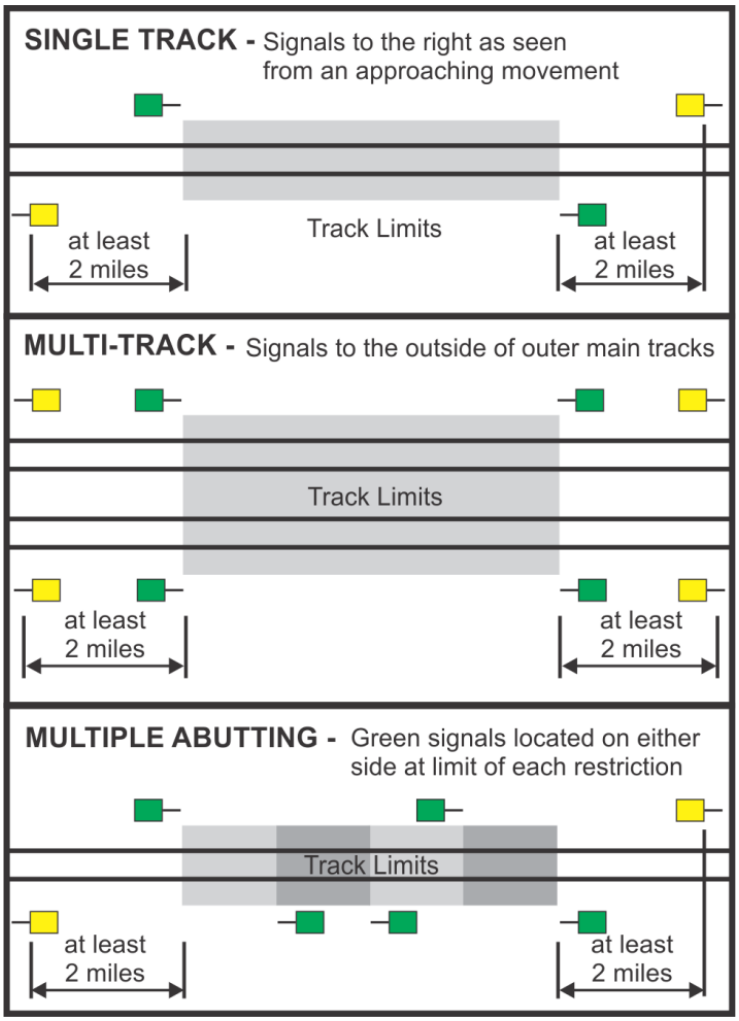
(a) When protection is required, the request must be in writing and on the prescribed form. When protection has been provided, the track and time limits must be confirmed in writing prior to the foreman named in the GBO arranging for the display of the prescribed flags as follows;
   (i) place a red flag at each identifiable location stated in the GBO to the right of the track as seen from an approaching movement; and
   (ii) place a yellow over red flag at least two miles outside the track limits defined by the red flags, to the right of the track as seen from an approaching movement.
   (iii) Track work must not be undertaken until the prescribed signals are in place in all directions.
   (iv) flags must not be in place more than 30 minutes prior to or after the times stated in the GBO unless provided for in the GBO.
   (v) Track limits must not be overlapped.

(b) When a specific track is to be used, instructions from the foreman must specify the track upon which the instructions apply.
   In CTC, when protection is in effect on more than one track or when signalled turnouts are within the limits there must be a clear understanding in writing between the foreman and the RTC as to what route(s) movements are to use. The foreman's instructions to the movement must be identical to the routing arrangement with the RTC. Should the foreman require operation on a specific track when the arrangement with the RTC was for more than one route, the foreman must make a new arrangement with the RTC before authorizing the movement.

(c) Track limits shall be kept as short as practicable and be expressed in whole miles or by other identifiable locations.

(d) The GBO must indicate the location of flags that cannot be placed at the distance prescribed.

843. SLOW TRACK PROTECTION – RULE 43



(a) When slow track protection is required the request must be in writing and when practicable on the prescribed form, and after GBO protection has been provided, the speed restriction(s) and limits must be confirmed to the foreman in writing who will arrange to place a:

(i) yellow flag to the right of the track as seen from an approaching movement at least two miles in each direction from the outermost limits indicated in the GBO, and

(ii) green flag to the right of the track as seen from an approaching movement in each direction, immediately beyond the defect.
Exception: When there are abutting limits contained within a single GBO, a single green flag will be displayed to either side of the track to identify each restriction within the limits.

(b) The GBO must indicate the location of flags that cannot be placed at the distance prescribed.

(c) When the placement of flags as prescribed is delayed, the RTC must be advised and the following must be added to the Form V: “Signals may not be in place.” The flags must be placed as soon as possible and the GBO changed accordingly.

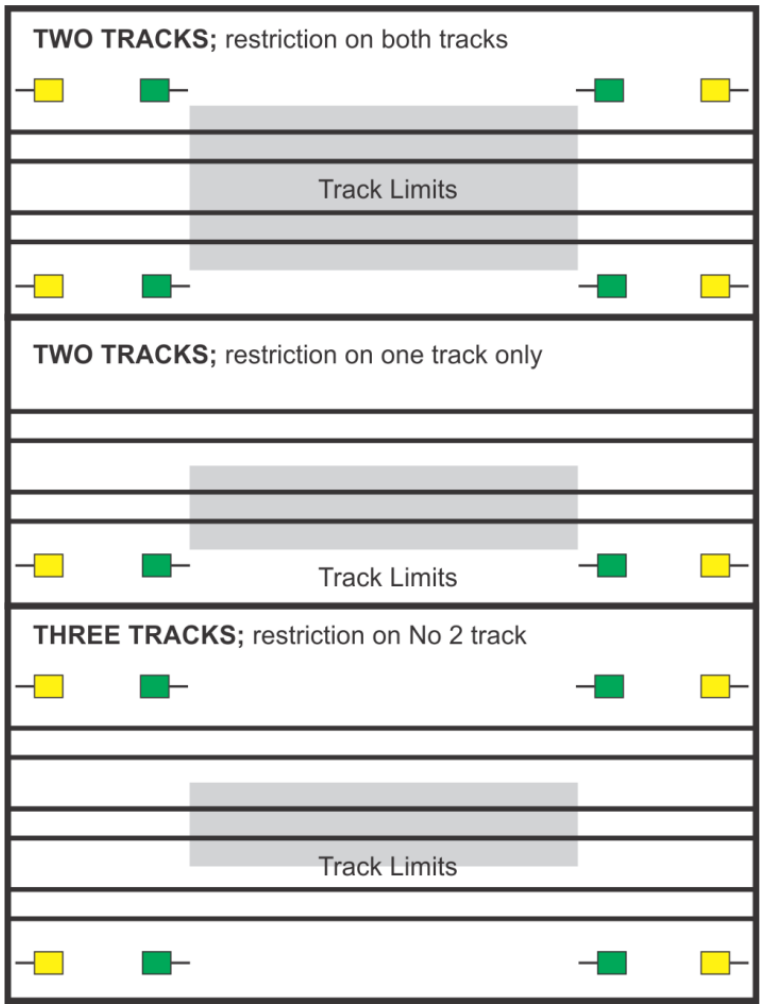
(d) When a restriction is located at a single mile point, one green signal will be displayed to identify the restriction and may be displayed to either side of the track.

(e) When a rail break has been detected by an engineering employee and it is safe to operate over the break at a speed less than posted speed, the RTC will provide GBO protection to affected movements stating the authorized speed over the break and how such location is marked in the field, by either a Rail Break Sign or foreman, at the break. Flags required will not be in place.

(f) The regular placement of flags must be utilized after 24 hours if the defect is continuing.

845. SIGNAL PLACEMENT MULTI-TRACK

Except on a subdivision designated in special instructions, signals required by Rules 842 and 843, must be placed to the outside of the outermost track(s) and not between the main tracks.



846. MOUNTING OF SIGNALS

(a) Signals displayed for protection of track work and track conditions must provide an unobstructed view of them as seen by the crew of an approaching movement. They will be of the prescribed colour, size and shape.

(b) When a day signal cannot be plainly seen, each flag must be reflectorized or equipped with a reflectorized lens, target or disc, or a reflectorized sign may be used instead. In the application of Rule 841, the required light must be displayed.

(c) Red, yellow, and yellow over red flags may display those colours only in the direction of an affected approaching movement. Green flags must display that colour in both directions.

TRACK OCCUPANCY PERMITS

849. BEFORE ISSUING TOP AUTHORITY

Before issuing TOP authority, the RTC must;

(a) ensure there is no conflicting movement within, or authorized to enter, the TOP limits to be granted unless such movement has been restricted in accordance with Rule 311, 567.1, 567.2, 618 or 618.1; and

(b) in CTC and controlled interlockings, block at Stop all devices controlling signals governing the entry of movements into the limits to be granted. Signal blocking applied to protect a TOP must be maintained until the TOP is cancelled to the foreman.

850. SAME OR OVERLAPPING TOP LIMITS

The RTC must not authorize a movement to enter overlapping TOP limits.

851. TOP AUTHORITY WITHIN CAUTIONARY LIMITS

(a) A TOP must not be issued to apply within cautionary limits where there are movements operated that cannot be controlled by the RTC.

(b) The RTC must not authorize a movement to the cautionary limit sign while a TOP is in effect within such limits.

852. TOP ENCOMPASSING CONTROLLED LOCATIONS

When authorized by a TOP to occupy a track within a controlled location, the authority includes any track within the controlled location that connects to that track but only to a point on the connecting track where occupancy would require separate TOP authority.

853. REMAINS IN EFFECT

A TOP once in effect continues so until superseded or cancelled.

854. ONE TRACK UNIT – FOREMAN REQUIREMENTS

Before acting under the authority of a TOP, a foreman in charge of a single track unit must;

(a) read the TOP aloud to the employees accompanying the track unit; and

(b) require those employees who hold a valid certificate of rules qualification to read and initial the TOP.

855. MULTIPLE TRACK UNITS AND/OR TRACK WORK – FOREMAN REQUIREMENTS

Before acting under the authority of a TOP, a foreman in charge of the protection of track work or in charge of more than one track unit must;

(a) read the TOP aloud to at least one other employee involved in the work who holds a valid certificate of rules; and

(b) when conditions permit, require those to whom the TOP is read aloud, to read and initial the TOP.

Special instructions will indicate additional procedures for protection of sub-foreman.

856. COMMUNICATION BETWEEN EMPLOYEES AND FOREMEN

An employee who has been made aware of the contents of the TOP must remind the foreman of the contents in sufficient time to ensure compliance.

857. MULTIPLE TOP

Where required, special instructions will indicate additional procedures.

EXCLUSIVE TOP

858. EXCLUSIVE DESIGNATION
When an Exclusive TOP is issued, it must be indicated in the appropriate section of the TOP.

859. EXCLUSIVITY
Before an Exclusive TOP is issued, the RTC must verify that no other TOP, Form Y or Form T is in effect within the limits to be covered by the TOP.
An Exclusive TOP must not be issued as a Follow-Up TOP.

860. AFTER ISSUING AN EXCLUSIVE TOP
Within the limits of an Exclusive TOP, the RTC must;
(a) not issue another TOP;
(b) not issue a Form T or Form Y;
(c) not issue a Rule 311, 567.1, 567.2, 618 or 618.1 authority to a movement.

861. EXCLUSIVE TOP – TWO TRACK UNITS
When a second track unit is occupying the limits, both track unit operators must have a thorough understanding in writing as to the operation of each other.

FOLLOW-UP TOP

862. RTC REQUIREMENTS
When one or more movements remain within the limits to be covered by a TOP, the RTC may issue a Follow-Up TOP to a foreman, provided such movements are authorized to proceed in the same direction and have left the location where the foreman will enter the limits of the TOP.
The RTC;
(a) may only issue the TOP to the foreman when the foreman is at the location where the foreman will enter the limits of the TOP;
(b) must not issue the TOP if any of the movements are authorized to reverse within the limits; or
(c) authorize any of the movements to reverse within the limits; and
(d) before issuing the TOP, verify that each movement has left the location where the foreman will enter the limits; and
(e) in the TOP, include the designation and location that the last movement has left.

862.1 OPTIONAL RTC REQUIREMENTS
When one or more movements remain within, are, or will be authorized into the limits to be covered by a TOP, the RTC may issue a Follow-Up TOP to a foreman, provided such movements are authorized to proceed in the same direction.
The RTC must;
(a) specify the designation of each movement on the TOP; and
(b) not authorize any of the movements to reverse within the limits.

863. FOREMAN REQUIREMENTS
When a Follow-Up TOP has been issued to a foreman and one or more movements remain within the limits of the TOP, the foreman, or any employees for whom the foreman is responsible, must;
(a) not enter the limits of the TOP except at or behind a location which the designated movement has left;
(b) not pass the designated movement within the limits of the TOP.

863.1 OPTIONAL FOREMAN REQUIREMENTS

When a Follow-Up TOP has been issued to a foreman, the foreman or any employee under the foreman's protection must not;

(a) enter the limits of the TOP except at or behind a location which all designated movements have left; or

(b) pass the designated movements within the limits of the TOP.

TOP CANCELLATION

864. TOP CANCELLATION

(a) The foreman must advise the RTC of the TOP number to be cancelled;

(b) the RTC must state the TOP number and limits of the TOP to be cancelled which must be acknowledged as correct by the foreman;

(c) the RTC will state the TOP number, "cancelled" and the initials of the RTC which must be repeated by the foreman; and

(d) the cancellation does not take effect until it has been correctly repeated and acknowledged by the foreman.

DATE FORMALIZED April 6, 2023 REVISED	Electrical Safety Policy

POLICY STATEMENT

In keeping with our values of Safety Full Stop, Go Beyond, Lead the Way and Never Stop Caring Ontario Northland Transportation Commission (ONTC) commits to ensuring that all employees who may be exposed to electrical hazards associated with their work have the knowledge, skill, tools, and equipment needed to ensure their safety.

In our efforts to Go Beyond our minimal requirements, ONTC commits to continuously improving our safe work practice by striving to incorporate the Workplace Electrical Safety standard, CSA Z462.

All authorized employees will ensure the power supply to electrical installations, equipment, or conductors is disconnected, locked out of service, connected to ground, and tagged before any work is done. **It is a requirement that, where possible, all hazardous energy sources are reduced to and maintained at a ZERO ENERGY state before starting any electrical work.** Should it become necessary that maintenance, cleaning, or adjustments need to be performed on any piece of equipment while it is in operation, safe work procedures for this type of work shall be made available and easily accessible. Only authorized employees shall be allowed to perform such work.

PURPOSE

To ensure employee safety by allowing only **Authorized Employees, Qualified Persons**, **Certified Electricians** or **Electricians in Training (EIT's)** who are under direct supervision of a **Certified Electrician** to do electrical work such as connect, maintain, or modify electrical equipment or installations at ONTC work locations.

To ensure that all ONTC employees or contractors working for ONTC comply with the Canada Labour Code, Occupational Health and Safety Act, associated regulations and ONTC procedures.

APPLICATION AND SCOPE

This procedure applies to all ONTC workers and contractors at all workplace locations. The procedure applies whenever exposure to a hazardous energy may occur while servicing, installing or maintaining, machinery or equipment.

DEFINITIONS

Affected employee – persons who are not directly involved in the work requiring the hazardous energy control, but who are (or may be) located in the work area.

Authorized employee – a qualified person who, in their duties or occupation, is obliged to approach or handle electrical equipment; or a person who, having been warned of the hazards involved, has been instructed or authorized by a qualified Supervisor or management member.

Certified Electrician – Electricians who have obtained a 442A Industrial or a 309A Construction certificate of qualification.

Control Device – means a device that will safety disconnect electrical equipment from its source of energy.

Electrical Equipment – means equipment for the generation, distribution, or use of electricity.

Electrician in Training (EIT's) – Aspiring electrician's registered with Skilled Trades Ontario who must complete specific criteria, a set number of hours, and a final test to be eligible to become a **Certified Electrician.**

Isolated – means separated or disconnected from every source of electrical, hydraulic, pneumatic, or other kind of energy that is capable of making electrical equipment dangerous.

Qualified Person – One who has demonstrated skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify hazards and reduce the associated risk.

RESPONSIBILITIES

Employer is responsible to:

1. Provide training and instruction on the Electrical Safety Policy and LOTO program.
2. Properly implement and periodically audit the Electrical Safety Policy and LOTO program.
3. Provide single key locks and tags as well as other LOTO equipment and maintain records of issuance of lock.
4. Provide all relevant PPE to ensure staff are performing their tasks in a safe manner.
5. Prequalify and approve contractors who work at any ONTC location.
6. Discipline, ensuring authorized and affected personnel perform their duties within the requirements of the LOTO Procedure.

Managers/Supervisors are responsible to:

1. Communicate any actual and potential hazards of which they are aware;
2. Apply and enforce the LOTO Program for all personnel in the workplace.
3. Identify those personnel who are authorized and affected and trained in accordance with this policy.
4. Periodically inspect the work area to ensure compliance with this policy;
5. Ensure that only authorized workers perform LOTO, and that work is performed in compliance to the procedure.
6. Provide written instructions as required; and
7. Provide to workers, company supplied LOTO equipment and PPE as required.

Workers and contractors of ONTC are responsible to:

1. Comply with the Electrical Safety Policy and LOTO Procedure.
2. Notify their supervisor or contact person of any questions or concerns with respect to LOTO.
3. Participate in electrical safety training as required.
4. Provide input on the effectiveness of the LOTO Procedure and participate in annual reviews of the electrical safety policy and LOTO Procedure as required.

5. Achieve a zero-energy state where hazardous energy may harm a person and ensure proper LOTO is achieved.
6. Ensure all power sources remain locked out before resuming work after a temporary absence.
7. Ensure only single keyed locks are used. The key must remain in the direct possession of the authorized person engaged in lockout.
8. remove only the locks that have been assigned by ONTC; and
9. avoid using a Point of Operation switch or controller for the sole Lockout of a device or piece of equipment unless it has been designed to accommodate an energy isolating device.

ELECTRICAL SAFETY RULES

1. A sign warning of the danger, and forbidding entry by unauthorized persons will be posted at the entrance to a room or similar enclosure containing exposed live electrical parts.
2. Any piece of equipment or tool found to be damaged or have defective electrical components or found to pose a safety or health hazard to any employee will be disconnected and removed from service without delay and must be tagged appropriately.
3. Any tool or piece of equipment that is capable of conducting electricity and/or endangering the safety of any worker will not be used around or close to any live electrical installation or equipment that might cause electrical contact with the live conductor.
4. Flammable materials/liquids shall not be stored anywhere near electrical equipment.
5. Eye protection must be worn when carrying out a work assignment.
6. Consider all electrical equipment to be live until you have properly tested it to confirm it's dead.
7. Do not work on "live" equipment unless it is absolutely necessary. If it is necessary, a safe work procedure must be in place.
8. If it is necessary to work on "live" equipment wear rubber gloves and work from a dry location.

9. Do not close any switch without knowledge of the circuit and the reason the switch was left open.
10. Notify the persons affected before the power on any circuit is shut off.
11. All electrical equipment of 110 volts or over must be grounded. Circuits sometimes retain a charge.
12. Portable electrical equipment used outdoors or in damp locations must be equipped with a ground fault circuit interrupter installed at the receptacle or on the circuit at the panel.
13. Specially authorized persons and electricians are the only ones permitted to change fuses.
14. Rubber gloves, tools and equipment must be maintained in good condition.
15. Do not handle “live” wires while standing in water or on moist or steel surfaces.
16. Electrically driven machinery and controls should normally be locked out before servicing. However check with your Supervisor to be sure.
17. Only persons authorized to do so may enter any electrical room and/or enclosure containing live parts. The entrance to any electrical and/or enclosure containing live parts will be marked by conspicuous warning signs stating that entry by unauthorized persons is prohibited.

TRAINING

Employees exposed to an electrical hazard when the risk associated with that hazard is not adequately reduced by the applicable electrical installation requirements shall be trained to understand the specific hazards associated with electrical energy.

- Safety-related work practices and procedural requirements necessary to provide protection from the electrical hazards associated with their job or task assignments; and
- They shall be trained to identify and understand the relationship between electrical hazards and possible injury.

Qualified persons shall be trained in and knowledgeable about the construction and operation of equipment or a specific work method and trained to identify and avoid the electrical hazards that might be present with respect to that equipment or work method. The training required shall meet the requirements of the CSAZ462.21 and may include classroom, on-the-job, electronic, or web-based training methodologies with interactive components.

Employees involved in or affected by the lockout procedure must be trained in the lockout procedure and their responsibility in the execution of the procedures.

Retraining in the lockout procedure shall be performed:

- When the procedures are revised;
- At intervals not to exceed 3 years; and
- When supervision or annual inspections indicate that the worker is not complying with the lockout procedure.

Employee training must be documented to confirm that each employee has received the training and retained for the duration of the employee's employment. The documentation must include

- when the employee demonstrates proficiency in the work practices involved
- contain the content of the training, each employee's name, and date of the training.

REFERENCES

Part II Canada Labour Code R.S.C, 1985, c. L-2
Published by the Minister of Justice at the following address:
http://laws-lois.justice.gc.ca

Implementing an Occupational Health and Safety (OH&S) program November 2017 DSS Catalogue Number CC273-2/17-1E Canadian Centre for Occupational Health and Safety (CCOHS): www.ccohs.ca

Occupational Health and Safety Act (R.S.O. 1990, c. 0.1) Consolidated Edition, Carswell

Workplace electrical safety, CSAZ462:21 CSA Group., July 20214

DATE FORMALIZED June 21, 2018 REVISED April 13, 2022	HOT WORK PROGRAM

POLICY STATEMENT

In keeping with our values of safety, accountability, and continuous improvement Ontario Northland Transportation Commission (ONTC) is committed to the safety and health of all its employees by ensuring that all hazards associated with hot work is properly recognized, assessed and controlled.

PURPOSE

To establish the minimum requirements for the safe performance of hot work when conducting hot work at any ONTC location, and to ensure that all measures are taken to eliminate any risk that is generated by welding, cutting, grinding, soldering, or blazing.

APPLICATION AND SCOPE

This policy applies to any ONTC division, department, and employee who is required to perform hot work at any time during their work.

POLICY

All hot work jobs or projects are to be authorized by a manager, supervisor, designate or identified in daily work schedules and/or job descriptions.

All hot work must be performed by a competent worker who has the knowledge and training in the work being performed as per the identified risks associated with the work.

A competent person will be designated to monitor all hot work activities ensuring all procedures are being followed, and to conduct a fire watch for dangerous sparks.

When hot work is required on a rail car that contains a commodity or residue that is either a flammable gas, flammable liquid, or a liquid with a flash point below the ambient temperature or the temperature in the rail car, the work is to be conducted outside (provide location) and is only permitted when all safety precautions outlined in this procedure have been met and adhered to by personnel who have been trained to assess and control the hazards associated with hot work.

DEFINITIONS

Flammable Commodity:
A commodity that is a flammable gas, a flammable liquid or a liquid that has a flash point below the ambient temperature or temperature inside the rail car.

Flammable Gas:
A gas that has an LEL of less than 13 percent by volume in air or flammable range of more than 12 percent.

Flammable Liquid:
A liquid having a flash point below 37.8^{o}C (100^{o}F), also known as an NFPA Class I liquid.

Flash Point:
The temperature at which a liquid produces enough vapour to ignite in the presence of a suitable source of ignition.

Gas Tester:
Person assigned to perform required testing on/in a confined space, restricted space, railcar, etc. to ensure the area is safe to work on and/or identify control measures required to eliminate risk.

Hot Work:
For the purposes of this procedure, refers to any operation, process, or the use of anything that creates a source of ignition. Hot work includes, but is not limited to: welding, cutting torches, gouging, and the use of tools and equipment that are not intrinsically safe.

Lower Explosive Limit (LEL):
The minimum concentration of a flammable gas mixed with air, where an explosion or deflagration may occur in the presence of a suitable ignition. This concentration is expressed in percent by volume, where 1 percent represents 10,000 parts per million.

Tester:
A competent person who is responsible for making determinations of the conditions in or around the area of work, and has completed appropriate training on the measurement instruments and procedures used to perform the evaluation.

Vapour:
A gas given off by a substance that is normally a liquid at room temperature.

MATERIAL REQUIRED

Hot Work Hazard Assessment and Full task Observation Sheet
Norfalco Acid Tank Car Hazard Safety Inspection Sheet
Personal Protective Equipment
Fire Extinguisher
Testing Equipment – PH Test Paper, Gas Monitoring Equipment
Communication Devices

HAZARDS

This procedure describes some of the potential health hazards associated with welding fumes and gases. It also discusses the control and management of these hazards.

Welding produces metal fumes and gases that can make you sick. The risk depends on:

- The welding method (such as MIG, TIG, or stick)
- What the welding rod (electrode) is make of
- Filler metals and base metals (such as mild steel and stainless steel)
- Paints and other coatings on the metals being welded
- Ventilation

In confined spaces, welding can be much more dangerous. With less fresh air, toxic fumes and gases can be much stronger. Shielding gases, like argon, can displace the oxygen and kill you.

The two most common types of welding used are:

- The electric arc welding of metal using a flux-coated electrode (manual metal arc welding, MMAW, SMAW); and
- The electric arc welding of metal using a gas-shielded wire electrode (gas metal arc welding, GMAW).

Welding Fumes
Cadmium – may be present as a coating in certain materials being welded. Cadmium oxide fume on inhalation may cause acute irritation of the respiratory passages, bronchitis, chemical pneumonia or excessive fluid in the lung tissues (pulmonary oedema). There may be a latent period of several hours between exposure and onset of symptoms. The effects of overexposure to cadmium fumes may resemble metal fume fever initially. A single exposure to a very high concentration of cadmium oxide fume may be fatal. Chronic cadmium poisoning results in injury to lungs and kidneys.

Manganese – potential exposure to manganese occurs whenever this metal is used in electrode cores and coatings or in electrode wire. Acute poisoning from oxides of manganese is very rare in welders, although respiratory tract irritation from the fume may occur. Exposure to fume from welding on manganese steel may give rise to acute

inflammation of lungs. Metal fume fever is also a possibility after exposure to manganese fume. Chronic manganese poisoning, characterized by severe disorder of the nervous system, has been reported in welders working in confined spaces on high manganese steels.

Zinc – may be present as a surface coating on steel products, that is, galvanized steel. Exposure to freshly formed zinc oxide fume may produce a brief acute self-limiting illness known as metal fume fever, zinc chills or brass founder's ague. The symptoms, which resemble those of an acute attach of influenza, usually occur several hours after exposure to fume and usually with complete recovery within about 24 to 48 hours. Freshly formed oxide fume from several other metals has also been reported to cause metal fume fever. Leucocytosis, a transient increase in white blood cell counts, is reported to be a common finding in metal fume fever, but is not known to be common among welders.
Iron – most welding involves ferrous materials. The most abundant constituent of ferrous alloy welding fume is iron oxide. Long, continued exposure to such welding fume may lead to deposition of iron oxide particles in the lungs. When present in sufficient quantities, the deposition is demonstrable on chest x-ray films as numerous fine discrete opacities (nodulation and stripping) resembling silicosis. The technical name for this is sierosis and it is a benign form of pneumoconiosis. Siderosis tends to clear up when the exposure to metallic particles stops.

Molybdenum – Molybdenum is found in some steel alloys. Molybdenum fumes may produce bronchial irritation and moderate fatty changes in the liver and kidneys.

Fluorides – Welders may be exposed to fluoride dust, fume and vapours from certain MMAW and GMAW operations. Fluoride fumes may produce irritation of the eyes, throat, respiratory tract and skin. Chronic fluorosis is a syndrome characterized by an increased density of bones and ligaments due to fluoride deposition. However, no corroborating data are available which identify a relationship between exposure to fluoride-containing welding fumes and disorders of bones or ligaments.

Other Metals – Welding may produce fume from other metals, including aluminium, copper, magnesium, tin, titanium and tungsten. Within the confines of the current information available, no serious health disorders in welders are known to occur from exposure to fume from these metals but, under certain conditions, copper, aluminium and magnesium may give rise to metal fume fever and others to irritation of the respiratory tract.

Beryllium is a volatile and toxic component that may be present in many copper alloys being welded, that is, in the work piece itself. Beryllium oxide fume is very toxic to the respiratory tract, lungs and skin, and is quick acting. Beryllium is suspect human carcinogen. Note that beryllium may also be present in some aluminium or magnesium brazing alloys.

Gases
Oxides of nitrogen – The oxides of nitrogen, nitric oxide and nitrogen dioxide, are frequently formed by the direct combination of oxygen and nitrogen in the air surrounding

the arc or flame, as a result of heat from the electric arc or gas torch (oxidizing flames). In outdoor or open shop welding, hazardous abnormal concentrations are unlikely, except perhaps for short periods. In confined spaces, hazardous concentrations of nitrogen oxides may rapidly build up in welding operations. High concentrations of nitrogen oxides have also been found during gas tungsten-arc cutting of stainless steel.

Exposure to oxides of nitrogen may not always produce immediate effects but may result in fatal excessive fluid in the lung tissues (pulmonary oedema) some hours after the exposure stops.

Ozone – is formed only in small amounts in MMAW and in gas welding. It is however, produced in significant amounts in GMAW when welding with argon, especially when high amperages are used. High ozone concentrations are especially a problem when welding on reflective surfaces, such as aluminum and its alloys and stainless steel, and with high-energy processes such as plasma arc welding.

Phosphine – Phosphine is generated when steel coated with a rust proofing compound is welded. High concentrations of phosphine gas are irritating to the eyes, nose and skin. There may also be serious effects on the lungs and other organs.

Insufficient – oxygen in GMAW, the presence of inert gases (argon, helium) in confined work environments may reduce the oxygen content of the atmosphere to dangerous levels, with the threat of asphyxiation. See also the section on carbon dioxide in this procedure.

Pyrolytic products of resins used in primers / paints – the main products of thermal decomposition of resins used in primers and paints are carbon monoxide and carbon dioxide. Specific toxic or irritant chemicals given off from the resins used in priming materials include such hazardous substances as phenol, formaldehyde, acrolein, isocyanates and hydrogen cyanide. Usually, a very complex mixture of organic gases is formed.

HEALTH EFFECTS

SHORT TERM

Metal fume fever – Metal fume fever occurs in welders who inhale zinc oxide fumes, although other components, for example, copper, aluminum and magnesium, may also produce this condition. Symptoms of metal fume fever, which resemble influenza, usually occur several hours after exposure and include a metallic or sweet taste, chills, thirst, fever, muscle aches, chest soreness, fatigue, gastro-intestinal pain, headache, nausea and vomiting. The symptoms usually subside within one to three days of exposure with no residual effect.

Exposure to ozone – Exposure to ozone generated in GMAW and plasma arc welding may produce excessive mucus secretion, headache, lethargy, eye irritation and irritation and inflammation of the respiratory tract. In extreme cases, excess fluid and even hemorrhage may occur in the lungs. The irritant effects of the gas on the upper respiratory tract and the lungs may be delayed.

Exposure to nitrogen oxides – Nitrogen oxides produce somewhat similar respiratory tract effects to ozone. Inhalation of nitrogen oxides does not always produce immediate irritant effects but may result in excessive fluid in the lung tissues (pulmonary oedema) some hours after exposure ceases.

Control Measures

Where there is a likelihood of worker exposure to welding fumes and gases, steps should be taken to minimize that exposure. A thorough examination of work practices is essential. Procedures should be adopted to ensure that workers are not exposed to the hazard. Control measures include, but are not limited to the following, which are ranked in priority of their effectiveness:

Elimination/Substitution

- Remove the hazard from the workplace, or substitute (replace) hazardous materials or machines with less hazardous ones

Engineering Controls

- includes designs or modifications to equipment, ventilation systems, and processes that reduce the hazard at the source of exposure

Administrative Controls

- altering the way the work is done we can reduce the exposure along the path i.e. policies, and **work practices** such as standards and operating procedures (including training, housekeeping, equipment maintenance, and personal hygiene practices)Conduct pre-assessment of work to identify all hazards

Personal Protective Equipment

- Equipment worn by individuals to reduce exposure such as contact with chemicals or exposure to noise

The control measures in this procedure are intended to assist anyone conducting hot work with identifying and controlling all hazards associated with the nature of the work. All hazards identified in the hazard assessment not identified in the procedure shall be controlled using this hierarchy first always looking to eliminate.

PROCEDURE

Welding, cutting, grinding, soldering and brazing in construction, maintenance, and fabricating activities present a significant opportunity for fire and injury.

Hot work presents an increased risk of fire and explosion hazard when it is performed in a confined and enclosed space. If performing Hot Work in a confined space, please refer to the confined space policy and procedure.

The following procedures are the minimum standard that ONTC anticipates its workers and contractors to achieve for all hot work performed.

1. Inspect the work area and consider the following:
   - Ensure that all equipment is in good operating order before work starts.
   - Ensure that all appropriate personal protective devices are available at the site.
   - Look for combustible materials.
   - Move all flammable and combustible materials away from the work area.
   - Sweep clean any combustible materials on floors around the work zone.
   - Remove spilled grease, oil, or other combustible liquid.

If combustible materials can't be moved:

2. If combustibles cannot be moved, cover them with fire resistant blankets or shields. Protect gas lines and equipment from falling sparks, hot materials, and objects.
3. Secure, isolate, and vent pressurized vessels, piping and equipment as needed before beginning hot work.
4. Post a trained fire watch within the work area, including lower levels if sparks or slag fall during welding, including during breaks, and for at least 30 minutes after work has stopped. Depending on the work done, the area may need to be monitored for longer (up to 3 or more hours) after the end of the hot work until fire hazards no longer exist.
5. Inspect the area following work to ensure that wall surfaces, studs, wires, or dirt have not heated up.
6. When work is completed ensure all compressed gas valves are closed and the cylinders are properly stored and secured safely.

Hot Work on Residue/Loaded Rail Cars

Before performing any work on a rail car ensure the following:

Before performing any work on a car containing acid caution must be given to the following risks:

1) The tank is still under pressure – highest risk
2) The tank will release acid gases/mists when opened and previously checked for pressure

The first time the tank is opened workers should wear a full face shield and protective clothing (e.g. polycoated Tyvek and gloves), and a ½ mask respirator equipped with a stacked P100/acid gas cartridges (or a full face respirator in lieu of the face shield).

Subsequent access if necessary may be limited to respiratory protection for acid gases/mists and gloves, but should not occur unless necessary.

1. The Manager of Quality Assurance shall determine the last contents and, where possible, the paint system used on the car to be worked on. This shall include, as applicable, the review of shipping documents and/or any other documentation or information as appropriate to verify the last contents or the paint system used.

   Identification by the commodity stencilled on the car is not sufficient for content determination.

2. Where the car is found to contain an acid commodity a **Hazard/Safety Inspection Assessment Nor Falco Acid Tank Car** form must be completed by the Quality Assurance inspector to indicate if the car has passed or failed.

3. Prior to engaging in any hot work the person conducting the testing shall:
   a. Identify and record the contents of the tank on the **Hot Work Hazard Assessment and Task Observation** sheet.
   b. Test for oxygen and then LEL at and around the manways, valves, or other potential sources of flammable gases that are within the distances outline in Section 3.
   c. Stop any leaks as practicable prior to continuing and record this on the Hot Work Hazard Assessment and Task Observation form.
   d. Record the final results of the testing on the Hot Work Hazard Assessment and Task Observation sheet.
   e. Where a car's last commodity contains an acid perform PH testing on the car to ensure there is no acid residue remaining on or in the car

4. When a car contains a flammable commodity, no welding, gouging, flame cutting or similar operation is permitted within 15.4 meters (50 feet) and any other type of hot work is not permitted within 4.6 meters (15 feet) until the identified hazards on the **Hot Work Hazard Assessment and Task Observation** sheet have been controlled.

5. Once safe work condition is met, hot work may proceed only after the assigned worker(s):
   a. Examines the Hot Work Hazard Assessment and Task Observation sheet and identifies the following items before commencing work:

- Car Number: verify that the number on the car is the same as that identified on the Hot Work Hazard Assessment and Task Observation sheet
- Test results: verify that the air test meets the Hot Work Hazard Assessment and Task Observation sheet condition, also verify that the test results were conducted on the same shift and date the hot work is to be performed.

b. Ensure that no other processes or operations are being performed in the area that could contaminate the work area with a significant amount of flammable gas, or that continuous monitoring occurs.
c. Ensure that if a combustible insulation is present, a suitable means to extinguish a fire is immediately available.
d. Ensure that all equipment to be used is inspected, in good condition and properly used and this is documented on the **Hot Work Hazard Assessment and Task Observation** sheet.
e. Ensure that required personal protective equipment is inspected, in good condition, used properly and is documented on the **Hot Work Hazard Assessment and Task Observation** sheet.
f. Ensure you print your name and initials on the **Hot Work Hazard Assessment and Task Observation** sheet.
g. Ensure that continuous monitoring is in place.

6. Hot work may normally only proceed when the LEL is zero, except where the source of flammable gas is clearly known and continuous monitoring is performed to ensure that the levels do not exceed 10 percent of the LEL.

7. The tests conducted are valid for no more than the present shift, including overtime hours where applicable.

8. Welding on the tank car shell of an uncleaned car containing a flammable commodity or residue is strictly prohibited. Welding on reinforcing pads of rail cars which are directly attached to the shell is permitted providing:
   - The welder is qualified and certified
   - No part of the weld is deposited on the tank shell
   - Continuous monitoring in the location of the hot work

9. The ground connection for welding is to be attached directly to the part to be welded whenever practicable or as near as possible to the weld area

10. A fully charged 20lb ABC fire extinguisher shall be readily available to the hot work area. In remote locations where work will be performed on a car containing a flammable commodity or residue, it is mandatory to have two (2) fully charged 20lb ABC fire extinguishers. One (1) in close proximity to the hot work site and the other one in an easily accessible location close by.

11. Where individuals are performing hot work on an uncleaned railcar radios must be available to ensure an effective means of communicating during an emergency. This process must be included in the site emergency response plan.

12. If a combustible insulation is present, a suitable means to extinguish a fire must be immediately available when welding, gouging, flame cutting or a similar operation is being performed.

13. When welding, gouging, flame cutting or a similar operation is to be performed, significant quantities of highly combustible materials (paper, wood chips, textile fibres, grass, etc.) must not be within 10 meters (35 feet) of the welding operation. If you are unable to relocate the highly combustible materials, they must be covered with a flame resistant tarp.

14. When welding, cutting, gouging or a similar operation is to be performed on the surface that has a paint system applied to it, using the hierarchy of controls appropriate precautions shall be taken to ensure that the person is not exposed to airborne concentrations above the applicable exposure limits established by the ACGIH or Provincial Legislation, whichever is most restrictive. This may include, but is not limited to:
    - Blasting the area clean prior to the performance of the work
    - Using stripping products to remove coatings, making sure to remove any residue before welding
    - Use wet slurry vacuum removal techniques for removing very toxic coatings
    - Do not grind coatings. Grinding dust may be toxic.
    - The use of engineering controls (e.g., ventilation)
    - The use of appropriate respiratory protection

15. Prior to performing hot work on the jacket of a car containing flammable commodity or residue the following must be completed:
    a. Test the jacket space for any flammable gas local to the work area, through:
    b. an existing access point to in the jacket space
    c. or by creating an access point, local to the work area, into the interstitial space between the shell and jacket using a pneumatic or intrinsically safe drill and keeping the drill bit and work area cool with a suitable coolant.

16. Where any amount of flammable gas is found, the source shall be determined, and if the source is from inside the jacket space it shall be eliminated or controlled

prior to any hot work being performed. Record this on the **Hot Work Hazard Assessment and Task Observation** sheet.

17. If it is reasonably believed that the jacket space may become contaminated with a flammable gas during performance of the work (e.g. product leaks from a tank) then the jacket space shall be continuously monitored.

18. Where contamination is found in the jacket space other than a flammable gas (e.g. sulphur), an assessment of the hazards shall be made and appropriate precautions taken to protect the health and safety of the worker.

19. If the **Hot Work Hazard Assessment and Task Observation** condition is violated, or there is reasonable cause to believe that it may be violated during the performance of the work (e.g. product leaks from a tank into the area of hot work, leaks from a nearby process), the work shall stop immediately while the source is investigated. Retesting must be performed to ensure that the conditions are safe before continuing. The new findings shall be recorded on the **Hot Work Hazard Assessment and Task Observation** sheet.

RESPONSIBILITIES

Employer:

- Ensure that a written program for hot work is developed and maintained in accordance with all relevant legislation.
- Ensure that the hot work program is developed and maintained in consultation with the workplace health and safety committee and/or policy health and safety committee.
- Ensure that the hot work program and associated documentation is current and available to all workers and contractors (as required) performing any hot work.
- Ensure that an adequate assessment of the hazards related to the hot work being performed has been carried out before any worker begins hot work.
- Appoint a person with adequate knowledge, training, and experience to carry out the assessment and maintain a record containing details of the person's knowledge, training, and experience.
- Ensure all workers are given adequate training in recognition of hazards and safe work practices associated with hot work.
- Maintain adequate training records showing who provided the training, who received the training, and the date the training was provided.
- Provide all personal protective equipment (PPE) required to ensure safe work.

Site Supervisor:

- Ensure a full hazard assessment is completed and any hazards are identified and controlled before hot work begins.

- Where rail car contains a flammable commodity or acid base commodity ensure that the Hot Work Hazard Assessment and Task Observation sheet completed.
- Inspect and monitor all hot work jobs to ensure procedures are being followed, and adequate fire protection is provided for a fire watch on site
- Ensure that all work does not begin until all conditions identified have been met.
- Ensure that all personnel follow this policy and procedure.
- Assign an Observer to watch for dangerous sparks in the area above and below the work being completed.

Manager of Quality Assurance Department:

- When hot work is to be performed on a rail car determine the last contents of the rail car and if possible determine the paint system.
- Perform/delegate required testing on the car to ensure the car is safe to work on and/or identify control measures required to eliminate risk.
- Place an ONTC pass or fail sticker on the car to indicate quality assurance testing compete.

Observer:

- Ensure all conditions, precautions and controls are followed.
- Watch for sparks in the area above and below the work being completed.
- Conduct fire watch at all times including any coffee breaks or lunch breaks for 60 minutes after any hot work has been completed. Maintain a fire watch at thirty min intervals to monitor area for 4 hours after work has been completed, in case of flare ups.

Workers:

- Comply with this program and be fully aware of the contents of relevant assessments.
- Notify the site supervisor of any questions or concerns with the hot work being performed or the hot work program.
- Notify the site supervisor of any contraventions of Part 2 of the Canada Labour Code, H&S regulations, and or any ONTC policies and procedures.
- Ensure all required PPE is in worn when conducting hot work.
- Participate in all required training.
- Inspect all cutting torches, and welding equipment for wear, defective parts and any other safety hazard before beginning any hot work and as often as required by the manufactures instructions.

Workplace/Policy Health and Safety Committee:

- Conduct regular audits to ensure the hot work procedures are being adhered to.
- Participate in policy review and provide recommendations to the employer if required

SWITCHING

1. A car that has been dropped off by a switching company (CN, CP, Railserve, etc.) and contains a flammable commodity, is not to be moved with a Trackmobile or similar equipment until an assessment is made to ensure that it is not leaking excessively.
2. Where a car that is leaking to the point where the airborne concentration of gas is likely to exceed 10 percent of the LEL at the coupler, a buffer car shall be positioned between the leaking car and the Track mobile, or similar equipment.
3. The distance set out in Section 3 of Hot Work on Residue/Loaded Rail Cars shall be considered when a car is to be moved such that the car does not enter an area where the requirements of this procedure would be violated (e.g. welding)
4. A car that contains a flammable commodity shall not be brought indoors unless it is confirmed that it is not leaking and it is being brought into an area that meets the requirements of NFPA 497.

Hot Work Hazard Assessment and Task Observation – RECORD RETENTION

When the work has been completed on Residue/Loaded Rail Cars:

1. Quality Assurance Tags to be removed from the car and the hot work hazard assessment and task observation sheets are filed and maintained for a minimum of 2 years.
2. Records for the testing must be kept for a minimum of three years.

TESTING EQUIPMENT

1. The gas monitoring equipment used for this standard is the VENTIS MX4.
2. Where available, the unit is to be set in the PPM mode for all tests.
3. A functional (“bump”) test must be performed on every instrument prior to each day’s use. A functional test is defined as a brief exposure of the monitor to known concentration of gas(s) for the purpose of verifying sensor and alarm operation. It is not intended to be a measure of accuracy of the instrument. The bump test shall be recorded on the bump test form.
4. A full instrument calibration must be performed monthly using certified concentrations of calibration gas(s) and recorded. Each gas-monitoring unit must have a calibration form, which will be maintained with the unit. Record the unit’s model and serial number, date calibrated and the name of the individual performing the calibration. Enter the full span reading for each sensor and the calibration has used.
5. The recommended calibration gas for the LEL sensor is Pentane.
6. The unit shall have the alarm set at 10 percent for LEL.

TRAINING

Any personnel performing hot work on residue/loaded rail cars must receive applicable training including but not limited to Hazard Assessment, WHMIS, and in some

circumstances Transportation of Dangerous Goods. Employees performing the tasks described in the procedure must also be aware of the commodity present in the particular car they are working on.

Personnel performing calibrations, bump testing, or other gas testing must be trained on the specific use and limitations of the particular gas detection devices they are using.

REFERENCES

1. Canada Labour Code R.S.C., 1985, c. L-2, Part II – Occupational Health and Safety
2. Canada Occupational Health & Safety Regulations (SOR/86-304)
3. PSP-S-03 - PROCOR Limited Standard Responsible Care Standard for Hot Work On Residue/Loaded Rails Cars
4. NFPA 51B - Fire prevention in the use of cutting and welding Processes
5. CSA W117.2-12 Safety in Welding, cutting, and allied processes
6. ANSI Z49.1:2012 Safety in Welding, Cutting, and Allied Processes
7. Canadian Centre for Occupational Health & Safety http://www.ccohs.ca/oshanswers/safety_haz/welding/hotwork.html

Ontario Northland

DATE FORMALIZED February 2019 REVISED September 2021	**Contractor/Subcontractor**

POLICY STATEMENT

In keeping with our values of safety, accountability, and continuous improvement, Ontario Northland Transportation Commission (ONTC) adheres to the requirements of the Canada Labour Code and all applicable Regulations, by ensuring that all selected contractors and subcontractors meet the set health and safety standards associated with each project.

All work shall be done safely no matter how urgent the job is and ONTC will assure that all contractors and subcontractors working on any ONTC property and/or project will following this guideline, adhering to all health and safety legislation and working in a manner that puts the safety of each employee/worker and the environment as the top priority.

PURPOSE

The purpose of this policy is to ensure that the health and safety of all Ontario Northland Transportation Commission (ONTC) employees, equipment, property and the environment are protected when work is being performed by an outside agency.

To ensure that all contractors retained by the ONTC are compliant with ONTC policies, procedures, standards, and applicable legislation.

To ensure that all contractor employees and ONTC employees are provided with a safe and healthy work environment.

To eliminate or minimize the risk of loss to employees, equipment, property and the environment.

To minimize corporate liabilities.

APPLICATION AND SCOPE

This procedure applies to all ONTC divisions and departments that require the services of an outside agency to perform work at any level.

DEFINITIONS

Adequate: in relation to procedure, plan, material, device, object or thing, means

a) Sufficient for both its intended use and actual use, and
b) Sufficient to protect a worker from occupational illness or occupational injury

Competent Person: a person who is,

a) Qualified because of knowledge, training, and experience to organize the work and its performance
b) Is familiar with the Occupational Health and Safety Act and/or the Canada Labour Code and the regulations that apply to the work, and
c) Has knowledge of any potential or actual danger to health or safety in the workplace

Construction: includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, land clearing, earth moving, grading, excavating, trenching, digging, boring, drilling, blasting, or concreting, the installation of any machinery or plant, and any work or undertaking in connection with a project, but does not include any work or undertaking in a mine.

Constructor: a person who undertakes a project for an owner and includes an owner who undertakes all or part of a project by himself/herself or by more than one employer.

Contractor: any person or entity contracted to provide service to ONTC.

Employer: a person who employs one more workers or contracts for the services of one or more workers and includes a contractor or subcontractor who performs work or supplies services and a contractor or subcontractor who undertakes with an owner, constructor, contractor or subcontractor, to perform work or supply services.

Prescribed: means prescribed by a regulation made under the Occupational Health and Safety Act or Canada Labour Code

Project: a construction project whether public or private, including

a) The construction of a building, bridge, structure, industrial establishment, mining plant, shaft, tunnel, caisson, trench, excavation, highway, railway, street, runway, parking lot, cofferdam, conduit, sewer, watermain, service connection, telegraph, telephone or electrical cable, pipeline, duct or well, or any combination thereof,
b) The moving of a building or structure, and
c) Any work or undertaking, or any lands or appurtenances, used in connection with construction

Project Administrator: a person who leads/coordinates work project.

Regulation: the regulations made under the Occupational Health and Safety Act or the Canada Labour Code.

MATERIAL REQUIRED

Contractor Safety Checklist and Orientation Form
ONTC Contractors Safety Requirements & Liability Release Form
Project Hazard Assessment
Contractor Orientation Training Package

PROCEDURE

Before Contractors/Subcontractors begin work/project ensure the following is adhered to:

- Ensure that all contractors on the property are compliant and current with all legislative licensing requirements.
- Ensure that all contractors provide a valid WSIB Clearance Certificate and/or liability insurance before beginning any work on ONTC property.
- Provide orientation training to contractors prior to commencement of work.
- Ensure contractors understand their contractual obligations under this standard.
- Provide a designated ONTC contact person to ensure contractors compliance to ONTC policies, procedures and standards through ongoing work site inspections, communications and reported safety concerns.
- Ensure that application of this standard is delivered and used consistently throughout ONTC operations.

Responsibilities

The responsibility of health and safety can become complex when contractors/subcontractors are procured to conduct work for any ONTC project.

To ensure clarity of responsibility, where a contractor is hired to conduct work for ONTC and the Provincial Occupational Health and Safety Act applies in respect of that work, the Contractor will be deemed the Constructor.

No ONTC employee will be assigned to work on the same project as the general contractor, unless there is an agreement between the Contractor and ONTC determining the contractor as the Constructor.

Where a project requires more than one employer, ONTC may enter into an agreement before the commencement of the project to determine control over the project identifying who will be the constructor.

Employer

The employer is responsible to:

- Ensure contractors, employees, supervisors and managers are adequately aware of the provisions and requirements of the POL Purchasing Policy and Procedure.

- Ensure that contractors, subcontractors and project worker companies are adequately prequalified in accordance with the Contractor Safety Prequalification Form for large projects or projects where the combined value of the project exceeds $50,000.00 and where ONTC is the Constructor.
- Ensure contractors, subcontractors and project worker companies have agreed with and endorsed in writing, the terms of the Contractor Health and Safety Responsibility Agreement.
- Properly implement and periodically audit the contractor prequalification and safety procedure.
- Ensure that authorized staff comply within the Contractor Prequalification and Safety Procedure.
- Discipline and or remove from the authorized contractors list any contractor that fails to comply with this procedure.

Procurement

The Procurement Department is responsible to:

- Conduct prequalification in conjunction with the Project Administrator for consultants and service providers and ensure the completion of the Contractor Health and Safety Responsibility Agreement and the Contractor Prequalification Form (as required) before any work is initiated on any of the ONTC properties;
- Maintain a list of all service agreements, memorandums of understanding, service contracts; and
- Obtain a current copy of WSIB Clearance Certificates and Insurance Certificate for pre-qualified consultants and service providers.

Project Administrator

The Project Administrator is responsible to:

- Contract a pre-qualified contractor;
- Ensure contractors, subcontractors and project worker companies are prequalified in accordance with the Contractor Safety Prequalification Form;
- Ensure the contractor completes the Contractor Orientation Training with the contractor's workers prior to the beginning of a project;
- Complete with the contractor and maintain the Project Hazard Assessment;
- Request applicable training records, certificates, licenses, and written procedures and measures from the contractor as required;
- Ensure the Contractor Health and Safety Responsibility Agreement is completed by the contractor prior to the beginning of work;
- Conduct Safety briefings with the contractors prior to the work beginning and as required by the project;
- Periodically view the work areas to ensure compliance with the Act, associated regulations and the relevant ONTC safety procedures;
- Respond to safety concerns from contractors and others impacted by a project; and
- Ensure all relevant ONTC safety procedures are being implemented at the project.
- Ensure all contractor has provided SDS for all hazardous product used and that the SDS are readily available if stored on ONTC property.

Where a Contractor is hired to perform work for ONTC and the work is subject to the requirements of the Occupational Health and Safety Act, the Contractor will be the Constructor. The aforementioned duties or similar must be completed by the contractor. **Note:** the Contractor – Constructor will be required to utilize their own prequalification and safety contract documents for any and all subcontractors hired to perform work on the project.

Contractors

Contractors are responsible to:

- Employ competent Supervisors and Workers;
- Comply with the Contractor Prequalification and Safety Procedure;
- Complete the ONTC Project Hazard Assessment and Contractor Health and Safety Responsibility Agreement;
- Furnish the ONTC with hard copies of applicable training records, certificates, licenses and written procedures and measures as required;
- Ensure that the Contractor Safety Checklist and Orientation form completed and signed;
- Notify the project administrator of any questions or concerns with Contractor Prequalification and Safety Policies;
- Notify the project administrator of any contraventions of the Act or ONTC's Procedures; and
- Participate in required safety training
- Provide WSIB documentation confirming the contractor is registered and their account is in good standing.
- Provide proof of liability insurance.
- Have all products used in their process evaluated by ONTC personnel prior to the products being brought onto ONTC property. This will be done through the evaluation of Safety Data Sheets (SDS) provided by the contractor/subcontractor.
- Ensure copies of all SDS are readily available.
- Immediately inform designated ONTC contact person of any changes in their process or products used in their operation.
- Prior to entering ONTC property, register with Security, appropriate supervisor or designated ONTC contact person for direction.
- Ensure that all equipment and vehicles are properly maintained and meet prescribed safety standards for that piece of equipment, e.g. no loose pins on backhoe extensions or arms, safety pins and safety features are working properly.

Workplace/Policy Health and Safety Committees

The WHSC/PHSC are responsible to:

- Participate in the development and review of the contractor subcontractor policy, procedure, and applicable forms; and
- Provide a resource to employees in regards to the contractor subcontractor policy, procedure, and applicable forms

Manager Health and Safety

The Manager of Health and Safety is responsible to:

- Provide assistance if needed with prequalification process of contractors as requires by the Purchasing Department and/or the Project Administrator;
- Approve/disapprove exceptions of the Contractor Safety Prequalification process.
- Facilitate in the development and review of the contractor subcontractor policy, procedure, and applicable forms; and
- Apply, audit and discipline compliance specific to the contractor subcontractor policy, procedure, and applicable forms.

TRAINING:

ONTC is responsible to ensure that those ONTC personnel who have duties and responsibilities to act under this procedure are adequately trained in these duties as applicable.

The training shall reinforce the hazard control hierarchy as follows:

- **Elimination**: activities or practices that involve the complete removal of the hazard from the worker in the workplace.
- **Substitution**: involves the replacement of high hazard task or workplace circumstance with a lower hazard task or workplace circumstance.
- **Engineering Controls**: involve creating and using designed infrastructure or equipment to minimize a hazard.
- **Administrative Controls**: involves creating protocols, involving stated obligations and prohibitions that change the way people work.
    - **Warning Signs**: are postings and placards that communicate the presence of a hazard as well as hazard control directives.
- **Personal Protective Equipment (PPE)**: involves the use of gear that is worn by the worker to create a barrier between the hazard and the worker. PPE can include gloves, respirators, hard hats, safety glasses, high-visibility clothing, and safety footwear.

The Manager of Health and Safety will ensure that the training is refreshed at adequate frequency.

Retraining will be provided for all authorized workers or contractors whenever there is a change in their job assignments, a change in condition, equipment or processes that present a new hazard, or when there is a change in the Contractor Safety Prequalification Process.

Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever there is reason to believe, that there are deviations from or inadequacies in the worker's knowledge or use of the Contractor Safety Prequalification Process. The Project Hazard Assessment will be updated to add any additional hazards and corresponding controls, as required.

PROCEDURE:

General Information

The Project Administrator shall establish practices so that all contractors, subcontractors, or contract workers perform their work in a safe and effective manner and meet all the requirements of the Occupational Health and Safety Act, the Canada Labour Code and the Construction Regulations. The Project Administrator must be adequately familiar with all applicable laws, codes and regulations and be capable of applying them.

Where ONTC retains a "Contractor to act as Constructor"

- ONTC is not responsible for ensuring that the requirements of the applicable regulations are met for contractor activities on site, where ONTC has retained a "Contractor who fulfils the role of the constructor" who fully controls all work at a construction site. (Pre-award, ONTC should ask what a candidate Contractor-Constructor company does to prequalify contractors (and subcontractors) to determine how the Constructor proposes to maintain adequate safety on site. Once the project is awarded, ONTC should not involve itself in the project in any way that could be interpreted as "material control" that is strictly the Constructor's duty).
- When ONTC retains the "contractor to act as constructor" for construction project: The ONTC does not have the health and safety responsibilities for this type of construction project, as long as the constructor completely controls all work and the ONTC workers are not intermingling in the project and ONTC is not controlling the project in any way.

ONTC will ensure that all contractors/subcontractors are properly trained, ensure that contractors/subcontractors are monitored and that requirements for safety are observed by the contractor, and that procedures for safe conduct of the work are in place and known to contractor employees.

The Project Administrator shall direct the contractor in completion of all applicable documentation, as described by the Contractor Safety Prequalification Procedure. The Project Administrator shall ensure that the constructor maintains full responsibility for safety on the particular job.

If the work is Non-Construction work where ONTC is acting as the "Employer"
The Project Administrator shall review the ONTC's applicable policies and procedures with the contractors/subcontractors. It is recommended that all contractor/subcontractor workers undergo this training orientation, but it is mandatory that at lease the contractor's supervisor or site superintendent receive the training orientation and then have a method to ensure that this information is passed on to all employees under their direct control. Please note that the requirement of "Lead Employer" must be fulfilled if the work is Confined Space Entry work.

It is the responsibility of the Project Administrator to ensure that the contractor is aware that project specific training is to be conducted.

The Project Hazard Assessment form shall be completed by the Project Administrator and reviewed with all contractors prior to commencement of work.

Contractors/subcontractors that regularly perform services at ONTC must complete a Contractor Training Orientation on annual basis or whenever there is a change in personnel or applicable and safety conditions which may affect the contractor's/subcontractors workers. For project contracts, a Hazard Safety Assessment form will be completed each time the contractor performs a new project, unless the same contract personnel had performed project work of a similar nature within the previous 12 months.

Prequalification

Pre-Qualification of a contractor is designed to ensure that the contractor has:

- Appropriate current and sufficient insurance;
- WSIB Coverage;
- An appropriate and compliant health and safety policy;
- Competent supervisors; and
- A program to completely undertake and control the construction work being conducted at ONTC

When pre-qualifying a contractor who will not act as "Constructor" ONTC shall determine whether the contractor has the specific policies, procedures, training and supervision to perform the job safely and in compliance with all provisions of the OHSA and the applicable regulations. Use the Contractor Safety Prequalification form to fulfill this policy obligation.

If the procurement department is completing the prequalification procedure, input may be required from the Manager of Health and Safety or the Project Administrator if there are specific requirements for a project.

The following items must be submitted by the contractor for prequalification:

- Certificates of insurance – general liability insurance (Minor projects $2,000,000 minimum, Major Projects $5,000,000 minimum)
- WSIB Safety Record – submit a copy for the last 3 years or equivalent accident/injury data.
- Current Clearance certificate – Confirms contractor has met reporting and payment obligations to WSIB. ONTC will be required to receive a copy of the clearance certificate every 2 months and before the final payment on the contract has been made.
- Contractor's Health and Safety Policy.
- Past Environmental, Health and Safety Records – a copy for the last 2 years.
- Training and Certification Records – Contractor must provide documentation verifying all workers have received the necessary safety training required for the specific job.
- Hazardous material list – the contractor must submit a list of all hazardous materials that will be brought onto ONTC property.
- ONTC may require a separate work plan detailing higher hazard work activity or any tasks that may tend to produce adverse.

The Project Administrator will ensure that the Contractor Health and Safety Responsibility Agreement has been completed by the contractor.

The Project Administrator will ensure current copies of insurance, and WSIB clearance certificates, and annual safety reviews are maintained for pre-qualified contractors.

Contractors that have already been pre-qualified should be reasonably favoured and used for OTNC projects.

Project Management
In all circumstances except where a Contractor has formally taken on the role of Constructor, the Project Administrator is responsible for the health and safety on the project, and must halt the project if there are health and safety concerns. The Project Administrator must maintain communication with the contractor throughout the project.

The Project Administrator will be responsible to ensure that all health and safety documentation for the project is completed and maintained.

The Project Administrator is responsible to obtain an ONTC Project Assessment Folder and complete it with Contractor prior to any work beginning.

- Signed Contractor Safety Responsibility Agreement;
- Certificates of Insurance – General Liability Insurance;
- WSIB Safety Record;
- Current Clearance Certificate;
- Contractor's health and safety policy and procedures applicable to the work being conducted;
- Training, licensing and certification records;
- Hazardous materials list and current SDS for material brought onto ONTC property and already onsite that will be used during or encountered during the project;
- Completed Contractor Orientation Training Records;
- And copies of any applicable ONTC procedures that have been reviewed; and
- Completed Contractor Prequalification form.

The Project Hazard Assessment form must be filed once the project has been completed and made available for review if required for auditing purposes.

The Project Administrator must ensure that the Contractor Orientation Training is completed for all workers on the project.

On-Site Safety – All ONTC safety procedures (Fall protection, Confined Space Entry, Lockout/Tagout, Ladder Safety, WHMIS, Personal Protection Equipment, Respiratory Protection, etc.) apply at all construction on ONTC projects.

The Project Administrator shall review all applicable safety procedures with contractors/subcontractors at the site. Copies of the ONTC procedures can be obtained through the Project Administrator.

The Project Administrator will ensure that daily safety briefings are conducted prior to the beginning of each project work day, as well as regularly inspect the work site as the project requires.

If the contractor or subcontractor has a question or concern regarding safety on the project, they should speak to the Project Administrator or their immediate supervisor.

All contractor(s) or subcontractor(s) supervisors must report to the Project Administrator:

- Any unsafe actions or conditions,
- Contraventions of the OHSA/CLC and regulations or any ONTC safety procedure, or
- Existence of any hazard at the project.

Any incident (first aid, near miss, etc.) on the project must be immediately reported to the Project Administrator.

NOTE: Workers and their supervisors shall be held accountable for violations of health and safety rules, regulations, and procedures. Disciplinary action, where necessary, will be dictated by the ONTC disciplinary procedure and will be based on the merits of the specific case.

APPENDICES/EDUCATIONAL MATERIAL:

- Contractor Safety Prequalification Form
- Contractor health and Safety Responsibility Agreement
- Contractor Orientation Training Checklist
- Project Hazard Assessment

REFERENCES:

- Ontario Occupational Health and Safety Act R.S.O 1990
- O.Reg 213/91 Construction Projects
- Canada Labour Code R.S.C., 1985 c L-2
- Canada Occupational Health and Safety Regulations SOR/86-304
- Contractors Subcontractors Safety NBRHC OH&S4-017

CONTRACTORS WORKING ON ONTC PROPERTY NEAR RAILWAY TRACKS

The following procedure is to be followed when it is necessary for a Contractor to work on Ontario Northland Transportation Commission (ONTC) property near railway tracks.

- The Contractor, through the Contract Administrator, shall contact the District Manager for the Ontario Northland Railway (ONR) to coordinate and schedule their operations on or near ONR property.

  Contact: **Mr. Chad Martin**
  District Manager - District # 1
  Englehart, Ontario
  Office Phone No. (705) 544-2292, Extension 125
  Cell No. (705) 545-0725

  Contact: **Mr. Dave Lallier**
  District Manager - District # 2
  Cochrane, Ontario
  Office Phone No. (705) 272-4610, Extension 632
  Cell No. (705) 272-9588

- The Contractor shall fully comply with all requirements of ONR in the planning, scheduling and control of his works within the ONR right-of-way.

- The Contractor shall plan and carry out his work in a manner that does not interfere with rail traffic, or cause clearance restrictions.

- Flagging protection for railway traffic will be provided by the ONR upon notification as outlined herein. However, flagmen provided shall not relieve the Contractor from liability for damages to Railway facilities caused by the Contractor's operation.

- The Contractor shall have a responsible person present at all times to whom the Contract Administrator will issue instructions regarding work on ONR right-of-way.

- All communications with ONR shall be done through the Contract Administrator. ONR will not deal directly with the Contractor.

- All instructions from flagmen shall be obeyed immediately by all personnel on site.

- A flagman will be required when any personnel or equipment is working within 15 metres of the centerline of the nearest track, or protective devices where the work, in the opinion of the Contract Administrator or the Railway, may be exposed to or interfere with the operation of the Railway tracks.

- When a flagman is required, the Contractor, through the Contract Administrator, shall provide a written notice at least one week in advance to ensure the availability of flagmen.

If prior to work commencing, the Contractor, through the contract Administrator, receives confirmation that such flagmen are not available, the Contractor, through the Contract Administrator, shall reschedule the proposed work to a date and time when such flagging protection will be available.

- In no case shall the Contractor or any of his equipment or personnel work closer than 15 metres from the centerline of the nearest track without prior consent of the Contract Administrator.

- No construction equipment, materials, or debris shall be permitted to be used, stored, dropped, or allowed to accumulate within 15 metres of overhead cable and posts.

- All equipment must stop working on the approach of any train when said equipment is on ONR right-of-way or within 15 metres of the centerline of the nearest track.

- The Contractor shall ensure that both rails of the same tracks are never connected with any conductor of electricity, such as steel measuring tapes or metal traction equipment.

Fiber Optic Cable

Along much of ONR's right-of-way lies buried fiber optic cable. A cable locate must be done prior to any work taking place. A locate request can be completed online at https://www.ontarioonecall.ca/portal/ or by calling 1-800-400-2255.

ONR Railway Flagging Policy and Costs

The Contractor shall be responsible for payment of flagman protection costs. Flagging protection will be billed out by the ONR in accordance with the following:

Any occupation or crossing of the operating railway right-of-way not covered under a license of occupation or private crossing agreement **MUST** be protected by a railway flagman.

Arrangements for flagging protection are to be made by the Contractor, through the Contract Administrator, at least one week in advance by contacting the appropriate District Manager at the numbers provided above.

Flagging protection will be billed out as per the attached "Railway Flagging Protection Policy".

ONTARIO NORTHLAND TRANSPORTATION COMMISSION
RAILWAY FLAGGING PROTECTION POLICY

Work or other activity (on, over or under) or within 15 metres of ONTC's track may impact upon the safe use of the track. Consequently, it is essential that qualified ONTC personnel provide flagging protection when personnel, equipment or vehicles are going to be (on, over or under) or within 15 metres of the track for any purpose. Workers must follow the directions and instructions of the ONTC personnel providing the flagging protection, at all times.

Emergency Situations
There is no exception made to the requirement for flagging protection even when a condition arises where the reliability or safety of an installation or of equipment or the safety of personnel is at risk.

Grade Crossing Exemption
All crossings, equipment or structures encroaching onto railway lands require approval by ONTC, a signed licence agreement with ONTC and (in some cases) proof of insurance. If a person or business has fulfilled the requirements and has obtained a licence agreement for a grade crossing from ONTC, they are permitted to cross the track over their approved crossing – if the way is clear and safe.

Snow removal and brush clearing are subject to specific exemptions and requirements.

Procedure
Arrangements for flagging protection are to be made at least one week in advance by contacting the appropriate District Manager at one of the following numbers:

District # 1	Chad Martin	(705) 545-0725
District # 2	Dave Lallier	(705) 272-9588

Unless otherwise authorized by the Director of Rail Infrastructure, all fees, as listed below, are to be paid by the applicant. The applicant is to provide a Purchase Order number at the time the arrangements are made with the District Manager.

Billing is based on an hourly rate including travel time, rounded up to the nearest full hour – plus applicable taxes. Rates are provided below.

Service ($ per hour)	**ONTC Fiscal Year**					
	2023-24		2024-25		2025-26	
	Regular	Overtime	Regular	Overtime	Regular	Overtime
Flagging - hirail included	$146.50	$202.00	$150.00	$206.7	$153.00	$210.85
Flagging - hirail operator only	$111.00	$166.50	$113.40	$170.10	$115.70	$173.55

Office of the Director of Rail Infrastructure
March 2023

FOR RAIL EMERGENCIES CALL: 1-800-558-4129 Ext. 141

GI, New Mechanical Building

Hearst, ON

Geotechnical Investigation

Ontario Northland
Final GI Report

March 14, 2024
02311183.000

ENGLOBE

Ontario Northland

GI, New Mechanical Building

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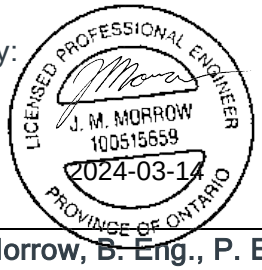

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Revisions and publications log

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0A	January 26, 2024	Draft version published for comments
01	March 14, 2024	Final Report

Distribution

1 PDF copy	Client

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If tests have been carried out, the results of these tests are valid only for the sample described in this report.

Englobe Corp.’s subcontractors who have carried out on-site or laboratory work are duly assessed according to the purchase procedure of our quality system. For further information, please contact your project manager.”

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APPENDICES

1 Introduction

As requested by Ontario Northland, the Client, Englobe Corp. (Englobe) has carried out the geotechnical investigation to assess the soil conditions at the location of a proposed new mechanical building located in Hearst, Ontario (the Site). The Site is located at 10-10th Street, located off Highway 11 at UTM coordinates 5507703N, 307746E, Zone 17U (see Key Plans, Drawing No. 1a and 1b, Appendix A). We have completed the field and laboratory testing programs and submit the results in this report along with our comments and recommendations.

It is understood that the proposed new mechanical building will be a single-storey building with no basement with a total area of approximately 166 sq.m (1792 sq.ft).

The purpose of the geotechnical investigation was to ascertain the subsurface soil and groundwater conditions in the general area of the proposed new developments to provide geotechnical recommendations to support the design of various foundation and infrastructure options.

1.1 Site Conditions

The proposed new mechanical building will be constructed on the site of an existing mechanical building and a shed. Underground utility service clearances were undertaken in advance of the investigation. An untraceable waterline was identified in the area of the proposed geotechnical investigation. The area that this waterline is assumed to exist was avoided during the geotechnical investigation and an area safe to advance the boreholes was provided by the Client.

See Photo Essay Appendix D for existing site conditions.

2 Fieldwork

The fieldwork for this geotechnical investigation was carried out on December 12, 2023, by Richard Twiss of Englobe Corp. The private utility locates at the site was done on November 21, 2023, by Landshark Locates, who was retained by the Client. The fieldwork consisted of four (4) sampled boreholes (BH No. 1 – BH No. 4) to depth ranges of 4.0 m – 5.9 m below grade.

The borehole locations were laid out on-site by Englobe field staff at the area of the proposed New Mechanical Building. The locations of the boreholes are shown on the Borehole Location Plan, Drawing No. 2 in Appendix A.

All boreholes were advanced with a Geoprobe 7822DT drill rig equipped with continuous flight hollow stem augers and a direct-push dual tube operated by North Drilling. The field work was under the full-time direction and supervision of an experienced member of our engineering field staff who was responsible for underground service locates, retrieving samples, field sample classification, and overall field/drill supervision. Samples at the borehole location were obtained at frequent intervals of depth by using the Standard Penetration Test (SPT) method. The SPT method of sampling involves advancing a 50 mm outside diameter split spoon sampler with the force of a 63.5 kg hammer, freely dropping 760 mm, mounted in a trip (automatic) hammer. The number of blows per 300 mm penetration is recorded as the “N” value.

All samples taken during this investigation were stored in labeled airtight containers for transport to our Thunder Bay laboratory for visual examination and select laboratory testing. The routine laboratory testing consisted of natural moisture content determination, particle size analysis, and Atterberg limits determination on select samples. In addition, limited analytical testing in accordance with the basic parameters required by Ontario Regulation 406/19 was done on select soil samples form each borehole for preliminary Excess Soils study (Factual data only). Samples remaining after testing will be stored for a period of three months following the date of this report and then discarded unless otherwise instructed.

Soil samples selected for chemical laboratory analysis were collected into pre-cleaned, laboratory-supplied containers provided with necessary preservatives and placed in an ice-chilled cooler to minimize the potential for chemical activity. Sample containers were labelled with unique sample identification, project reference, date, and sampling time.

To comply with the intent of Ontario Water Resources Act Regulation 903 amended to O. Reg. 128/03, the boreholes were sealed with reverse augering techniques for the full depth and, where appropriate, the surface was sealed with a bentonite plug.

The borehole locations were surveyed into a local temporary benchmark (TBM) using rod and level survey equipment, assuming a reference elevation of 100 m and an accuracy of ±0.05 m. The local benchmark is described as the top of the service box of a water main near the existing mechanical building (see Photo Essay, Photo 4, Appendix D). Handheld GPS was used to collect UTM coordinates at the borehole locations with an accuracy of ±3.0 m horizontally. These elevations have not been confirmed by an Ontario Land Surveyor (OLS) and, as such, must be confirmed by an OLS prior to use in design.

Table 2-1: Summary of Borehole and Auger probe, Locations and Depths

Borehole ID	UTM Easting (1) (m)	UTM Northing (1) (m)	Elevation (m)(2)	Depth (m)	Refusal Depth (m)
BH No.1	307735	5507708	100.0	5.9	N/A
BH No. 2	307730	5507702	100.0	5.9	N/A
BH No. 3	307759	5507707	99.9	5.9	N/A
BH No. 4	307749	5507689	100.1	4.0	4.0

Notes:

(1) UTM Zone 17U

(2) Ground elevation noted in relation to local benchmark of 100.00 m. Top of the service box of a water main located near existing mechanical building was used as local benchmark.

All measurements in this report are in Metric units (unless otherwise noted).

3 Subsurface Conditions

Soil conditions are confirmed at the boring locations only and may vary between borings. The boundaries between stratums indicated on the logs are inferred from non-continuous sampling, results of in-situ tests (e.g., SPT, etc.), observations during the drilling operations, and/or the response of the drilling equipment. These boundaries are approximations only and should not be regarded as exact planes of geological change as the actual transition may be gradual from one soil type to another. The description of compactness of the granular subsoils, in part, was based on the results of the SPT, and/or the response of the drilling equipment. The consistency of very fine cohesive subsoils, if encountered, was based on in-situ vane tests. Refusal is defined as the point at which the augers can no longer be practically advanced with the equipment used in this investigation. Refusal, if encountered, to further advance of the augers, and SPT may have been due to the presence of very dense soils, cobbles/boulders in the underlying soils, or possibly bedrock. Defining the nature of auger refusal with diamond drilling operations was outside the scope of work for this project.

The borehole locations are shown in Drawing No. 2 included in Appendix A. The subsurface conditions in the geotechnical boreholes are presented in the individual Borehole Logs (presented in Appendix B) and summarized in the following paragraphs.

3.1 Subsurface Summary Description

Boreholes BH No. 1 to BH No. 4 were advanced in the area of the proposed new Mechanical Building. The subsurface conditions of each borehole are summarized in Table 3-1 below.

Table 3-1: Summary of Observed Stratigraphy at the Discrete Borehole Locations

Borehole ID	Approximate Depth (m)			
	Fill - Sand	Clay	Silt	Silty Sand/Sandy Silt
BH No. 1	0 - 0.8	0.8 - 2.3	2.3 - 5.3	5.3 - 5.9
BH No. 2	0 - 0.8	0.8 - 2.3	2.3 - 4.6	4.6 - 5.9
BH No. 3	-	0 - 0.8	-	0.8 - 5.9
BH No. 4	0 - 0.8	-	2.3 - 4.0	0.8 - 2.3

3.1.1 Fill - Sand

At the surface of BH No. 1, 2, and 4 to a depth of 0.8 m below grade, a layer of sand fill was encountered. The material was brown/black in colour, dry to wet in saturation, with silt, some gravel, and trace to some clay also observed within the stratum. The natural moisture content of this material ranged from 23% - 27%. Gradation (hydrometer) analysis was carried out on one (1) sample obtained from this deposit, the results of this test is summarized in Section 3.1.5 below and also summarized in Appendix C – Laboratory Test Results.

3.1.2 Clay

At the surface of BH No. 3 and at BH No. 1 and BH No. 2 from the depth ranges of 0.8 m – 2.3 m below grade, a layer of clay was encountered. The material was brown in colour, moist in saturation with some sand, gravel, silt, and trace organics also observed within the stratum. The natural moisture content of this material ranged from 17% to 26%. Based SPT 'N'-values of the samples obtained from these boreholes ranging from 5 to 11 blows per 300 mm of penetration and the estimated undrained shear strength from field pocket penetrometer testing of 50kPa, the consistency of this material can be described as “firm to stiff”.

Atterberg Limits Testing was carried out on two (2) samples of this deposit, the results of these tests are summarized in Section 3.1.5 below and summarized in Appendix C – Laboratory Test Results.

3.1.3 Silt

Underlying the clay at BH No.1 and BH No.2, and underlying the silty sand at BH No. 4, a layer of silt was encountered ranging from 1.7 m to 3.0 m thick. The material was brown in colour, moist to wet in saturation, with sand, some clay, and trace gravel also observed within the stratum. The natural moisture content of this material ranged from 9% to 14%. Based on SPT ‘N’-values of the samples obtained from these boreholes ranging from 15 to 79 blows per 300 mm of penetration, the compactness of this material can be described as “compact to very dense”, generally very dense.

Gradation (sieve/hydrometer) analysis was carried out on two (2) samples of this deposit. The results of these tests are summarized in Section 3.1.5 below and also summarized in Appendix C – Laboratory Test Results.

3.1.4 Silty Sand / Sandy Silt

Underlying the clay at BH No.1 and BH No. 2, underlying the clay at BH No. 3, and underlying the sand fill at BH No. 4, a layer of silty sand or sandy silt was encountered ranging from 0.6 m – 5.1 m

thick. The material was grey/brown in colour, dry to wet in saturation with trace clay and trace to some gravel also observed within this stratum. The natural moisture content of this material ranges from 11% to 26%. Gradation (sieve) analysis was carried out on two samples obtained from BH No.3 and the results of this test are summarized in Section 3.1.5 below and summarized in Appendix C – Laboratory Test Results.

3.1.5 Laboratory Test Results

The following summarizes the laboratory data results obtained from relevant samples collected during the geotechnical investigation. Samples were obtained from the investigation at BH No. 1 – BH No. 4 at frequent intervals of depth by using the Standard Penetration Test (SPT) method, or by collecting an auger sample. The SPT method of sampling involves advancing a 50 mm outside diameter split spoon sampler with the force of a 63.5 kg hammer, freely dropping 760 mm, mounted in a trip (automatic) hammer.

The following laboratory tests were conducted to determine relevant geotechnical information at select borehole locations:

- Gradation (sieve)
- Gradation (hydrometer)
- Atterberg Limits Testing

The following Table 3-2 summarizes the gradation results (sieve and hydrometer) obtained from conducting laboratory testing on the following samples:

Table 3-2: Gradation Results – Sieve & Hydrometer

Borehole & Sample ID	Description	Depth (m)	Gradation			
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH No. 1	Silt	2.3 - 3.0	4	24	61	11
BH No. 2	Silt	3.0 -3.8	3	28	69	
BH No. 3	Sandy Silt	0.8 - 1.5	6	33	61	
BH No. 3	Sandy Silt	5.3 - 5.9	2	37	61	
BH No. 4	Sand	0.0 - 0.8	14	59	23	4

The following Table 3-3 summarizes the Atterberg Limits Testing results on the samples obtained from conducting laboratory testing on the following samples:

Table 3-3: Atterberg Limit Results

Borehole & Sample ID	Depth (m)	Atterberg Limits		
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
BH No. 1, SS 3	1.5 - 2.25	22.8	15.8	7.0
BH No. 2, SS 2	0.75 - 1.5	43.9	21.3	22.5

The Results of the Atterberg Limits analysis on silt and clay samples indicates that the sample obtained from BH No.1 contains low plastic lean clay and cohesionless silt (CL-ML). The sample obtained from BH No. 2 consists of medium plastic clay (CI).

3.2 Groundwater Data

Groundwater levels at the boreholes were measured during the field investigation. It is noted that there may have been insufficient time for groundwater levels to stabilize while the boreholes were being excavated/open. The groundwater level estimates are recorded on the individual Record of Borehole Log Sheets (Appendix B) and also summarized in Table 3-4 below:

Table 3-4: Groundwater Level Measurements

Boring ID	Ground Elevation (m)	Groundwater Depth (m)	Cave-In Depth (m)	Groundwater Elevation (m)
BH No. 1	100.0	Dry (1)	4.9	-
BH No. 2	100.0	Dry (1)	5.2	-
BH No. 3	99.9	5.5	5.4	94.4
BH No. 4	100.1	Dry (1)	3.6	-

Notes:
(1) Dry indicates that no groundwater was present within the borehole at the time of the investigation.

Groundwater levels will fluctuate seasonally and/or yearly. As such, the groundwater level should be established in advance of the construction operations (i.e. at time of tender or following award, prior to starting site work) such that adequate groundwater control plans can be developed.

3.3 Chemical Analysis of Soils

3.3.1 Preliminary Reuse Soil Quality Assessment Criteria

The soil analytical results were compared to the criteria presented in Part II: Excess Soil Quality Standards of the Ministry of Environment, Conservation and Parks (MECP) document titled “Rules for Soil Management and Excess Soil Quality Standards,” dated December 08, 2020 (hereinafter referred to as the MECP Excess Soil Standards). Samples were selected from the geotechnical investigation to provide a preliminary assess of the soil quality at the Site. To determine the appropriate off-site reuse of the excess soil, the following O. Reg. 406/19 Excess Soil Quality Standards were used to assess the soil quality:

- Table 1: Full Depth Background Site Condition Standards for residential/parkland/institutional/ industrial/commercial/community (RPIICC) property use (Table 1 RPIICC Standards);
- Table 2.1: Full Depth Excess Soil Quality in a Potable Ground Water Condition for RPI and ICC property use (Table 2.1 RPI Standards and Table 2.1 ICC Standards, respectively); and
- Table 3.1: Full Depth Excess Soil Quality in a Non-Potable Ground Water Condition for RPI and ICC property use (Table 3.1 RPI Standards and Table 3.1 ICC Standards, respectively).

3.3.2 Preliminary Reuse Soil Leachate Assessment Criteria

The soil analytical results for the samples submitted for Modified Synthetic Precipitate Leaching Procedure (mSPLP) analysis were compared to MECP Leachate Screening Levels (LSLs):

- Table 1: Leachate Screening Levels for Excess Soils Reuse for RPI and ICC property use (Table 1 RPIICC LSLs);
- Table 2.1: Leachate Screening Levels for Full Depth Soils in Potable Groundwater Conditions for RPI and ICC property use (Table 2.1 RPI and Table 2.1 ICC LSLs, respectively); and
- Table 3.1: Leachate Screening Levels for Full Depth Soils in Non-Potable Groundwater Conditions for RPI and ICC property use (Table 3.1 RPI and Table 3.1 ICC LSLs, respectively).

3.4 Soil Quality

Based on the requirements of O. Reg. 406/19 On-site and Excess Soil Management, for the laboratory analytical results of bulk soil samples and leachate soil samples:

- If Table 1 RPI/ICC Standards and Table 1 LSLs are met, the excess soil shall be reused at any receiving site or can be sent to any receiving facility;
- If Table 2.1 RPI/ICC Standards and Table 2.1 LSLs are met, the excess soil can be reused at an appropriate soil receiving facility where Table 2.1 and 3.1 RPI/ICC Standards are required. The excess soil cannot be reused at a site where Table 1 RPI/ICC and LSLs Standards are required;
- If Table 3.1 RPI/ICC Standards and Table 3.1 LSLs are met, the excess soil can only be reused at an appropriate soil receiving/landfill facility where Table 3.1 RPI/ICC Standards are required. The excess soil cannot be reused at a site where Table 1 and Table 2.1 RPI/ICC and LSLs Standards are required; and

  If Table 3.1 ICC Standards and/or Table 3.1 ICC LSLs are exceeded, the excess soil cannot be reused and should be disposed of at a licensed landfill facility.

3.4.1 O. Reg. 406/19: Bulk Soil Samples

Based on the review of the laboratory analytical results, all the analyzed parameters (i.e., Metals and inorganic parameters and PHCs/BTEX) were below the laboratory detection limits and/or met the respective Standards with the following exceptions:

Table 3-5: Soil Exceedance Summary - Bulk Analysis

Sample ID	Date	Depth (m bgs)	Table 1 RPI/ICC	Table 2.1 RPI	Table 2.1 ICC	Table 3.1 RPI	Table 3.1 ICC
BH1,SS-2	2023-12-12	0.8-1.4	**EC**	Meets	Meets	Meets	Meets
BH2,SS-3	2023-12-12	1.5-2.1	**SAR**	Meets	Meets	Meets	Meets
BH3,SS-3	2023-12-12	1.5-2.1	**PHCs and BTEX**	**PHCs and BTEX**	**PHCs and BTEX**	**PHCs and BTEX**	**PHCs**

The soil analytical results for PHCs, BTEX, and metals are summarized in Tables 1, 2, and 3, which are contained in Appendix C.

The laboratory certificates of analysis (COAs) provided by Bureau Veritas for soil samples analyzed for this Soil Characterization are contained in Appendix F.

3.4.2 O. Reg. 406/19: Leachate (mSPLP) Samples

Based on a review of the laboratory analytical results, all the analyzed parameters (i.e., metals and VOCs) were below the laboratory detection limits and/or below the MECP Table 1, Table 2.1, and Table 3.1 Leachate Screening Levels for RPI and ICC property use.

The mSPLP soil analytical results for metals and VOCs are summarized in Tables 3, 4, and 5 in Appendix E.

The detailed laboratory results of the mSPLP analyses are provided in the attached laboratory COAs in Appendix F.

3.4.3 Quality Assurance/Quality Control

Soil sampling undertaken during the Field Program followed written procedures to ensure sample integrity and reliable data collection. Soil samples were collected into pre-cleaned test group specific containers prepared with any necessary preservatives by the contractual laboratory, Bureau Veritas. Sample integrity was maintained by placing containerized samples immediately upon collection into ice-chilled insulated coolers to minimize chemical activity or sample degradation and delivered to the laboratory within test group specific holding times. Decontamination protocols were followed, and new/clean disposable sampling equipment (i.e., gloves) was used to minimize the potential for sample cross-contamination and bias.

Certificates of analysis prepared by the contractual laboratory were received for all soil samples analyzed. Review of the certificates of analysis indicated that they were prepared in a manner consistent with the requirements of O. Reg. 153/04, as amended and O. Reg. 406/19. Copies of the laboratory certificates of analysis are presented in Appendix F.

Relative Percent Difference values (RPDs) are considered statistically applicable when the concentrations of the sample and its duplicate are both greater than five times of the laboratory reported detection limit (RDL), according to guidance provided by the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (MOE, 2011).

One (1) field duplicate sample was collected and sent for laboratory analyses. Based on the review of the laboratory QA/QC sample results from the duplicate sample (BH No. 5, SS-2), all the RPD values were either below alert limits or could not be calculated as the analytical results were less than five times the RDLs. Based on the review of the laboratory QA/QC sample results and RPD calculation results, the quality of analytical data is reliable. A summary of the calculated RPDs for the selected soil sample and its pair is shown in Table 7, in Appendix E.

4 Discussion and Recommendations

It is understood that the proposed new mechanical building will be single storey with no basement. The dimensions of the proposed building is expected to be approximate 9.75m by 17m (32 ft x 56 ft).

In general, the soil conditions are generally consistent throughout the site. To summarize the borehole findings:

- Surficial sand fill was observed at BH No. 1, 2, and 4. The surface of BH No. 3 consisted of clay.
- Clay and silt overlying silty sand was observed at BH No. 1 and BH No. 2.
- SPT refusal was encountered at BH No. 4 at a depth of 4.0 m.
- Groundwater was observed at BH No. 3 at a depth of 5.5 m below grade. The cave-in depths of the boreholes ranged from 3.6 m – 5.5 m below grade.

All foundation design recommendations presented in this report assume that an adequate level of construction monitoring during foundation excavation and installation will be provided. An adequate level of construction monitoring is considered to be:

a) For shallow foundations, examination of all excavation surfaces prior to fill placement or forming footings to ensure the integrity of the subgrade;
b) For earthwork, full-time monitoring and compaction testing.

4.1 Frost Protection

The estimated frost depth penetration for the area of the subject site is approximately 2.6 m depth for exposed, native soil locations (OPSD3090.100 Rev#1 Nov 2010)

The overburden soils at this site have a moderate variability to potential frost heave. Where silt content is less than 40%, the susceptibility to frost heave is low, however, in areas where silt is identified as the predominant soil type, the potential for frost heave should be considered to be high.

All exterior footings/foundation elements and isolated footings supported on soil and subject to frost penetration must have frost protection (permanent and during construction) to the depths noted above.

If a sufficient depth of earth cover cannot be provided for frost protection, equivalent expanded extruded polystyrene (EEP) insulation may be used in conjunction with available soils cover to provide frost protection. If EEP is used for frost protection, precautions must be taken to protect the insulation from accidental spillage of hydrocarbons, solvents or other destructive products.

Foundations can be founded at a higher elevation provided they are supported on approved subgrades and insulated. The following general insulation design can be used. The following insulation design was based on the generalized design curves (Robinsky and Bespflug, 1973) for minimum insulation requirements for heated structures founded on sandy soil. Synthetic insulation (i.e. Styrofoam SM, HI-40, HI-60, HI-100, depending on loading, or equivalent) should be placed in accordance with Table 4-1 below:

Table 4-1: Insulation Design – Building Foundations

Temperature of Building	Minimum Soil Cover (Z, mm)	Outward Horizontal extension (L, m)	Minimum thickness (t, mm)
Unheated	300	2.44	180
7°C	300	2.44	75
18°C	300	1.22	75

The insulation thicknesses are based on 2000 Design Freezing Days for the location of the site (Hearst, ON) as per Figure 13.6 of the Canadian Foundation Engineering Manual (CFEM). For every additional 0.3 m of soil cover, the horizontal outward extension of the insulation can be reduced by 0.3 m.

The insulation should be installed in accordance with the manufacturer's directions. In general, beyond the building/foundation footprint, the horizontal insulation should be sloped downwards slightly (i.e. 2 to 3%) to promote drainage away from the structure. The insulation should be overlapped (or step jointed) and pegged or spot glued together. The insulation must be unbroken and any damaged pieces must be replaced. To reduce the risk of damage to the polystyrene insulation from an accidental hydrocarbon spill, it is recommended that the insulation be covered, where appropriate, with a layer of 6 mil polyethylene (i.e. maintenance areas, garage entrances, below parking lots, etc.).

Soils that are sensitive to frost heave may experience heave during the winter/spring months, only to settle back once thawed. As such, the founding subgrades for footings, slab on grade, services, etc. must be protected from frost penetration at all times during foundation excavation and construction operations. Should freezing temperatures occur during construction, the Contractor must undertake to prevent frost penetration into the natural soils (straw, insulated traps, etc.) until such a time that footings, slab on grade, services, etc. are adequately protected (soil cover, insulation, heat is supplied to the building, etc.).

Frost susceptible soils shall not be used adjacent to the foundation walls within the depth of frost penetration from the ground surface. Frost jacking from adjacent soils is not expected to be a concern as long as non-frost susceptible material is used as backfill (Granular B Type I or Granular A).

Concrete cannot be placed against materials with subzero temperatures.

All granular backfill must be free of frost, ice, and snow, and at an appropriate moisture content and temperature to allow compaction. Once a lift of engineered fill is placed, compacted, and accepted, it is considered acceptable to backfill overtop of this lift if the lift is unfrozen or if there is minimal frost within the surface of the lift. If the surface of a granular fill lift is frozen, the Contractor shall, in

conjunction with an Englobe representative, confirm depth of frost prior to backfilling. It is noted that frost penetration can be reduced through the use of insulated tarps, with or without heat source (depending upon ambient temperatures), and by ensuring backfilling operations are continuous.

In addition, active monitoring of the subgrade temperatures may be warranted depending upon the time of year that construction is undertaken.

If winter construction is anticipated, a detailed winter construction plan shall be provided by the Contractor prior to the commencement of the project.

4.2 Suggested Soil Parameters

Based on the results of in-situ and laboratory tests conducted to date and presented in Appendix C, the following parameters are suggested as design parameters for the soil types encountered in the boreholes. The geotechnical soil design parameters are summarized in Table 4-2 below.

Table 4-2: Suggested Soil Parameters for Geotechnical Design Analyses

Soil type	Unit weight (kN/m^3)	Undrained Shear Strength, kPa	Angle of Internal Friction, ϕ (Degree)[2]	Interface Friction Angle,δ (Degree)[2,3]	Modulus of Subgrade Reaction Ks (kN/m^3)[1]
Granular Engineered Fill (To be constructed)	21	N/A	33	22	30,000
Sand Fill	18-20 (20)	N/A	28-33 (30)	19	10,000 to 20,000
Native Clay	17 to 18 (17)	40	22 to 25 (22)	18 to 20	3,000 to 15,000
Native Silt	17 to 19 (18)	N/A	27 to 30 (27)	19	5,000 to 10,000
Silty Sand/Sandy Silt	19 to 20 (19)	N/A	28 to 33 (29)	20 to 21	10,000 to 20,000

(1) Recommended parameters have been estimated based on visual observation of the soil conditions, results of measured field testing, laboratory test results, correlation with published information (Terzaghi, Peck, and Mesri, Third Edition; Kenney, 1959; Ohsaki et al. 1959; CFEM, 4th Edition) and our previous experience with similar materials.
(2) Design values are in brackets
(3) Interface between soil and concrete
(4) Provided that all organic inclusions can be removed
(5) N/A - Not Applicable

4.3 Shallow Foundation Recommendations

Preliminary foundation design parameters are provided in this report for static, vertically and concentrically loaded foundations in compression, unless specifically noted otherwise. Eccentric and other design parameters can be provided when more design details are available, if applicable and requested by the structural engineer. All foundation design recommendations presented in this report should be considered preliminary in nature for feasibility and volume considerations and subject to refinements and change during subsequent supplementary analysis during more detailed design stages of the project. In addition, all recommendations are based on the assumption that an adequate level of construction monitoring during foundation excavation and installation will be provided. An adequate level of construction monitoring is considered to include:

a) For shallow foundations, inspection of all excavation surfaces before engineered fill and foundations placement to ensure the suitability of the subgrade; and

b) For earthwork, full-time monitoring and compaction testing for engineered fill below and above foundations.

Due to the compressible nature of the clay up to 2.3 m below grade that was observed at BH No. 1 and BH No. 2, it is recommended that all native clay be removed and replaced with engineered fill. The engineered fill should be minimum 0.5 m thick at the footing locations and extend minimum 0.5 m wide on either side of the footing. A maximum total length of 20 m was considered for estimation of the strip footing geotechnical resistances.

Shallow foundations (concrete base pad or footing) can be designed using limit state static bearing pressures listed in Table 4-3 and Table 4-4 For these estimated bearing pressures to be realized, minimum soil cover is required above the footing as described below (Depth of the footing, D). Adequate equivalent frost protection must be provided as per Section **Error! Reference source not found.**, if footings are installed above frost depth (2.4 m depth at this site). The geotechnical resistance of the proposed bearing areas can be estimated for the ultimate limit state (ULS) and serviceability limit state (SLS) for a maximum settlement of 25 mm. The geotechnical resistance at ULS was calculated by applying load resistance factor of 0.5 according to the 2006 Canadian Foundation Engineering Manual (4th Edition).

Table 4-3: Geotechnical Resistances and Reactions – Strip Shallow Foundations

Location / Area	Possible Bearing Area	Depth of the footing, D (m)	Width of the Footing, B (m)	Factored Resistance at ULS (kPa)	Reaction At SLS (kPa)[1]
BH No. 1 - BH No. 4	500 mm of Engineered Fill over native soil	1.8	Up to 1.0	250	100
			1.0 to 1.5	300	90

Notes:

(1) Subject to satisfactory site-specific settlement checks and necessary adjustments for each individual footing during detailed design stage

Table 4-4: Geotechnical Resistances and Reactions – Square Shallow Foundations

Location / Area	Possible Bearing Area	Depth of the footing, D (m)	Length/Width of the Footing, B/L (m)	Factored Resistance at ULS (kPa)	Reaction At SLS (kPa)[1]
BH No. 1 - BH No. 4	500 mm of Engineered Fill over native soil	1.8	Up to 1.0	300	120
			1.0 to 1.5	350	150

Notes:

(1) Subject to satisfactory site-specific settlement checks and necessary adjustments for each individual footing during detailed design stage

It should be noted that the footing dimensions have been assumed based on typical configuration for similar projects and information provided by the client.

Where unsuitable (e.g. peat/organic soil, existing fill and others) or unstable (e.g. disturbed during excavating, unexpected very loose or soft subgrade, etc.) soils are encountered during construction, the foundation soils must be removed and replaced with compacted engineered fill to the foundation grade. The unsuitable material should be excavated, under the direction of a geotechnical engineer, to competent subgrade and then backfilled either with Granular 'A' material compacted to 100% standard Proctor maximum dry density (SPMDD) or with a lean concrete mix. The footprint of such removal of weak soils and replacement with engineered fill, should be considered on a case-by-case basis depending on depths required for removal so that bearing pressures can be distributed accordingly.

As previously stated, the granular pad below footings, or for engineered fill to raise site grade below footings, should comprise Granular 'A' material meeting Ontario Provincial Standard Specifications (OPSS). The engineered fill should be placed and compacted in an unfrozen condition and the subgrade should be protected at all times from frost penetration. Engineered fill below footings shall be placed immediately upon excavation and following subgrade approval, using equipment compatible with lift thicknesses suitable based on-site conditions, and generally in level consistently placed lifts not exceeding 300 mm in thickness.

Bearing areas will require very careful preparation. Following excavation, all bearing surfaces should be cleaned of all organic, loose, disturbed, or sloughed material prior to concreting or placing compacted engineered fill. Bearing surfaces should be protected at all times from rain, freezing temperatures and the ingress of groundwater before, during, and after construction. Subgrade dewatering should be anticipated and planned for. All foundation excavations and bearing surfaces should be inspected by a qualified geotechnical engineer to confirm the suitability of bearing surfaces and to confirm that the resistances provided in this report are consistent with what is observed during construction inspection.

Backfill above the footing area should consist of granular backfill such as OPSS Granular B Type I compacted to at least 98% of the SPMDD.

4.4 Slab-on-Grade

Slab on grade construction can be used at this site. All deleterious materials (i.e. fill, organics, etc.) should be removed from below the slab on grade. It is suggested that a minimum 300 mm of engineered fill, supported on the undisturbed competent native soil or pre-approved proof-rolled fill, shall be placed below the slab on grade.

The contractor should be prepared to locally excavate deeper to remove unacceptable areas that may become apparent during construction operations. The approved subgrade can then be brought up to the underside of the vapour retarder with engineered fill consisting of an imported granular material meeting OPSS.MUNI 1010 for Granular B Type III, compacted to a minimum 98% SPDD or better. A well-graded coarse-grained soil is described as having no excess particles in any size range with no intermediate sizes lacking (i.e. smooth, concave distribution curve). Generally, the distribution curve for this backfill should fall in the middle of the specification and be limited to maximum sized particles of 75 mm or less (to prevent damage when backfilling against underground structures) and should contain at a minimum 2% fines to facilitate compaction efforts. The use of a well-graded material will facilitate compaction operations.

The use of a vapour retarder will be dependent upon the floor coverings to be used (if any) and the floor covering manufacturers' recommendations should be followed. For preliminary design, a manufactured vapour retarder system (i.e. min 10 mil polyethylene, etc.) over top of the engineered fill may be used. The vapour retarder manufacturer's specifications must be adhered to (minimum overlaps, taping/sealing at openings, sealed around utility and foundation or column perforations, etc.) and the integrity of the system must be maintained (i.e. no holes, tears, or other perforations). The concrete supplier and finisher should undertake to use a mix and placement methodology that will minimize the potential for slab curling.

4.5 Lateral Earth Pressure and Sliding Resistance

Temporary bracing and shoring may be designed using the typical soil coefficients and parameters given in Table 4-5: Lateral Pressure Coefficients, however the designer/contractor should verify the

appropriate soil parameters for the designs of a specific bracing and shoring system. The design should incorporate the effects of hydrostatic pressure, traffic surcharge and retained sloping earth conditions in the bracing design. Lateral Earth Pressure Coefficients are presented in Table 4-5 below.

Table 4-5: Lateral Pressure Coefficients

Soil type	Angle of Internal Friction	Active Earth Pressure (K_a)	Passive Earth Pressure, (K_p)	Earth Pressure at Rest, (K_0)
Granular Engineered Fill (To be constructed)	34°	0.28	3.54	0.44
Sand Fill	30°	0.33	3.0	0.5
Native Clay	22°	0.45	2.20	0.62
Native Silt	27°	0.38	2.66	0.54
Silty Sand/Sandy Silt	29°	0.35	2.88	0.52

Notes:
ø is an angle of internal friction

The sliding resistance can be calculated using the following formula.

$F_r = \Sigma W (\tan\delta)$

Where,

F_r = base resistance to sliding (ultimate)

δ = Interface friction angle

ΣW= Total weight of the of vertical forces acting on footing.

A resistance factor of 0.8 should be applied to the ultimate sliding resistance in accordance with Canadian Foundation Engineering Manual (4th Edition).

4.6 Excavations

Based on the Occupational Health and Safety Act Regulations for Construction Projects, the existing fills and native soils are classified as follows:

— Native silty sand/sandy silt - Type 3

— Silts/clays - Type 4

All excavations greater than 1.2 m in depth must be sloped or shored in accordance with the Occupational Health and Safety Act Regulations for Construction Projects. Depending on location and excavation depth, excavations will be considered as Type 3 or Type 4. Short-term (i.e., day) open excavations in Type 3 soils will be stable above the groundwater table at a temporary angle of 1H:1V, however excavations established at this slope must not be left unattended at any time. Below the prevailing groundwater table, the slopes of open excavations will have to be flattened to 2H:1V or possibly shallower depending upon the method of dewatering employed. Based on the drawings provided by the Client, it is assumed that all installations should be feasible by open cut methods and temporary protection systems will not be required. However, consideration could be given to traditional 'window' excavations utilizing steel engineered trench boxes, assuming adequate dewatering and excavations are undertaken.

4.7 Dewatering

It was noted that the groundwater table was only observed at BH No. 3 at a depth of 5.5 m below grade. However, it is possible that the groundwater levels at the open borehole locations did not have time to stabilize at the completion of the investigation.

Localised groundwater control will be required to maintain a stable and undisturbed subgrade during excavating, construction, and backfilling operations. An unwatered subgrade condition must be maintained at all times during the in-ground operations until backfilling has reached a sufficient height above the prevailing water table (i.e. at a minimum 1 m). The groundwater table should be temporarily drawn down to a sufficient depth (depends upon soil type, depth of excavation, location of water table, etc.) below the ultimate subgrade elevation (i.e. base of excavation) to maintain subgrade stability and to allow for the placement of bedding, engineered fill, and/or construction of structures.

Ultimately, the method of dewatering will be the choice of the contractor. The importance and benefits of maintaining a dry stable subgrade during excavation and construction cannot be stressed enough. Failure by the contractor to adequately control the groundwater can result in disturbance to the founding/supporting subgrades, which can result in having to carry out corrective measures (i.e., additional excavation, time delays, etc.) to improve the subgrade. Corrective measures required to improve subgrades where groundwater is not adequately controlled will be at the Contractors cost.

The EPA requires a person who is engaging in the prescribed water taking activities set out in O. Reg. 63/16, that meet the criteria set out in that regulation, to register those activities in the Environmental Activity and Sector Registry (EASR), and possibly obtain a Permit to Take Water (PTTW). An EASR or PTTW is required by the Ministry of Environment, Conservation and Parks if the daily taking of groundwater exceeds 50,000 L or 400,000 L per day, respectively.

Standard groundwater control techniques through the use of sump holes with pump can be used at this site. Temporary construction groundwater control is typically undertaken using oversized excavations and installing perimeter/interior drains/ditches leading to a sufficient number of strategically placed filtered sump holes located in the base of the excavation outside the area of influence of engineered fill and/or foundations. It is noted that the efficiency of conventional sump holes to control the groundwater depends highly upon the number of sumps, the depth of their base below the ultimate subgrade level, method of construction (i.e. cased and filtered sump hole versus a pump at the base of the excavation), and their spacing. In our experience, to be efficient at groundwater control, conventional sump holes should not be placed more than 10 m apart, preferably less, although placement is highly dependent upon soil types (permeability, etc.) and conditions, depth of sump holes, extent/depth of drains/ditches leading to the sumps, as well as the intent of the project. Where greater draw down is required, a more sophisticated dewatering system will be required that will have to be developed by a qualified dewatering subcontractor. In order to be effective any dewatering operation must be started well in advance of the excavating operations and be run continuously throughout the subsurface construction operations.

The Contractor must undertake to control surface water that develops from precipitation or snow melt that may become perched in the excavations during excavating operations. The groundwater control program designed by the Contractor should account for this during construction operations.

It must be emphasized that, when wet, silty/clay soils (such as encountered at this site) can be easily disturbed through excavation operations, foot traffic, etc. and such disturbed soils can lose a significant amount of the native bearing. To minimize the potential for disturbance, the groundwater must be drawn down a sufficient depth below the base of the excavation (i.e. 500 mm to 1 m).

As part of the Contractors proposed methodology of construction, the Contractor should be requested to submit a dewatering plan prior to commencement of the project that details how they will control groundwater. The plan should include all aspects from methodology (i.e. sump holes and pumps, drainage ditches, vacuum well points), to construction of system (sump hole details, placement, etc.), to operation of system, etc.

4.8 Subgrade Preparation

Based on the findings of the boreholes, the natural silts, silty sands, or sandy silts are suitable to support the new installations, assuming they are adequately protected and prepared.

When wet, the native soil can become sensitive to vibrations (i.e., resulting from excavating, movement of equipment/personnel across the exposed subgrade, etc.) and can be easily disturbed, resulting in significantly reduced bearing capacity and stability. The Contractor must take every precaution to minimize disturbing the subgrade. The Contractor is responsible to address the specific soil conditions, which will be reviewed by the soils engineer. Dependent upon the subgrade condition, the approved subgrade may have to be proofrolled or subexcavated and replaced with engineered fill or lean concrete. Controlling the groundwater in silty subgrades greatly reduces the potential for disturbance.

Some areas may require deeper excavations to achieve an acceptable subgrade or areas of weak/poor subgrade may become evident during construction requiring specific treatment or deeper excavation. The contractor should be prepared to locally excavate deeper to achieve an acceptable subgrade. Every effort must be made to prevent disturbing the founding subgrade during excavating and construction operations. All deleterious materials (i.e., disturbed, organic soils, old infrastructure, etc.) should be removed from the subgrade and replaced with engineered fill, in consideration of the above recommendations.

4.8.1 Subgrade Preparation – Exterior Areas with Hard Surfaces

Three conditions must be met for frost heaving to occur: freezing temperatures, moisture in the subsoil, and the presence of frost susceptible material within the zone of frost penetration. In the project area, the frost penetration depth below surfaces without snow cover is upwards of 2.4 m. All subgrades must be uniform, or proper tapers provided between differing subgrades, to minimize the potential for frost heave.

Based on the select laboratory testing, the natural silts have high to low susceptibility to frost heaving, as such there is a risk of frost related differential movement.

In order to minimize the risk of differential movement (i.e., due to frost heaving, variable subgrade conditions etc.), a uniform subgrade cross-section must be maintained. For example, either the natural subgrade is at a consistent depth below ground surface, which attempts to implement a consistent heave, or the natural subgrade is tapered to allow for gradual differential movement. Alternatively, the excavated natural soils can be reused to create a uniform subgrade where excavations are required; provided the natural soil can be compacted and is replaced in the same soil type and order that it was removed.

Proper subgrade tapers and drainage must be provided between areas with varying subgrades and areas where the native subgrades are encountered at different depths to provide a gradual subgrade

transition to minimize the magnitude of differential heaving beneath the pavement structure. Considering the soils at this site consist of a generally granular fill overlying native sand, silt and silty clay deposits, if the natural soils are used as backfill (provided they are at an appropriate moisture content to allow compaction) tapers should not be necessary.

If soil conditions are encountered that vary significantly from those identified at the borehole locations, tapers may also be required.

Proper frost tapers impart a gradual heave and as such are less noticeable. Standard frost tapers for roadway construction are established at a minimum of 10H:1V slope and should be utilized for this project within paved roadway sections within the depth of anticipated frost penetration.

4.9 Parking Lot – Flexible Pavement Design

It is understood that the Client proposes to construct an asphalt parking lot as part of the development at the site.

The production of a long-lasting, quality pavement structure is highly dependent upon several factors. The pavement structure that supports and distributes the traffic load consists of three separate layers: the subbase, base, and wearing surface. This, in turn, is supported by the subgrade. The long-term performance of the pavement structure is highly dependent upon the uniformity of these layers. A uniform subgrade cross-section must be maintained below the entire pavement structure, free of depressions, and properly sloped towards adequate drainage facilities.

It is recommended that the existing parking structure materials be removed at minimum to the thickness of the proposed pavement structure. The natural subgrade is to be exposed throughout to allow for adequate preparation as described in Section 4.8.

All deleterious materials (i.e., fill, disturbed soil, old infrastructure, organic soil, or service trenches, etc.) should be removed down to the full depth and proper tapers installed, where warranted (See Section 4.8). Some areas of weak/poor subgrade may become evident during construction requiring specific treatment or deeper excavation. If service trenches must cross below paved areas (servicing, etc.) and the trench invert is below the subgrade level, the utility should be properly bedded in granular as per manufacturers specifications, however, the trench should be backfilled, up to subgrade level, using the excavated native materials or OPSS Select Subgrade Material.

Once stripped, the subgrade must be approved by a qualified member of this firm. Ideally, the surface of the subgrade underlying the subbase course is to be crowned at a minimum of 3% cross-fall. If drainage outlet (i.e., subdrains or ditches) inverts are restricted in depth, a cross-fall crowned at 3% may not be achievable. The subgrade shall be crowned to achieve the maximum cross-fall possible to achieve positive drainage. It may be required to crown the subgrade in several sections, directing the drainage to the various perimeter outlets.

Engineered fill may be required to raise the subgrade from approved native subgrade to underside of the pavement structure. If backfill is required to raise the site from approved subgrade to underside of the pavement structure (subbase), it is recommended that, at a minimum, a material meeting OPSS for a well-graded Select Subgrade Material (SSM) be used.

Provided subgrade is properly prepared and is uniform, the following pavement structure is recommended, at a minimum, for the new parking lot:

Table 4-6: Recommended Pavement Structure – Parking Areas

Recommended Layer	Minimum Layer Thickness (Heavy Duty Traffic)	Minimum Layer Thickness (Light Duty Traffic)
OPSS.MUNI 1150 Superpave 12.5 Hot Mix Asphalt Surface Course	40 mm	40 mm
OPSS.MUNI 1150 Superpave 12.5 or 19.0 Hot Mix Asphalt Binder Course	50 mm	N/A
OPSS.MUNI 1010 Granular A (Base and surfacing)	150 mm	150 mm
OPSS.MUNI 1010 Granular B Type I Or OPSS.MUNI 1010 Granular B Type II	600 mm 450 mm	600 mm 450 mm

As noted previously, the cross-section and subgrade type must be uniform to reduce the impact of potential differential frost heaving.

4.9.1 Hot Mix Paving

Surface course pavement placed on this project shall be Superpave (SP) 12.5 and the binder course shall be SP 19.0. It is recommended that both asphalt types be design for Traffic Category 'D'.

4.9.2 Performance Grade Asphalt Cement (PGAC)

A PGAC grade of 58-34 is suggested for projects in PGAC Zone 2 on Table 2 in the March 2008 MTO Superpave and SMA Guide (SP&SMA Guide). Increasing the high temperature value is warranted based on the guidelines provided in Section 4.5 on page 8 of the SP&SMA Guide. As such the asphalt cement used for this work shall be PGAC 62-34.

4.9.3 Removal of Asphalt Pavement

Where possible, remove pavement partial depth (mill) to construct end transitions at the limits of paving, (i.e., along intersecting streets or parking areas) as per OPSS 310, Section 310.07.11.03. Construct butt joints where milled end transitions are not possible.

4.9.4 Granular Materials

Imported granular materials used in the pavement structure on this project shall consist of OPSS.MUNI 10410 Granular A and Granular B Type I.

4.9.5 Compaction

All Granular A (base course) and existing fills and/or Granular B Type I (subbase) material should be compacted to a minimum of 100% Standard Proctor Dry Density (SPDD). Imported fill (SSM), if required, should be compacted to a similar density where possible above the prevailing ground water table.

4.9.6 Drainage

The surface of the pavement must be crowned at a cross-fall of 2% towards ditches or other drainage outlets (storm catch basins). The importance of draining the pavement structure (granular material) below the roadway areas cannot be stressed enough.

To provide positive drainage of the granular base and subbase material below the paved areas perforated drainage pipes leading to a positive outlet are recommended. The invert of the drainage pipes should be located at the underside of the subbase layer (i.e. not trenched in). The perforated drainage pipe should be 150 mm in diameter and be surrounded by an approved porous geotextile membrane.

While not recommended, if ditches are considered, the invert of the ditches should be placed at a minimum of 0.5 m below the underside of the subbase (i.e., Granular B Type I or Type II) level. Ditches require regular maintenance and cleaning to ensure positive drainage.
The ditches and/or perforated drainage pipe must have a positive gradient towards an outlet or catch basin that will provide continuous drainage.

4.9.7 Performance

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be overemphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be sloped to provide effective drainage. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. As noted previously, the cross-section and subgrade type must be uniform to reduce the impact of potential differential frost heaving.

4.10 Monitoring During Construction

All foundation design recommendations presented in this report are based on the assumption that an adequate level of construction monitoring by qualified geotechnical personnel during construction will be provided. An adequate level of construction monitoring is considered to be: a) for deep and shallow foundations: full-time monitoring and design review during construction; and b) for earthworks: full-time quality control and compaction testing.

An important purpose of providing an adequate level of monitoring is to check that recommendations, based on data obtained at discrete borehole locations, are relevant to other areas of the site.

In order to provide an adequate level of construction monitoring, qualified geotechnical personnel should manage and supervise the following tasks during construction:

<u>Shallow and Deep foundations:</u>

- Confirm that materials and methods meet specifications.
- Inspect foundation subgrades.
- Inspect excavation.
- Review shallow foundation installation/testing methods.
- Review compaction testing records.
- Provide review comments, including any discrepancies found with respect to specifications as well as this report, and the need for any modifications to the design or methods.

Earthworks:

- Confirm that materials and methods meet specifications.
- Inspect subgrade prior to any fill placement.
- Quality control of granular and select fill material.
- Review compaction testing records.

An adequate level of construction monitoring for granular pavement materials is considered to be inspection of the subgrade and compaction testing. An adequate level of construction monitoring for asphalt paving is considered full-time monitoring and testing of the compaction, asphalt cement content, gradation and Marshall properties of the mix.

4.11 Soil Reuse

An Assessment of Past Uses or a Sampling and Analysis Plan have not been completed prior to this preliminary soil quality investigation. The findings from preliminary soil quality testing included in this report do not take into consideration the estimated volume of soil to be managed during construction activities. The soil analytical results were assessed against Table 1, Table 2.1, and Table 3.1 RPI/ICC Standards. The mSPLP results were assessed against the applicable Table 1, Table 2.1, and Table 3.1 RPI/ICC LSLs.

Based on the review of soil analytical results, the following exceedances were noted:

- EC and/or SAR were identified in soil samples BH1,SS-2 and BH2,SS-3 at concentrations above Table 1 RPIICC Standards. The excess soil with EC and/or SAR exceedances generated from the Project Area can be reused onsite or shipped off-site and reused at a site accepting EC and SAR exceedances.
- BTEX (ethylbenzene and total xylenes) were identified above in Table 1 and Table 2.1 RPI/ICC Standards in soil sample BH3,SS-3. The reuse of the excess soil in the vicinity of BH No. 3 location should be considered together with the findings of other contaminants from this borehole location.
- PHCs (F1 and F2) were identified above in Table 1, Table 2.1, and Table 3.1 RPI/ICC Standards in soil sample BH3,SS-3. Based on the presence of PHC exceedances in soil in BH No. 3, the excess soils generated from this area cannot be reused onsite or off-site and should be disposed of at a licensed landfill facility.

Based on the review of the mSPLP results, all the analyzed parameters were reported either below the laboratory detection limits and/or below the MECP Table 1, Table 2.1, and Table 3.1 Leachate Screening Levels for RPI/ICC property use in the soil samples selected for analysis.

Due to the exceedance of PHCs and BTEX noted in BH No. 3, Englobe recommends that additional soil sampling and chemical testing of PHCs and BTEX be done to delineate the limits of the exceedance. This will assist in determining the extent of soils that can be reused onsite or sent to the appropriate receiving site, as well as soils that should be disposed of at a licensed facility.

Based on the review of the laboratory QA/QC sample results, the quality of analytical data is reliable.

This preliminary soil quality investigation is based on soil samples collected from the investigated locations and submitted for selected chemical analysis. The environmental quality of the soils may vary beyond and between the sampling locations. Furthermore, in the event, during the construction activities, if soils appear to be environmentally impacted (i.e., high vapour monitoring readings, staining, odours and/or debris, etc.), such soils should be segregated into separate stockpiles (soil tarping below and above the stockpile), inspected, and analyzed to determine appropriate handling and/or disposal requirements at that time.

5 Limitations

The design recommendations given in this geotechnical report are applicable only to the project described in the text and only if constructed substantially in accordance with details of alignment and elevations stated in the report. Since all details of the design may not be known, in our analysis certain assumptions had to be made. The actual conditions may however, vary from those assumed, in which case changes and modifications may be required to our geotechnical recommendations. We recommend, therefore, that we be retained and provided the opportunity during the design stage to review the design drawings, site survey information, proposed elevations, etc. to verify that they are consistent with our recommendations or the assumptions made in our analysis. It is further recommended that we be retained to review the final design drawings and specifications relative to the geotechnical recommendations. If, during construction, conditions in the field vary from those assumed at the design stage, an engineer from this office must be notified immediately.

Proper subgrade preparation, groundwater control, compaction, etc. are all critical aspects of the bearing capacity of native soils. It must be noted that different aspects of the geotechnical design are based on the assumption that Englobe will be retained during site preparation and construction of the proposed works to ensure that both the geotechnical site characteristics and the construction operations/techniques are consistent with our recommendations. Should Englobe not be involved during the full construction phase, our liability is strictly limited to the factual information contained herein only.

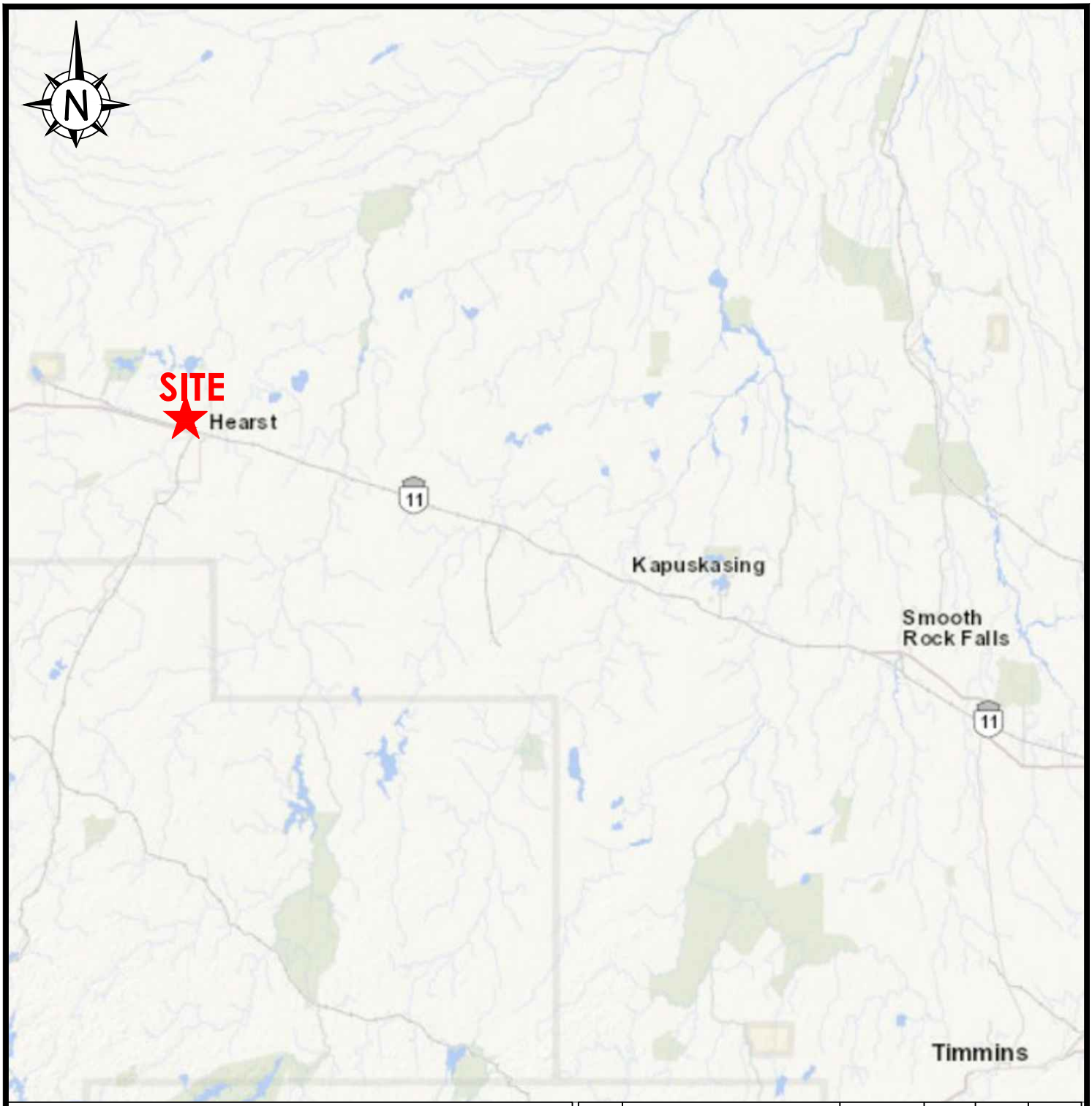
The comments in this report are intended solely for the guidance of the design team and address the geotechnical conditions only. The number of boreholes required to determine the localized conditions between boreholes directly affecting construction costs, equipment, scheduling, etc. would in fact be greater than what has been carried out for design purposes. Inclusion of the factual information (Sections 1 to 3 inclusive) in the tender documents is furnished merely for the general information of bidders and is not in any way warranted or guaranteed by or on behalf of the owner or the owner's consultants and its subconsultants or the consultants' or subconsultants' employees, and neither the owner nor its consultants or its employees shall be liable for any representations negligent or otherwise contained in the documents. Therefore, contractors bidding on this project or undertaking this work should make their own interpretations of the factual borehole results and carry out further work as they deem necessary to assess the scope of the project.

Section 4 of this report is intended solely for the use of the client and the design team. If this section is provided to the Contractor, it is solely to provide an understanding of the geotechnical aspects of the site, and alternatives presented are not to be considered potential substitutes of the final design. If there is a discrepancy between this report and the tender documents and/or construction drawings, the latter shall govern and the discrepancy must be immediately brought to the attention of the design team.

Appendix A
Drawings

Drawing No. 1a and 1b	Key Plans
Drawing No. 2	Borehole Location Plan

eNGLOBe



No.	Version	Date	By	Verif	Appr.
01	Final	2024/03/01	DMc	RT	JMM/BV

Ontario Northland

Geotechnical Investigation
Proposed New Mechanical Building

10 - 10th Street, Hearst, Ontario

Key Plan (Macro)

eNGLOBe
2–120 Progress Court
North Bay, Ontario, P1A 0C2
705-476-2550

Discipline:	Geotechnical	Prepare by: DMc	Verify by: RT
Scale:	Not To Scale	Draw by: DMc	Approval by: JMM/BV
Date:	2024/03/01	Drawing no:	1a
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Man.	Project	Otp	Project	Phase	Electronic ref.	Rev.
JRB	02311183	---	GE	-	-- -- ----	01

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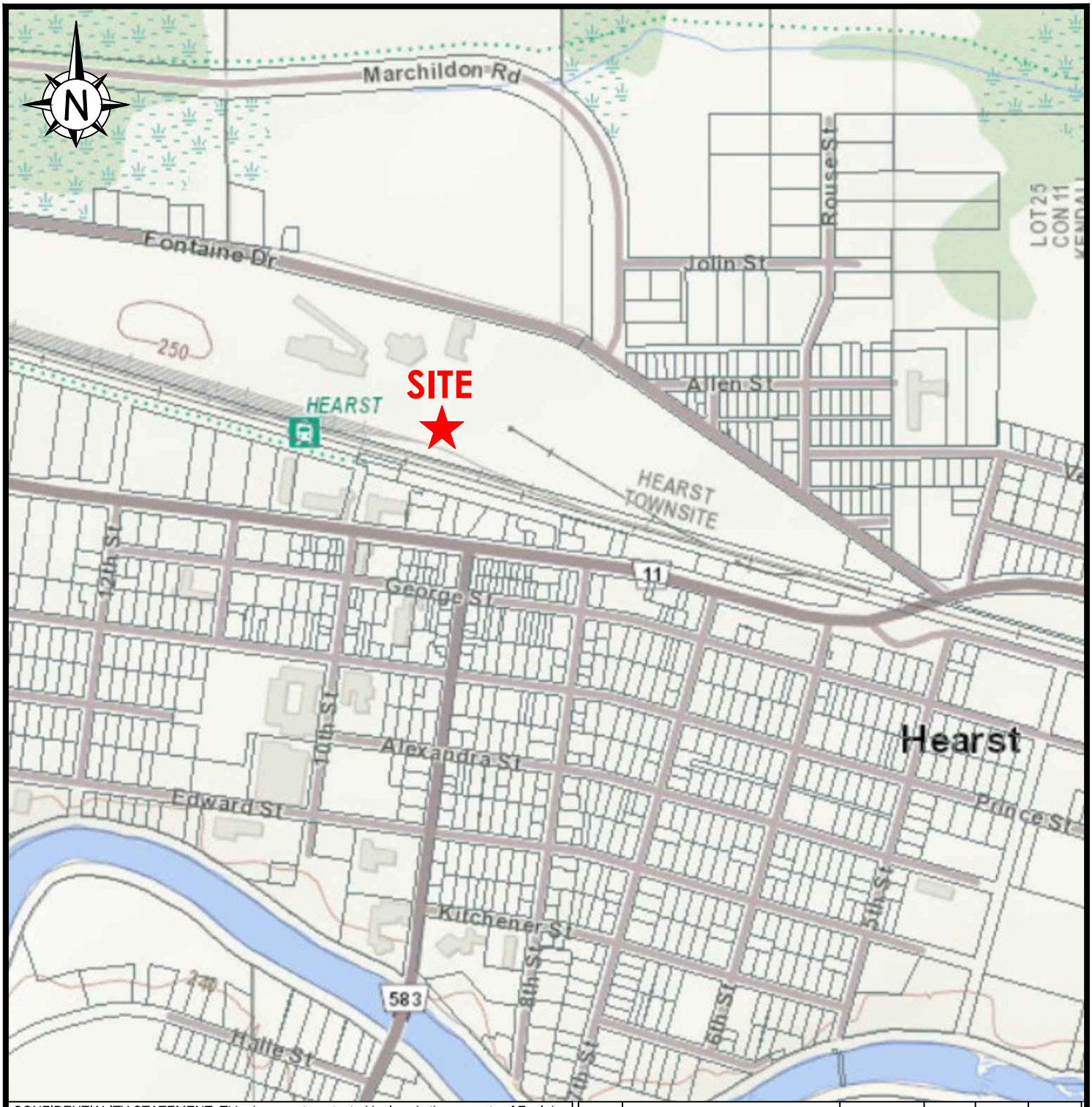

No.	Version	Date	By	Verif	Appr.
01	Final	2024/03/01	DMc	RT	JMM/BV

Ontario Northland

Geotechnical Investigation
Proposed New Mechanical Building

10 - 10th Street, Hearst, Ontario

Key Plan (Micro)

eNGLOBe

2–120 Progress Court
North Bay, Ontario, P1A 0C2
705-476-2550

Discipline:	Geotechnical	Prepare by: DMc	Verify by: RT
Scale:	Not To Scale	Draw by: DMc	Approval by: JMM/BV
Date:	2024/03/01	Drawing no:	1b
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Man.	Project	Otp	Project	Phase	Electronic ref.	Rev.
JRB	02311183	---	GE	-	-- -- ----	01

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No.	Version	Date	By	Verif	Appr.
01	Final	2024/03/01	DMc	RT	JMM/BV

Ontario Northland

Geotechnical Investigation
Proposed New Mechanical Building
10 - 10th Street, Hearst, Ontario

Borehole Location Plan

eNGLOBe
2–120 Progress Court
North Bay, Ontario, P1A 0C2
705-476-2550

Discipline:	Geotechnical	Prepare by: DMc	Verify by: RT
Scale:	Not To Scale	Draw by: DMc	Approval by: JMM/BV
Date:	2024/03/01	Drawing no:	2
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Man.	Project	Otp	Project	Phase	Electronic ref.	Rev.
JRB	02311183	---	GE	- -- --	----	01

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Appendix B
Borehole Logs

Enclosure No. 1 List of Abbreviations and Symbols

Enclosure No. 2 - 5 Record of Borehole Sheets

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LIST OF ABBREVIATIONS & DESCRIPTION OF TERMS

The abbreviations and terms, used to describe retrieved samples and commonly employed on the borehole logs, on the figures and in the report are as follows:

1. ABBREVIATIONS

AS Auger Sample
CS Chunk Sample
DS Denison type sample
FS Foil Sample
NFP No Further Progress
PH Sampler advanced by hydraulic pressure
PM Sampler advanced by manual pressure
RC Rock core with size & percentage of recovery
SS Split Spoon
ST Slotted Tube
TO Thin-walled, open
TP Thin-walled, piston
WS Wash Sample

2. PENETRATION RESISTANCE/"N"

Dynamic Cone Penetration Test (DCPT):

A continuous profile showing the number of blows for each 300 mm of penetration of a 50 mm diameter 60° cone attached to AW rod driven by a 63 kg hammer falling 760 mm.

Plotted as —•—•—•—•—

Standard Penetration Test (SPT) or "N" Values

The number of blows of a 63 kg hammer falling 760 mm required to advance a 50 mm O.D. drive open sampler 300 mm.

3. SOIL DESCRIPTION

a) *Cohesionless Soils:*

"N" (blows/0.3 m)	*Compactness Condition*
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

3. SOIL DESCRIPTION (Cont'd)

b) *Cohesive Soils:*

Undrained Shear Strength (kPa)	*Consistency*
Less than 12	very soft
12 to 25	soft
25 to 50	firm
50 to 100	stiff
100 to 200	very stiff
over 200	hard

c) *Method of Determination of Undrained Shear Strength of Cohesive Soils:*

+ 3.2 - Field Vane test in borehole. The number denotes the sensitivity to remoulding.

D - Laboratory Vane Test

¨ - Compression test in laboratory

For a saturated cohesive soil the undrained shear strength is taken as one-half of the undrained compressive strength.

4. TERMINOLOGY

Terminology used for describing soil strata is based on the proportion of individual particle sizes present in the samples (please note that, with the exception of those samples subject to a grain-size analysis, all samples were classified visually and the accuracy of visual examination is not sufficient to determine exact grain sizing):

Trace, or occasional	Less than 10%
Some	10 to 20%
With	20 to 30%
Adjective (i.e. silty or sandy)	30 to 40%
And (i.e. sand and gravel)	40 to 60%

5. LABORATORY TESTS

P Standard Proctor Test
A Atterberg Limit Test
GS Grain Size Analysis
H Hydrometer Analysis
C Consolidation

SAMPLE DESCRIPTION NOTES:

1. **FILL:** The term fill is used to designate all man-made deposits of natural soil and/or waste materials. The reader is cautioned that fill materials can be very heterogeneous in nature and variable in depth, density and degree of compaction. Fill materials can be expected to contain organics, waste materials, construction materials, shot rock, rip-rap, and/or larger obstructions such as boulders, concrete foundations, slabs, abandoned tanks, etc.; none of which may have been encountered in the borehole. The description of the material penetrated in the borehole therefore may not be applicable as a general description of the fill material on the site as boreholes cannot accurately define the nature of fill material. During the boring and sampling process, retrieved samples may have certain characteristics that identify them as 'fill'. Fill materials (or possible fill materials) will be designated on the Borehole Logs. If fill material is identified on the site, it is highly recommended that testpits be put down to delineate the nature of the fill material. However, even through the use of testpits defining the true nature and composition of the fill material cannot be guaranteed. Fill deposits often contain pockets or seams of organics, organically contaminated soils or other deleterious material that can cause settlement or result in the production of methane gas. It should be noted that the origins and history of fill material is frequently very vague or non-existent. Often fill material may be contaminated beyond environmental guidelines and the material will have to be disposed of at a designated site (i.e. registered landfill). Unless requested or stated otherwise in this report, fill material on this site has not been tested for contaminants however, environmental testing of the fill material can be carried out at your request. Detection of underground storage tanks cannot be determined with conventional geotechnical procedures.

2. **TILL:** The term till indicates a material that is an unstratified, glacial deposit, heterogeneous in nature and, as such, may consist of mixtures and pockets of clay, silt, sand, gravel, cobbles and/or boulders. These heterogeneous deposits originate from a geological process associated with glaciation. It must be noted that due to the highly heterogeneous nature of till deposits, the description of the deposit on the borehole log may only be applicable to a very limited area and therefore, caution must be exercised when dealing with a till deposit. When excavating in till, contractors may encounter cobbles/boulders or possibly bedrock even if they are not indicated on the borehole logs. It must be appreciated that conventional geotechnical sampling equipment does not identify the nature or size of any obstruction.

3. **BEDROCK:** Auger refusal may be due to the presence of bedrock, but possibly could also be due to the presence of very dense underlying deposits, boulders or other large obstructions. Auger refusal is defined as the point at which an auger can no longer be practically advanced. It must be appreciated that conventional geotechnical sampling equipment does not differentiate between nature and size of obstructions that prevent further penetration of the boring below grade. Bedrock indicated on the borehole logs will be labeled 'possibly' or 'probable' etc. based on the response of the boring and sampling equipment, surrounding topography, etc. Bedrock can be proven at individual borehole locations, at your request, by diamond core drilling operations or, possibly, by testpits. It must also be appreciated that bedrock surfaces can be, and most times are, very erratic in nature (i.e. sheer drops, isolated rock knobs, etc.) and caution must be used when interpreting subsurface conditions between boreholes. A bedrock profile can be more accurately estimated, at the clients' request, through a series of closely positioned unsampled auger probes combined with core drilling.

4. **GROUNDWATER:** Although the groundwater table may have been encountered during this investigation and the elevation noted in the report and/or on the record of boreholes, it must be appreciated that the elevation of the groundwater table will fluctuate based upon seasonal conditions, localized changes, erratic changes in the underlying soil profile between boreholes, underlying soil layers with highly variable permeabilities, etc. These conditions may affect the design and type and nature of dewatering procedures. Cave-in levels recorded in borings give a general indication of the groundwater level in cohesionless soils however, it must be noted that cave-in levels may also be due to the relative density of the deposit, drilling operations etc.

ENCLOSURE NO.:2 (Pg. 1 of 1)

METRIC

RECORD OF BOREHOLE NO. 1

eNGLOBe

REFERENCE 02311183.000 DATUM TBM LOCATION See Borehole Location Plan; Appendix A, Dwg. No. 2 ORIGINATED BY RT

PROJECT Proposed New Mechanical Building BOREHOLE TYPE Geoprobe 7822DT, Hollow Stem Auger COMPILED BY DMc

CLIENT Ontario Northland DATE (Started) December 12, 2023 TIME (Completed) 10:50:00 AM CHECKED BY JMM/BV

DATE (Completed) December 12, 2023

ELEV / DEPTH	DESCRIPTION (see Enclosure No. 1)	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / UNDRAINED SHEAR STRENGTH (Su, kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE ▼ REMOLD VANE × PENETROMETER (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
100.0										
0.0	FILL - SAND - with silt, some gravel, trace clay, brown/black, dry		1	AS						
99.3										
0.8	CLAY - some silt, brown, moist, firm		2	SS	5		99			
			3	SS	6		98			
97.7										
2.3	SILT - with sand, some clay, trace gravel, brown, moist, compact to very dense		4	SS	25					4 24 61 11
			5	SS	55		97			
			6	SS	57		96			
			7	SS	62		95			
94.7										
5.3	SILTY SAND - grey/brown, dry		8A	SS	31					
	- brown, wet		8B							
94.1										
5.9	End of Borehole at 5.9 m bgs									

COMMENTS

The stratification lines represent approximate boundaries. The transition may be gradual.

+ 3, × 3 : Numbers on right refer to Sensitivity
Numbers on left refer to values greater than 100 kPa

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
1) 12/12/23 10:50:00 AM	-	4.95
2)	-	-
3)	-	-

MEL-GEO 2311183 - NEW MECH BLD, HEARST.GPJ MEL-GEO.GDT 1/26/24

Englobe Corp.
120 Progress Court, North Bay, On P1A 0C2 Phone: (705)476-2550 Fax: (705)476-8882 Email: northbay@englobecorp.com

ENCLOSURE NO.:3 (Pg. 1 of 1)

METRIC

RECORD OF BOREHOLE NO. 2

eNGLOBe

REFERENCE 02311183.000 DATUM TBM LOCATION See Borehole Location Plan; Appendix A, Dwg. No. 2 ORIGINATED BY RT

PROJECT Proposed New Mechanical Building BOREHOLE TYPE Geoprobe 7822DT, Hollow Stem Auger COMPILED BY DMc

CLIENT Ontario Northland DATE (Started) December 12, 2023 TIME (Completed) 12:50:00 PM CHECKED BY JMM/BV

DATE (Completed) December 12, 2023

ELEV / DEPTH	DESCRIPTION (see Enclosure No. 1)	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE
100.0							100
0.0	FILL - SAND - with silt, some clay, trace gravel, black, wet		1	AS			
99.3							99
0.8	CLAY - some silt, trace sand, brown, moist, firm to stiff		2	SS	7		
			3	SS	11		98
97.7							
2.3	SILT - some clay, sand, gravel, brown, moist, compact to very dense		4	SS	15		
	- with sand, trace gravel, clay		5	SS	47		97
			6	SS	76		96
95.4							
4.6	SILTY SAND - trace gravel, brown, moist, dense to very dense		7A	SS	32		
	- wet		7B				95
			8	SS	59		
94.1							
5.9	End of Borehole at 5.9 m bgs						

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

UNDRAINED SHEAR STRENGTH (Su, kPa)
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × REMOLD VANE
PENETROMETER
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%)
20 40 60

UNIT WEIGHT γ kN/m³

REMARKS & GRAIN SIZE DISTRIBUTION (%)

	GR	SA	(SI CL)
7A	3	28	(69)

COMMENTS

The stratification lines represent approximate boundaries. The transition may be gradual.

+ 3, × 3 : Numbers on right refer to Sensitivity
Numbers on left refer to values greater than 100 kPa
○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
1) 12/12/23 12:50:00 PM	-	5.2
2)	-	-
3)	-	-

MEL-GEO 2311183 - NEW MECH BLD, HEARST.GPJ MEL-GEO.GDT 1/26/24

Englobe Corp.
120 Progress Court, North Bay, On P1A 0C2 Phone: (705)476-2550 Fax: (705)476-8882 Email: northbay@englobecorp.com

ENCLOSURE NO.:4 (Pg. 1 of 1)

METRIC

RECORD OF BOREHOLE NO. 3

eNGLOBe

REFERENCE 02311183.000 DATUM TBM LOCATION See Borehole Location Plan; Appendix A, Dwg. No. 2 ORIGINATED BY RT

PROJECT Proposed New Mechanical Building BOREHOLE TYPE Geoprobe 7822DT, Hollow Stem Auger COMPILED BY DMc

CLIENT Ontario Northland DATE (Started) December 12, 2023 TIME (Completed) 3:10:00 PM CHECKED BY JMM/BV

DATE (Completed) December 12, 2023

ELEV / DEPTH	DESCRIPTION (see Enclosure No. 1)	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / UNDRAINED SHEAR STRENGTH (Su, kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE ▼ REMOLD VANE × PENETROMETER	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
100.0								20 40 60 80 100	20 40 60		
0.0	CLAY - some sand, gravel, trace organics, brown, moist		1	AS							
99.2							99				
0.8	SANDY SILT - trace gravel, clay, grey, dry, compact to very dense		2	SS	20						6 33 (61)
			3	SS	42		98				
	- some gravel, moist		4	SS	26						
	- brown/grey		5	SS	73		97				
	- brown		6	SS	71		96				
	- wet		7	SS	29		95				
			8	SS	14	▼					2 37 (61)
94.1											
5.9	End of Borehole at 5.9 m bgs										

COMMENTS

The stratification lines represent approximate boundaries. The transition may be gradual.

+ ³, × ³ : Numbers on right refer to Sensitivity
Numbers on left refer to values greater than 100 kPa

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
1) 12/12/23 3:10:00 PM	5.5 ▽	5.45 ▣
2)	- ▽	-
3)	- ▼	-

MEL-GEO 2311183 - NEW MECH BLD, HEARST.GPJ MEL-GEO.GDT 1/26/24

Englobe Corp.
120 Progress Court, North Bay, On P1A 0C2 Phone: (705)476-2550 Fax: (705)476-8882 Email: northbay@englobecorp.com

ENCLOSURE NO.:5 (Pg. 1 of 1)

METRIC

RECORD OF BOREHOLE NO. 4

eNGLOBe

REFERENCE 02311183.000 DATUM TBM LOCATION See Borehole Location Plan; Appendix A, Dwg. No. 2 ORIGINATED BY RT

PROJECT Proposed New Mechanical Building BOREHOLE TYPE Geoprobe 7822DT, Hollow Stem Auger COMPILED BY DMc

CLIENT Ontario Northland DATE (Started) December 12, 2023 TIME (Completed) 4:45:00 PM CHECKED BY JMM/BV

DATE (Completed) December 12, 2023

ELEV / DEPTH	DESCRIPTION (see Enclosure No. 1)	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / UNDRAINED SHEAR STRENGTH (Su, kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE ▼ REMOLD VANE × PENETROMETER	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
100.1								20 40 60 80 100	20 40 60		
0.0	FILL - SAND - with silt, some gravel, trace clay, brown/black, dry		1	AS			100				14 59 23 4
99.3											
0.8	SILTY SAND - trace gravel, brown, dry, compact to dense		2	SS	12		99				
			3	SS	31						
97.8							98				
2.3	SILT - with sand, brown, wet, compact to very dense		4	SS	26						
	- with sand, gravel, dry		5	SS	79		97				
96.1			6	SS	50+						
4.0	SPT/Auger Refusal at 4.0 m bgs										

COMMENTS

The stratification lines represent approximate boundaries. The transition may be gradual.

+ 3, × 3 : Numbers on right refer to Sensitivity
Numbers on left refer to values greater than 100 kPa

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
1) 12/12/23 4:45:00 PM	-	3.6
2)	-	-
3)	-	-

MEL-GEO 2311183 - NEW MECH BLD, HEARST.GPJ MEL-GEO.GDT 1/26/24

Englobe Corp.
120 Progress Court, North Bay, On P1A 0C2 Phone: (705)476-2550 Fax: (705)476-8882 Email: northbay@englobecorp.com

Appendix C
Laboratory Test Results

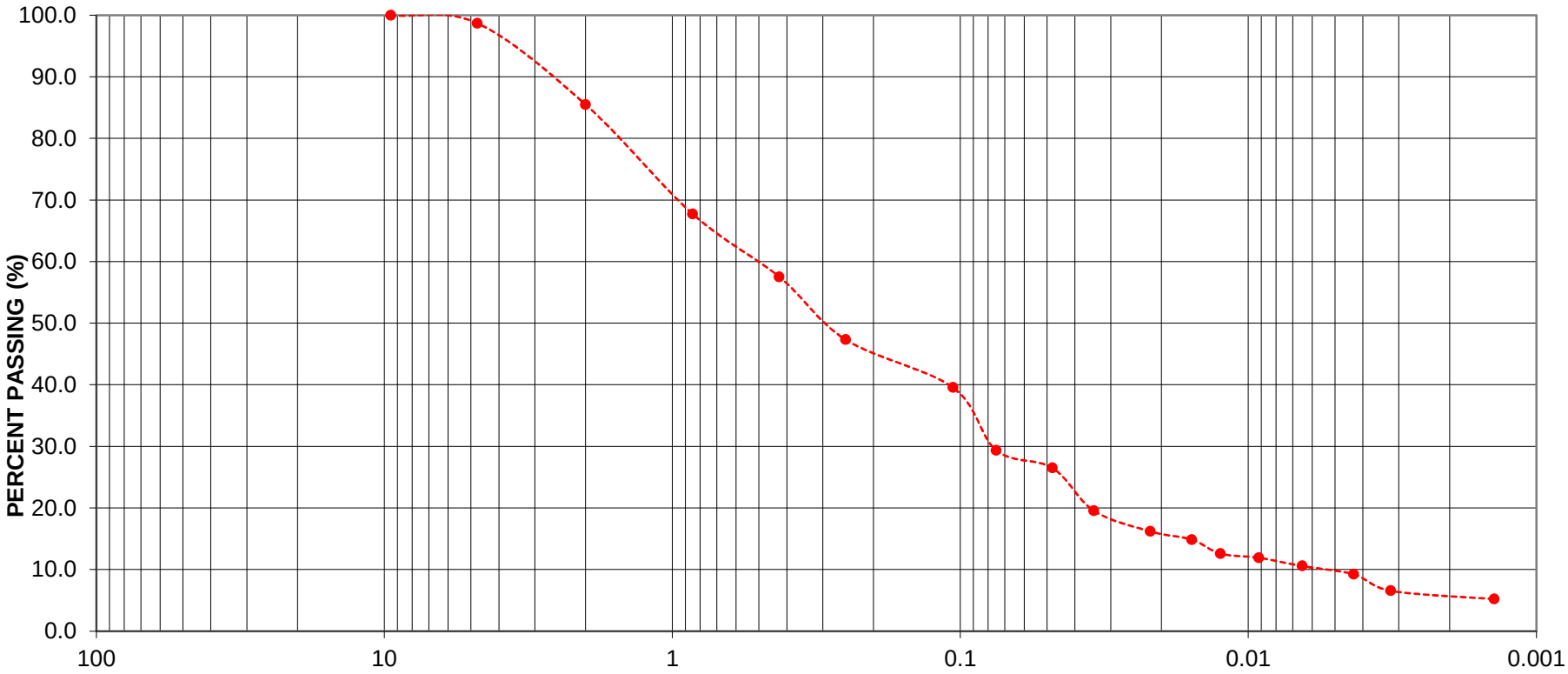
Lab Data

ENGLOBE

Reference No.: 02311183
Date: January 2024

GRAIN SIZE ANALYSIS

GRAVEL		SAND			SILT & CLAY
Coarse	Fine	Coarse	Medium	Fine	



FILL SAND

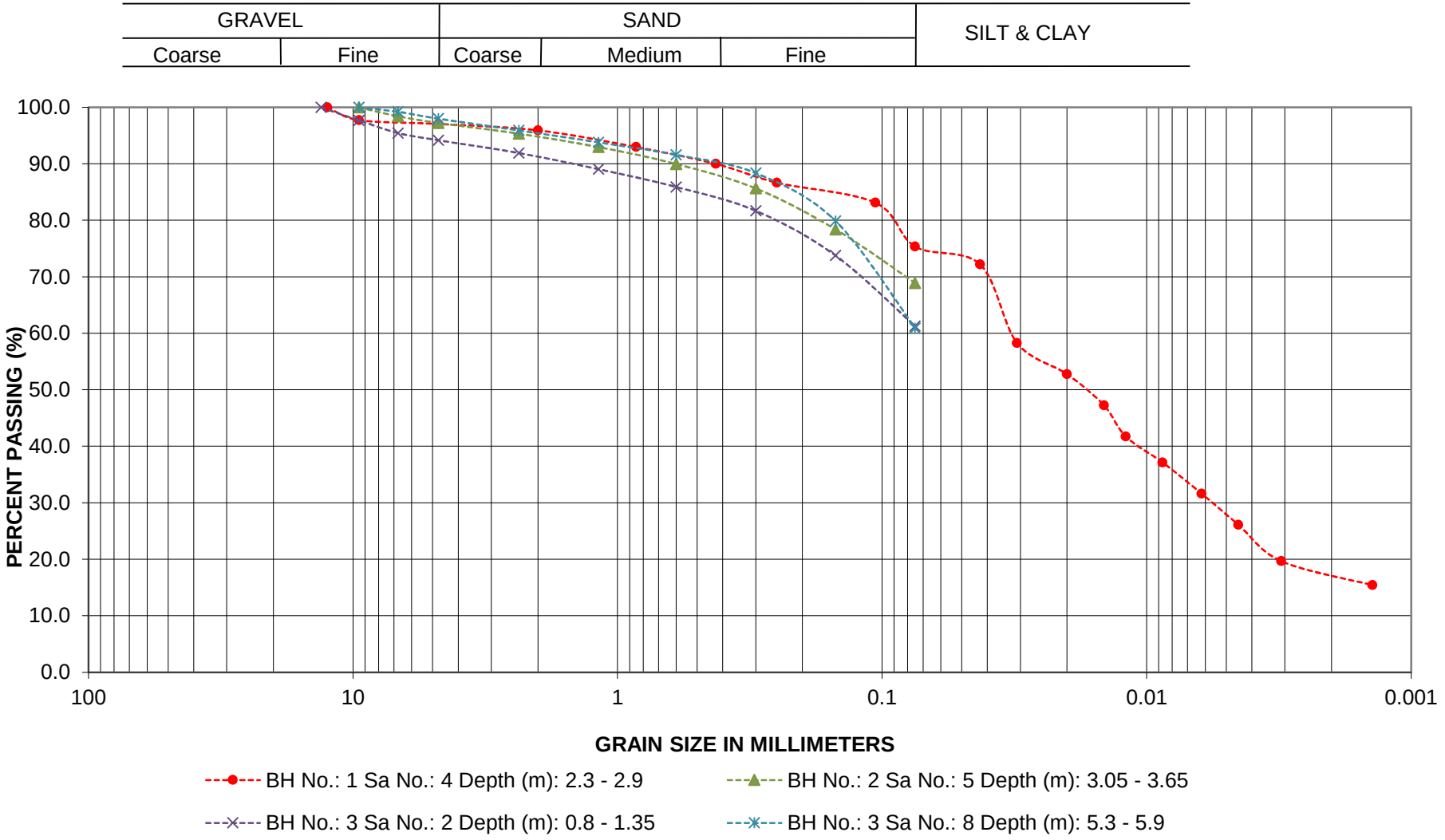
PROJECT: Proposed New Mechanical Building
LOCATION: Hearst, Ontario

Englobe Corp.

FIGURE L-1

Reference No.: 02311183
Date: January 2024

GRAIN SIZE ANALYSIS



SILTS to SANDY SILTS

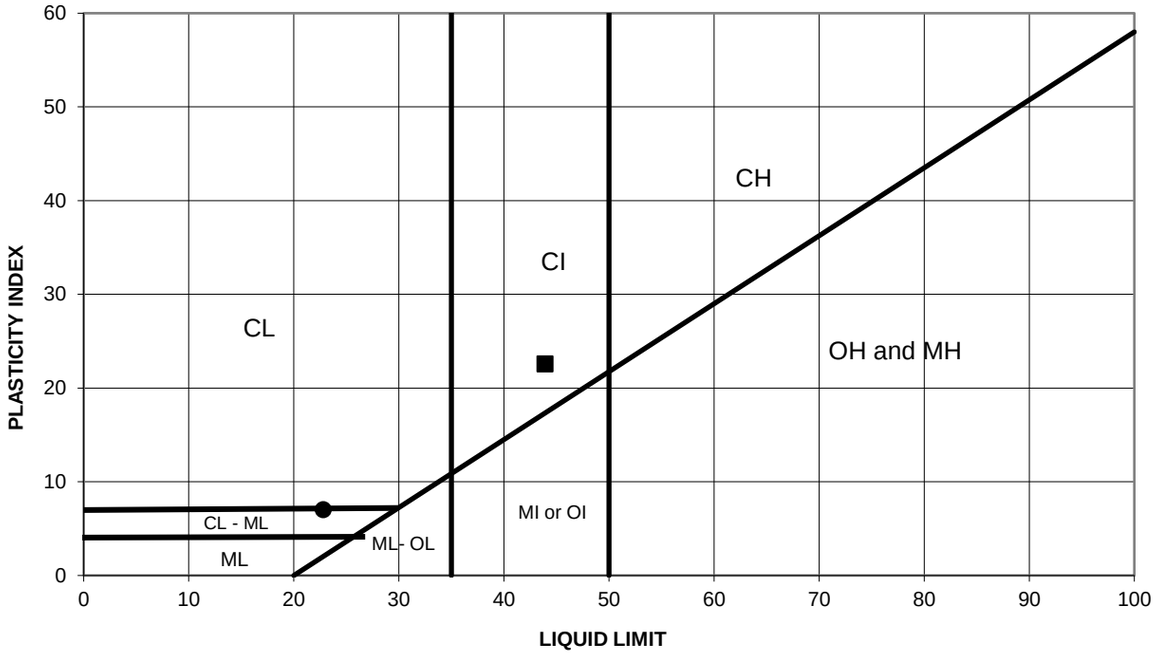
PROJECT: Proposed New Mechanical Building
LOCATION: Hearst, Ontario

Englobe Corp.

FIGURE L-2

ATTERBERG LIMITS TEST RESULTS	FIGURE L-3

ATTERBERG INDICES



SYMBOL	BH No.	Sa No.	Depth (m)	Plasticity Index	Plastic Limit	Liquid Limit	NMC %
●	1	3	1.5 - 2.1	7.0	15.8	22.8	19.6
■	2	2	0.8 - 1.35	22.6	21.3	43.9	25.0

Date: 4-Jan-24 Prepared By: DMc

Project: Proposed New Mechanical Building, Hearst, Ontario

ENGLOBE CORP.

Appendix D
Photo Essay

ENGLOBE

Geoprobe Drill Rig	Photo: 1

Drilling at BH 4	Photo: 2

Project: Proposed New Mechanical Building, Hearst, ON	Photos By: Englobe Date: December, 2023

Drilling at BH 3	Photo: 3

Benchmark for Survey	Photo: 4

Project: Proposed New Mechanical Building, Hearst, ON	Photos By: Englobe Date: December, 2023

Appendix E
Tabulated Excess Soils Data

ENGLOBE

ONTC New Mechanical Building
Hearst, Ontario
Englobe Reference No.: 02311183.000

Table 1
Soil Analytical Results
Metals and PHC/BTEX

March 2024

				Sample ID				
				Sample Collection Date (dd-mmm-yy)				
				BH1,SS-2	BH2,SS-3	BH3,SS-3	BH4,SS-2	BH5,SS-2
Parameter	Table 1 RPIICC Standards	Units	RDL	12-Dec-23	12-Dec-23	12-Dec-23	12-Dec-23	12-Dec-23
Physical Parameters				**Coarse Soil**		**Coarse Soil**	**Coarse Soil**	**Duplicate of BH4, SS-2**
pH	NV	pH units	NA	7.55	7.68	7.65	7.77	7.76
Conductivity	0.57	(mS/cm)	0.002	**0.58**	0.29	0.17	0.14	0.18
Sodium Adsorption Ratio	2.4	NA	NA	1.3	**4.5**	0.27	0.28	0.24
Dissolved Metals								
Antimony	1.3	ug/g	0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	18	ug/g	1	4.5	1.6	1	1.7	1.8
Barium	220	ug/g	0.5	110	30	18	22	26
Beryllium	2.5	ug/g	0.2	1	0.27	<0.20	0.21	0.25
Cadmium	1.2	ug/g	0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	70	ug/g	1	67	19	14	16	18
Cobalt	21	ug/g	0.1	17	4.3	3.1	3.5	4.2
Copper	92	ug/g	0.5	24	9.2	7.4	8.7	10
Lead	120	ug/g	1	15	3.9	2.8	3.4	4.1
Molybdenum	2	ug/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nickel	82	ug/g	0.5	44	11	8	9.7	11
Selenium	1.5	ug/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	0.5	ug/g	0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	1	ug/g	0.05	0.3	0.078	0.067	0.074	0.076
Vanadium	86	ug/g	5	64	21	16	18	20
Zinc	290	ug/g	5	81	19	15	16	18
Total Boron	36	ug/g	5	13	7.9	7.4	7.6	8.1
Uranium	2.5	ug/g	0.05	0.99	0.56	0.49	0.52	0.54
Hydrocarbons								
Benzene	0.02	ug/g	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Toluene	0.2	ug/g	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	0.05	ug/g	0.02	<0.020	<0.020	**0.12**	<0.020	<0.020
m/p xylenes	NV	ug/g	0.04	<0.040	<0.040	0.55	<0.040	<0.040
o xylene	NV	ug/g	0.02	<0.020	<0.020	0.33	<0.020	<0.020
Total Xylenes	0.05	ug/g	0.04	<0.040	<0.040	**0.87**	<0.040	<0.040
F1 (C6-C10)	25	ug/g	10	<10	<10	**43**	<10	<10
F1 (C6-C10) - BTEX	NV	ug/g	10	<10	<10	42	<10	<10
F2 (C10-C16)	10	ug/g	10	<10	<10	**340**	<10	<10
F3 (C16-C34)	240	ug/g	50	<50	<50	170	<50	<50
F4 (C34-C50)	120	ug/g	50	<50	<50	<50	<50	<50
Reached Baseline at C50	NV	NA	NA	YES	YES	YES	YES	YES

Notes	
Table 1 RPIICC Standards	Table 1: Full Depth Background Site Condition Standards for Residential/Parkland/Institutional/ Industrial/Commercial/Community (RPIICC) Property Use
RDL	Reportable Detection Limit
NA	Not Applicable
NV	No Value
'<'	Value is less than the RDL
Results	Concentration Exceed Table 1 RPIICC

Table 2
Soil Analytical Results
Metals and PHC/BTEX

					Sample ID				
					Sample Collection Date (dd-mmm-yy)				
					BH1,SS-2	BH2,SS-3	BH3,SS-3	BH4,SS-2	BH5,SS-2
Parameter	Table 2.1 RPI Standards	Table 2.1 ICC Standards	Units	RDL	12-Dec-23	12-Dec-23	12-Dec-23	12-Dec-23	12-Dec-23
Physical Parameters					**Coarse Soil**		**Coarse Soil**	**Coarse Soil**	**Duplicate of BH4, SS-2**
pH	NV	NV	pH units	NA	7.55	7.68	7.65	7.77	7.76
Conductivity	0.7	1.4	(mS/cm)	0.002	0.58	0.29	0.17	0.14	0.18
Sodium Adsorption Ratio	5	12	NA	NA	1.3	4.5	0.27	0.28	0.24
Dissolved Metals									
Antimony	7.5	40	ug/g	0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	18	18	ug/g	1	4.5	1.6	1	1.7	1.8
Barium	390	670	ug/g	0.5	110	30	18	22	26
Beryllium	4	8	ug/g	0.2	1	0.27	<0.20	0.21	0.25
Cadmium	1.2	1.9	ug/g	0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	160	160	ug/g	1	67	19	14	16	18
Cobalt	22	80	ug/g	0.1	17	4.3	3.1	3.5	4.2
Copper	140	230	ug/g	0.5	24	9.2	7.4	8.7	10
Lead	120	120	ug/g	1	15	3.9	2.8	3.4	4.1
Molybdenum	6.9	40	ug/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nickel	100	270	ug/g	0.5	44	11	8	9.7	11
Selenium	2.4	5.5	ug/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	20	40	ug/g	0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	1	3.3	ug/g	0.05	0.3	0.078	0.067	0.074	0.076
Vanadium	86	86	ug/g	5	64	21	16	18	20
Zinc	340	340	ug/g	5	81	19	15	16	18
Total Boron	120	120	ug/g	5	13	7.9	7.4	7.6	8.1
Uranium	23	33	ug/g	0.05	0.99	0.56	0.49	0.52	0.54
Hydrocarbons									
Benzene	0.02	0.02	ug/g	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Toluene	0.2	0.2	ug/g	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	0.05	0.05	ug/g	0.02	<0.020	<0.020	**0.12**	<0.020	<0.020
m/p xylenes	NV	NV	ug/g	0.04	<0.040	<0.040	0.55	<0.040	<0.040
o xylene	NV	NV	ug/g	0.02	<0.020	<0.020	0.33	<0.020	<0.020
Total Xylenes	0.091	0.091	ug/g	0.04	<0.040	<0.040	**0.87**	<0.040	<0.040
F1 (C6-C10)	25	25	ug/g	10	<10	<10	**43**	<10	<10
F1 (C6-C10) - BTEX	NV	NV	ug/g	10	<10	<10	42	<10	<10
F2 (C10-C16)	10	26	ug/g	10	<10	<10	**340**	<10	<10
F3 (C16-C34)	240	240	ug/g	50	<50	<50	170	<50	<50
F4 (C34-C50)	2800	3300	ug/g	50	<50	<50	<50	<50	<50
Reached Baseline at C50	NV	NV	NA	NA	YES	YES	YES	YES	YES

Notes	
Table 2.1 RPI Standards	Table 2.1: Full Depth Excess Soil Quality in a Potable Ground Water Condition for Residential/Parkland/Institutional Property Use
Table 2.1 ICC Standards	Table 2.1: Full Depth Excess Soil Quality in a Potable Ground Water Condition forIndustrial/Commercial/Community Property Use
RDL	Reportable Detection Limit
NA	Not Applicable
NV	No Value
'<'	Value is less than the RDL
Results	Concentration exceeds Table 2.1 RPI
Results	Concentration exceeds Table 2.1 ICC

Table 3
Soil Analytical Results
Metals and PHC/BTEX

					Sample ID				
					Sample Collection Date (dd-mmm-yy)				
					BH1,SS-2	BH2,SS-3	BH3,SS-3	BH4,SS-2	BH5,SS-2
Parameter	Table 3.1 RPI Standards	Table 3.1 ICC Standards	Units	RDL	12-Dec-23	12-Dec-23	12-Dec-23	12-Dec-23	12-Dec-23
Physical Parameters					**Coarse Soil**		**Coarse Soil**	**Coarse Soil**	**Duplicate of BH4, SS-2**
pH	NV	NV	pH units	NA	7.55	7.68	7.65	7.77	7.76
Conductivity	0.7	1.4	(mS/cm)	0.002	0.58	0.29	0.17	0.14	0.18
Sodium Adsorption Ratio	5	12	NA	NA	1.3	4.5	0.27	0.28	0.24
Dissolved Metals									
Antimony	7.5	40	ug/g	0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	18	18	ug/g	1	4.5	1.6	1	1.7	1.8
Barium	390	670	ug/g	0.5	110	30	18	22	26
Beryllium	4	8	ug/g	0.2	1	0.27	<0.20	0.21	0.25
Cadmium	1.2	1.9	ug/g	0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	160	160	ug/g	1	67	19	14	16	18
Cobalt	22	80	ug/g	0.1	17	4.3	3.1	3.5	4.2
Copper	140	230	ug/g	0.5	24	9.2	7.4	8.7	10
Lead	120	120	ug/g	1	15	3.9	2.8	3.4	4.1
Molybdenum	6.9	40	ug/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Nickel	100	270	ug/g	0.5	44	11	8	9.7	11
Selenium	2.4	5.5	ug/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	20	40	ug/g	0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	1	3.3	ug/g	0.05	0.3	0.078	0.067	0.074	0.076
Vanadium	86	86	ug/g	5	64	21	16	18	20
Zinc	340	340	ug/g	5	81	19	15	16	18
Total Boron	120	120	ug/g	5	13	7.9	7.4	7.6	8.1
Uranium	23	33	ug/g	0.05	0.99	0.56	0.49	0.52	0.54
Hydrocarbons									
Benzene	0.02	0.034	ug/g	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Toluene	0.99	7.8	ug/g	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	1.9	1.9	ug/g	0.02	<0.020	<0.020	0.12	<0.020	<0.020
m/p xylenes	NV	NV	ug/g	0.04	<0.040	<0.040	0.55	<0.040	<0.040
o xylene	NV	NV	ug/g	0.02	<0.020	<0.020	0.33	<0.020	<0.020
Total Xylenes	0.9	3	ug/g	0.04	<0.040	<0.040	0.87	<0.040	<0.040
F1 (C6-C10)	25	25	ug/g	10	<10	<10	**43**	<10	<10
F1 (C6-C10) - BTEX	NV	NV	ug/g	10	<10	<10	42	<10	<10
F2 (C10-C16)	10	26	ug/g	10	<10	<10	**340**	<10	<10
F3 (C16-C34)	300	1700	ug/g	50	<50	<50	170	<50	<50
F4 (C34-C50)	2800	3300	ug/g	50	<50	<50	<50	<50	<50
Reached Baseline at C50	NV	NV	NA	NA	YES	YES	YES	YES	YES

Notes	
Table 3.1 RPI Standards	Table 3.1: Full Depth Excess Soil Quality in a Potable Ground Water Condition for Residential/Parkland/Institutional Property Use
Table 3.1 ICC Standards	Table 3.1: Full Depth Excess Soil Quality in a Potable Ground Water Condition forIndustrial/Commercial/Community Property Use
RDL	Reportable Detection Limit
NA	Not Applicable
NV	No Value
'<'	Value is less than the RDL
Results	Concentration exceeds Table 3.1 RPI
Results	Concentration exceeds Table 3.1 ICC

Table 4
Soil Analytical Results
Leachate Parameters

Parameter	Table 1 RPIICC LSLs	Units	RDL	Sample ID		
				Sample Collection Date (dd-mmm-yy)		
				BH1,SS-2	BH2,SS-3	BH3,SS-3
				12-Dec-23	12-Dec-23	12-Dec-23
SPLP Metals						
Antimony	NV	ug/L	0.5	<0.5	<0.5	<0.5
Arsenic	NV	ug/L	1	<1	<1	<1
Barium	NV	ug/L	5	<5	13	<5
Beryllium	NV	ug/L	0.5	<0.5	<0.5	<0.5
Boron (total)	NV	ug/L	10	<10	<10	<10
Cadmium	NV	ug/L	0.1	<0.1	<0.1	<0.1
Chromium Total	NV	ug/L	5	<5	<5	<5
Cobalt	NV	ug/L	0.5	<0.5	<0.5	<0.5
Copper	NV	ug/L	1	2	2	<1
Lead	NV	ug/L	0.5	1.1	<0.5	<0.5
Molybdenum	23	ug/L	1	1	1	2
Nickel	NV	ug/L	1	<1	<1	<1
Selenium	NV	ug/L	2	<2	<2	<2
Silver	0.3	ug/L	0.1	<0.1	<0.1	<0.1
Thallium	2	ug/L	0.05	<0.05	<0.05	<0.05
Uranium	NV	ug/L	0.1	<0.1	0.1	0.1
Vanadium	NV	ug/L	1	2	3	<1
Zinc	NV	ug/L	5	<5	<5	<5
SPLP Leachable VOCs						
Bis(2-chloroethyl)ether	5	ug/L	2	<2.0	<2.0	<2.0
Bis(2-chloroisopropyl)ether	5	ug/L	2	<2.0	<2.0	<2.0
Bromomethane	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Carbon Tetrachloride	0.2	ug/L	0.19	<0.19	<0.19	<0.19
Chloroaniline p-	10	ug/L	5	<5.0	<5.0	<5.0
Chloroform	1	ug/L	0.9	<0.90	<0.90	<0.90
Dichlorobenzene, 1,2-	0.55	ug/L	0.4	<0.40	<0.40	<0.40
Dichlorobenzene, 1,4-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichlorobenzidine, 3,3'-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethane, 1,1-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethane, 1,2-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,1-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,2-cis-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,2-trans-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloropropane, 1,2-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloropropene,1,3-	0.5	ug/L	0.42	<0.42	<0.42	<0.42
Diethyl Phthalate	2	ug/L	1	<1.0	<1.0	<1.0
Dimethylphthalate	2	ug/L	1	<1.0	<1.0	<1.0
Dinitrophenol, 2,4-	10	ug/L	5	<5.0	<5.0	<5.0
Dinitrotoluene, 2,4 & 2,6-	5	ug/L	4.2	<4.2	<4.2	<4.2
Ethylene dibromide	NV	ug/L	0.19	<0.19	<0.19	<0.19
Tetrachloroethane, 1,1,1,2-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Tetrachloroethane, 1,1,2,2-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Tetrachloroethylene	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichloroethane, 1,1,2-	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichloroethylene	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichlorophenol, 2,4,6-	0.75	ug/L	0.7	<0.70	<0.70	<0.70

Notes	
Table 1 RPIICC LSLs	Table 1: Leachate Screening Levels for Excess Soils Reuse for Residential/Parkland/Institutional/Industrial/Commercial/Community (RPIICC) Property Use
RDL	Reportable Detection Limit
NV	No Value
'<'	Value is less than the RDL
Results	Concentration exceeds Table 1 RPIICC LSLs

Table 5
Soil Analytical Results
Leachate Parameters

Parameter	Table 2.1 RPI LSLs	Table 2.1 ICC LSLs	Units	RDL	Sample ID		
					Sample Collection Date (dd-mmm-yy)		
					BH1,SS-2	BH2,SS-3	BH3,SS-3
					12-Dec-23	12-Dec-23	12-Dec-23
SPLP Metals							
Antimony	6	6	ug/L	0.5	<0.5	<0.5	<0.5
Arsenic	NV	NV	ug/L	1	<1	<1	<1
Barium	1000	1000	ug/L	5	<5	13	<5
Beryllium	4	4	ug/L	0.5	<0.5	<0.5	<0.5
Boron (total)	5000	5000	ug/L	10	<10	<10	<10
Cadmium	NV	0.5	ug/L	0.1	<0.1	<0.1	<0.1
Chromium Total	50	50	ug/L	5	<5	<5	<5
Cobalt	3.8	3.8	ug/L	0.5	<0.5	<0.5	<0.5
Copper	14	14	ug/L	1	2	2	<1
Lead	NV	NV	ug/L	0.5	1.1	<0.5	<0.5
Molybdenum	23	23	ug/L	1	1	1	2
Nickel	78	78	ug/L	1	<1	<1	<1
Selenium	10	10	ug/L	2	<2	<2	<2
Silver	0.3	0.3	ug/L	0.1	<0.1	<0.1	<0.1
Thallium	2	2	ug/L	0.05	<0.05	<0.05	<0.05
Uranium	20	20	ug/L	0.1	<0.1	0.1	0.1
Vanadium	NV	NV	ug/L	1	2	3	<1
Zinc	180	180	ug/L	5	<5	<5	<5
SPLP Leachable VOCs							
Bis(2-chloroethyl)ether	5	5	ug/L	2	<2.0	<2.0	<2.0
Bis(2-chloroisopropyl)ether	4	4	ug/L	2	<2.0	<2.0	<2.0
Bromomethane	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Carbon Tetrachloride	0.2	0.2	ug/L	0.19	<0.19	<0.19	<0.19
Chloroaniline p-	10	10	ug/L	5	<5.0	<5.0	<5.0
Chloroform			ug/L	0.9	<0.90	<0.90	<0.90
Dichlorobenzene, 1,2-	0.55	0.55	ug/L	0.4	<0.40	<0.40	<0.40
Dichlorobenzene, 1,4-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichlorobenzidine, 3,3'-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethane, 1,1-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethane, 1,2-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,1-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,2-cis-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,2-trans-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloropropane, 1,2-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloropropene,1,3-	NV	NV	ug/L	0.42	<0.42	<0.42	<0.42
Diethyl Phthalate	2	2	ug/L	1	<1.0	<1.0	<1.0
Dimethylphthalate	2	2	ug/L	1	<1.0	<1.0	<1.0
Dinitrophenol, 2,4-	10	10	ug/L	5	<5.0	<5.0	<5.0
Dinitrotoluene, 2,4 & 2,6-	5	5	ug/L	4.2	<4.2	<4.2	<4.2
Ethylene dibromide	0.2	0.2	ug/L	0.19	<0.19	<0.19	<0.19
Tetrachloroethane, 1,1,1,2-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Tetrachloroethane, 1,1,2,2-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Tetrachloroethylene	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichloroethane, 1,1,2-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichloroethylene	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichlorophenol, 2,4,6-	0.75	0.75	ug/L	0.7	<0.70	<0.70	<0.70

Notes	
Table 2.1 RPI LSLs	Table 2.1: Leachate Screening Levels for Excess Soils Reuse for Residential/Parkland/Institutional (RPI) Property Use
Table 2.1 ICC LSLs	Table 2.1: Leachate Screening Levels for Excess Soils Reuse for Industrial/Commercial/Community (ICC) Property Use
RDL	Reportable Detection Limit
NV	No Value
'<'	Value is less than the RDL
Results	Concentration exceeds Table 2.1 RPI LSLs
Results	Concentration exceeds Table 2.1 ICC LSLs

Table 6
Soil Analytical Results
Leachate Parameters

Parameter	Table 3.1 RPI LSLs	Table 3.1 ICC LSLs	Units	RDL	Sample ID		
					Sample Collection Date (dd-mmm-yy)		
					BH1,SS-2	BH2,SS-3	BH3,SS-3
					12-Dec-23	12-Dec-23	12-Dec-23
SPLP Metals							
Antimony	NV	NV	ug/L	0.5	<0.5	<0.5	<0.5
Arsenic	NV	NV	ug/L	1	<1	<1	<1
Barium	4600	4600	ug/L	5	<5	13	<5
Beryllium	11	11	ug/L	0.5	<0.5	<0.5	<0.5
Boron (total)	NV	NV	ug/L	10	<10	<10	<10
Cadmium	NV	0.5	ug/L	0.1	<0.1	<0.1	<0.1
Chromium Total	130	130	ug/L	5	<5	<5	<5
Cobalt	10	10	ug/L	0.5	<0.5	<0.5	<0.5
Copper	14	14	ug/L	1	2	2	<1
Lead	NV	NV	ug/L	0.5	1.1	<0.5	<0.5
Molybdenum	NV	1500	ug/L	1	1	1	2
Nickel	78	78	ug/L	1	<1	<1	<1
Selenium	10	10	ug/L	2	<2	<2	<2
Silver	0.3	0.3	ug/L	0.1	<0.1	<0.1	<0.1
Thallium	NV	80	ug/L	0.05	<0.05	<0.05	<0.05
Uranium	66	66	ug/L	0.1	<0.1	0.1	0.1
Vanadium	NV	NV	ug/L	1	2	3	<1
Zinc	180	180	ug/L	5	<5	<5	<5
SPLP Leachable VOCs							
Bis(2-chloroethyl)ether	NV	NV	ug/L	2	<2.0	<2.0	<2.0
Bis(2-chloroisopropyl)ether	NV	NV	ug/L	2	<2.0	<2.0	<2.0
Bromomethane	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Carbon Tetrachloride	0.2	0.2	ug/L	0.19	<0.19	<0.19	<0.19
Chloroaniline p-	NV	NV	ug/L	5	<5.0	<5.0	<5.0
Chloroform	NV	NV	ug/L	0.9	<0.90	<0.90	<0.90
Dichlorobenzene, 1,2-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichlorobenzene, 1,4-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichlorobenzidine, 3,3'-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethane, 1,1-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethane, 1,2-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,1-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,2-cis-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichloroethylene, 1,2-trans-	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Dichloropropane, 1,2-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Dichloropropene,1,3-	NV	NV	ug/L	0.42	<0.42	<0.42	<0.42
Diethyl Phthalate	2	2	ug/L	1	<1.0	<1.0	<1.0
Dimethylphthalate	2	2	ug/L	1	<1.0	<1.0	<1.0
Dinitrophenol, 2,4-	NV	NV	ug/L	5	<5.0	<5.0	<5.0
Dinitrotoluene, 2,4 & 2,6-	NV	NV	ug/L	4.2	<4.2	<4.2	<4.2
Ethylene dibromide	0.2	0.2	ug/L	0.19	<0.19	<0.19	<0.19
Tetrachloroethane, 1,1,1,2-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Tetrachloroethane, 1,1,2,2-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Tetrachloroethylene	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichloroethane, 1,1,2-	NV	NV	ug/L	0.4	<0.40	<0.40	<0.40
Trichloroethylene	0.5	0.5	ug/L	0.4	<0.40	<0.40	<0.40
Trichlorophenol, 2,4,6-	NV	NV	ug/L	0.7	<0.70	<0.70	<0.70

Notes	
Table 3.1 RPI LSLs	Table 3.1: Leachate Screening Levels for Excess Soils Reuse for Residential/Parkland/Institutional (RPI) Property Use
Table 3.1 ICC LSLs	Table 3.1: Leachate Screening Levels for Excess Soils Reuse for Industrial/Commercial/Community (ICC) Property Use
RDL	Reportable Detection Limit
NV	No Value
'<'	Value is less than the RDL
Results	Concentration exceeds Table 3.1 RPI LSLs
Results	Concentration exceeds Table 3.1 ICC LSLs

Table 7
Relative Percent Difference (RPD)

Parameter	Units	Lowest Detection Limit (LDL)	Alert Limit	BH4,SS-2 12-Dec-23 Primary Sample	BH5,SS-2 12-Dec-23 Duplicate Sample	RPD
PHCs and BTEX						
Benzene	ug/g	0.02	100%	<0.020	<0.020	NC
Toluene	ug/g	0.02	100%	<0.020	<0.020	NC
Ethylbenzene	ug/g	0.02	100%	<0.020	<0.020	NC
m/p xylenes	ug/g	0.04	100%	<0.040	<0.040	NC
o xylene	ug/g	0.02	100%	<0.020	<0.020	NC
Total Xylenes	ug/g	0.04	100%	<0.040	<0.040	NC
F1 (C6-C10)	ug/g	10	60%	<10	<10	NC
F1 (C6-C10) - BTEX	ug/g	10	60%	<10	<10	NC
F2 (C10-C16)	ug/g	10	60%	<10	<10	NC
F3 (C16-C34)	ug/g	50	60%	<50	<50	NC
F4 (C34-C50)	ug/g	50	60%	<50	<50	NC
Metals and Inorganics						
Antimony	ug/g	0.2	60%	<0.20	<0.20	NC
Arsenic	ug/g	1	60%	1.7	1.8	6%
Barium	ug/g	0.5	60%	22	26	17%
Beryllium	ug/g	0.2	60%	0.21	0.25	17%
Cadmium	ug/g	0.1	60%	<0.10	<0.10	NC
Chromium	ug/g	1	60%	16	18	12%
Cobalt	ug/g	0.1	60%	3.5	4.2	18%
Copper	ug/g	0.5	60%	8.7	10	14%
Lead	ug/g	1	60%	3.4	4.1	19%
Molybdenum	ug/g	0.5	60%	<0.50	<0.50	NC
Nickel	ug/g	0.5	60%	9.7	11	13%
Selenium	ug/g	0.5	60%	<0.50	<0.50	NC
Silver	ug/g	0.2	60%	<0.20	<0.20	NC
Thallium	ug/g	0.05	60%	0.074	0.076	3%
Vanadium	ug/g	5	60%	18	20	11%
Zinc	ug/g	5	60%	16	18	12%
Total Boron	ug/g	5	60%	7.6	8.1	6%
Uranium	ug/g	0.05	60%	0.52	0.54	4%
Physical Parameters						
pH	ug/g	NA	60%	7.77	7.76	0%
Conductivity	ug/g	0.002	60%	0.14	0.18	25%
Sodium Adsorption Ratio	ug/g	NA	60%	0.28	0.24	15%

Notes	
RPD	Relative Percent Difference
NC	Not Calculatable
NV	No Criteria
'<'	Value is less than the LDL

Appendix F
Chemical Testing Results
Bureau Veritas Certificate of Analysis

Your Project #: 2311183.000.0200.0201
Your C.O.C. #: 968100-01-01

Attention: Mathew Quick

Englobe Corp.
Thunder Bay - Standing Offer
605 Hewitson Street
Thunder Bay, ON
CANADA P7B 5V5

Report Date: 2023/12/27
Report #: R7970655
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3BJ588
Received: 2023/12/15, 10:50

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
ABN Compounds in SPLP Leachates	3	2023/12/21	2023/12/22	CAM SOP-00301	EPA 8270 m
1,3-Dichloropropene Sum	3	N/A	2023/12/21		EPA 8260D m
Conductivity	5	2023/12/21	2023/12/21	CAM SOP-00414	OMOE E3530 v1 m
Dinitrotoluene Sum	3	N/A	2023/12/27	CAM SOP - 00301	EPA 8270
Petroleum Hydro. CCME F1 & BTEX in Soil (1)	5	N/A	2023/12/20	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (2)	5	2023/12/20	2023/12/21	CAM SOP-00316	CCME CWS m
Acid Extractable Metals by ICPMS	5	2023/12/21	2023/12/21	CAM SOP-00447	EPA 6020B m
Total Metals in SPLP Leachate by ICPMS	3	2023/12/21	2023/12/21	CAM SOP-00447	EPA 6020B m
Moisture	1	N/A	2023/12/19	CAM SOP-00445	Carter 2nd ed 70.2 m
Moisture	4	N/A	2023/12/20	CAM SOP-00445	Carter 2nd ed 70.2 m
Modified SPLP extraction - Weight	3	N/A	2023/12/21	CAM SOP-00941	OMOECP LaSB E9003 R3
pH CaCl2 EXTRACT	5	2023/12/21	2023/12/21	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	5	N/A	2023/12/21	CAM SOP-00102	EPA 6010C
SPLP Zero Headspace Extraction	3	2023/12/19	2023/12/20	CAM SOP-00430	EPA 1312 m
Volatile organics in SPLP leachates	3	N/A	2023/12/20	CAM SOP-00228	EPA 8260D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Your Project #: 2311183.000.0200.0201
Your C.O.C. #: 968100-01-01

Attention: Mathew Quick

Englobe Corp.
Thunder Bay - Standing Offer
605 Hewitson Street
Thunder Bay, ON
CANADA P7B 5V5

Report Date: 2023/12/27
Report #: R7970655
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3BJ588

Received: 2023/12/15, 10:50

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

(1) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.

(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ankita Bhalla, Project Manager
Email: Ankita.Bhalla@bureauveritas.com
Phone# (905) 817-5700

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O.REG 406 EXCESS SOIL BULK ICPMS METALS (SOIL)

Bureau Veritas ID		XXJ654		XXJ655		XXJ656		
Sampling Date		2023/12/12 09:45		2023/12/12 11:50		2023/12/12 14:10		
COC Number		968100-01-01		968100-01-01		968100-01-01		
	UNITS	**BH1,SS-2**	**QC Batch**	**BH2,SS-3**	**QC Batch**	**BH3,SS-3**	**RDL**	**QC Batch**
Metals								
Acid Extractable Antimony (Sb)	ug/g	<0.20	9125772	<0.20	9125521	<0.20	0.20	9125772
Acid Extractable Arsenic (As)	ug/g	4.5	9125772	1.6	9125521	1.0	1.0	9125772
Acid Extractable Barium (Ba)	ug/g	110	9125772	30	9125521	18	0.50	9125772
Acid Extractable Beryllium (Be)	ug/g	1.0	9125772	0.27	9125521	<0.20	0.20	9125772
Acid Extractable Boron (B)	ug/g	13	9125772	7.9	9125521	7.4	5.0	9125772
Acid Extractable Cadmium (Cd)	ug/g	<0.10	9125772	<0.10	9125521	<0.10	0.10	9125772
Acid Extractable Chromium (Cr)	ug/g	67	9125772	19	9125521	14	1.0	9125772
Acid Extractable Cobalt (Co)	ug/g	17	9125772	4.3	9125521	3.1	0.10	9125772
Acid Extractable Copper (Cu)	ug/g	24	9125772	9.2	9125521	7.4	0.50	9125772
Acid Extractable Lead (Pb)	ug/g	15	9125772	3.9	9125521	2.8	1.0	9125772
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	9125772	<0.50	9125521	<0.50	0.50	9125772
Acid Extractable Nickel (Ni)	ug/g	44	9125772	11	9125521	8.0	0.50	9125772
Acid Extractable Selenium (Se)	ug/g	<0.50	9125772	<0.50	9125521	<0.50	0.50	9125772
Acid Extractable Silver (Ag)	ug/g	<0.20	9125772	<0.20	9125521	<0.20	0.20	9125772
Acid Extractable Thallium (Tl)	ug/g	0.30	9125772	0.078	9125521	0.067	0.050	9125772
Acid Extractable Uranium (U)	ug/g	0.99	9125772	0.56	9125521	0.49	0.050	9125772
Acid Extractable Vanadium (V)	ug/g	64	9125772	21	9125521	16	5.0	9125772
Acid Extractable Zinc (Zn)	ug/g	81	9125772	19	9125521	15	5.0	9125772

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 406 EXCESS SOIL BULK ICPMS METALS (SOIL)

Bureau Veritas ID		XXJ657	XXJ658		
Sampling Date		2023/12/12 15:45	2023/12/12 16:30		
COC Number		968100-01-01	968100-01-01		
	UNITS	**BH4,SS-2**	**BH5,SS-2**	**RDL**	**QC Batch**
Metals					
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.20	9125521
Acid Extractable Arsenic (As)	ug/g	1.7	1.8	1.0	9125521
Acid Extractable Barium (Ba)	ug/g	22	26	0.50	9125521
Acid Extractable Beryllium (Be)	ug/g	0.21	0.25	0.20	9125521
Acid Extractable Boron (B)	ug/g	7.6	8.1	5.0	9125521
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	0.10	9125521
Acid Extractable Chromium (Cr)	ug/g	16	18	1.0	9125521
Acid Extractable Cobalt (Co)	ug/g	3.5	4.2	0.10	9125521
Acid Extractable Copper (Cu)	ug/g	8.7	10	0.50	9125521
Acid Extractable Lead (Pb)	ug/g	3.4	4.1	1.0	9125521
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	<0.50	0.50	9125521
Acid Extractable Nickel (Ni)	ug/g	9.7	11	0.50	9125521
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.50	9125521
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	0.20	9125521
Acid Extractable Thallium (Tl)	ug/g	0.074	0.076	0.050	9125521
Acid Extractable Uranium (U)	ug/g	0.52	0.54	0.050	9125521
Acid Extractable Vanadium (V)	ug/g	18	20	5.0	9125521
Acid Extractable Zinc (Zn)	ug/g	16	18	5.0	9125521

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 406 EXCESS SOIL BULK BTEX/F1-F4 (SOIL)

Bureau Veritas ID		XXJ654	XXJ655			XXJ655			XXJ656		
Sampling Date		2023/12/12 09:45	2023/12/12 11:50			2023/12/12 11:50			2023/12/12 14:10		
COC Number		968100-01-01	968100-01-01			968100-01-01			968100-01-01		
	UNITS	**BH1,SS-2**	**BH2,SS-3**	**RDL**	**QC Batch**	**BH2,SS-3 Lab-Dup**	**RDL**	**QC Batch**	**BH3,SS-3**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons											
Benzene	ug/g	<0.020	<0.020	0.020	9122600	<0.020	0.020	9122600	<0.020	0.020	9122600
Toluene	ug/g	<0.020	<0.020	0.020	9122600	<0.020	0.020	9122600	<0.020	0.020	9122600
Ethylbenzene	ug/g	<0.020	<0.020	0.020	9122600	<0.020	0.020	9122600	0.12	0.020	9122600
o-Xylene	ug/g	<0.020	<0.020	0.020	9122600	<0.020	0.020	9122600	0.33	0.020	9122600
p+m-Xylene	ug/g	<0.040	<0.040	0.040	9122600	<0.040	0.040	9122600	0.55	0.040	9122600
Total Xylenes	ug/g	<0.040	<0.040	0.040	9122600	<0.040	0.040	9122600	0.87	0.040	9122600
F1 (C6-C10)	ug/g	<10	<10	10	9122600	<10	10	9122600	43	10	9122600
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	9122600	<10	10	9122600	42	10	9122600
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	9124343				340	10	9124343
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	9124343				170	50	9124343
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	9124343				<50	50	9124343
Reached Baseline at C50	ug/g	Yes	Yes		9124343				Yes		9124343
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	101	102		9122600	103		9122600	96		9122600
4-Bromofluorobenzene	%	95	98		9122600	97		9122600	105		9122600
D10-o-Xylene	%	89	90		9122600	89		9122600	88		9122600
D4-1,2-Dichloroethane	%	94	98		9122600	97		9122600	96		9122600
o-Terphenyl	%	106	106		9124343				107		9124343

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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O.REG 406 EXCESS SOIL BULK BTEX/F1-F4 (SOIL)

Bureau Veritas ID		XXJ656			XXJ657		XXJ658		
Sampling Date		2023/12/12 14:10			2023/12/12 15:45		2023/12/12 16:30		
COC Number		968100-01-01			968100-01-01		968100-01-01		
	UNITS	**BH3,SS-3 Lab-Dup**	**RDL**	**QC Batch**	**BH4,SS-2**	**QC Batch**	**BH5,SS-2**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons									
Benzene	ug/g				<0.020	9124948	<0.020	0.020	9122600
Toluene	ug/g				<0.020	9124948	<0.020	0.020	9122600
Ethylbenzene	ug/g				<0.020	9124948	<0.020	0.020	9122600
o-Xylene	ug/g				<0.020	9124948	<0.020	0.020	9122600
p+m-Xylene	ug/g				<0.040	9124948	<0.040	0.040	9122600
Total Xylenes	ug/g				<0.040	9124948	<0.040	0.040	9122600
F1 (C6-C10)	ug/g				<10	9124948	<10	10	9122600
F1 (C6-C10) - BTEX	ug/g				<10	9124948	<10	10	9122600
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	540 (1)	10	9124343	<10	9124343	<10	10	9124343
F3 (C16-C34 Hydrocarbons)	ug/g	230	50	9124343	<50	9124343	<50	50	9124343
F4 (C34-C50 Hydrocarbons)	ug/g	<50	50	9124343	<50	9124343	<50	50	9124343
Reached Baseline at C50	ug/g	Yes		9124343	Yes	9124343	Yes		9124343
Surrogate Recovery (%)									
1,4-Difluorobenzene	%				99	9124948	103		9122600
4-Bromofluorobenzene	%				101	9124948	104		9122600
D10-o-Xylene	%				86	9124948	98		9122600
D4-1,2-Dichloroethane	%				100	9124948	99		9122600
o-Terphenyl	%	109		9124343	108	9124343	105		9124343

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Duplicate results exceeded RPD acceptance criteria for flagged analytes. Sample extract was reanalyzed with the same results. This is likely due to sample heterogeneity.

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O.REG 406 EXCESS SOIL SPLP ABNS (SOIL)

Bureau Veritas ID		XXJ654	XXJ655	XXJ656			XXJ656		
Sampling Date		2023/12/12 09:45	2023/12/12 11:50	2023/12/12 14:10			2023/12/12 14:10		
COC Number		968100-01-01	968100-01-01	968100-01-01			968100-01-01		
	UNITS	**BH1,SS-2**	**BH2,SS-3**	**BH3,SS-3**	**RDL**	**QC Batch**	**BH3,SS-3 Lab-Dup**	**RDL**	**QC Batch**
Semivolatile Organics									
Leachable (SPLP) Bis(2-chloroethyl)ether	ug/L	<2.0	<2.0	<2.0	2.0	9127088	<2.0	2.0	9127088
Leachable (SPLP) Bis(2-chloroisopropyl)ether	ug/L	<2.0	<2.0	<2.0	2.0	9127088	<2.0	2.0	9127088
Leachable (SPLP) p-Chloroaniline	ug/L	<5.0	<5.0	<5.0	5.0	9127088	<5.0	5.0	9127088
Leachable (SPLP) 3,3'-Dichlorobenzidine	ug/L	<0.40	<0.40	<0.40	0.40	9127088	<0.40	0.40	9127088
Leachable (SPLP) Diethyl phthalate	ug/L	<1.0	<1.0	<1.0	1.0	9127088	<1.0	1.0	9127088
Leachable (SPLP) Dimethyl phthalate	ug/L	<1.0	<1.0	<1.0	1.0	9127088	<1.0	1.0	9127088
Leachable (SPLP) 2,4-Dinitrophenol	ug/L	<5.0	<5.0	<5.0	5.0	9127088	<5.0	5.0	9127088
Leachable (SPLP) 2,4-Dinitrotoluene	ug/L	<3.0	<3.0	<3.0	3.0	9127088	<3.0	3.0	9127088
Leachable (SPLP) 2,6-Dinitrotoluene	ug/L	<3.0	<3.0	<3.0	3.0	9127088	<3.0	3.0	9127088
Leachable (SPLP) 2,4,6-Trichlorophenol	ug/L	<0.70	<0.70	<0.70	0.70	9127088	<0.70	0.70	9127088
Calculated Parameters									
Leachable 2,4- & 2,6-Dinitrotoluene	ug/L	<4.2	<4.2	<4.2	4.2	9118759			
Surrogate Recovery (%)									
Leachable (SPLP) 2,4,6-Tribromophenol	%	46	58	73		9127088	70		9127088
Leachable (SPLP) 2-Fluorobiphenyl	%	78	81	81		9127088	83		9127088
Leachable (SPLP) D14-Terphenyl (FS)	%	112	111	110		9127088	113		9127088
Leachable (SPLP) D5-Nitrobenzene	%	86	89	85		9127088	85		9127088
Leachable (SPLP) D5-Phenol	%	34	37	40		9127088	38		9127088

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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O.REG 406 EXCESS SOIL SPLP METALS (SOIL)

Bureau Veritas ID		XXJ654	XXJ655	XXJ656		
Sampling Date		2023/12/12 09:45	2023/12/12 11:50	2023/12/12 14:10		
COC Number		968100-01-01	968100-01-01	968100-01-01		
	UNITS	**BH1,SS-2**	**BH2,SS-3**	**BH3,SS-3**	**RDL**	**QC Batch**
Metals						
Leachable (SPLP) Antimony (Sb)	ug/L	<0.5	<0.5	<0.5	0.5	9126553
Leachable (SPLP) Arsenic (As)	ug/L	<1	<1	<1	1	9126553
Leachable (SPLP) Barium (Ba)	ug/L	<5	13	<5	5	9126553
Leachable (SPLP) Beryllium (Be)	ug/L	<0.5	<0.5	<0.5	0.5	9126553
Leachable (SPLP) Boron (B)	ug/L	<10	<10	<10	10	9126553
Leachable (SPLP) Cadmium (Cd)	ug/L	<0.1	<0.1	<0.1	0.1	9126553
Leachable (SPLP) Chromium (Cr)	ug/L	<5	<5	<5	5	9126553
Leachable (SPLP) Cobalt (Co)	ug/L	<0.5	<0.5	<0.5	0.5	9126553
Leachable (SPLP) Copper (Cu)	ug/L	2	2	<1	1	9126553
Leachable (SPLP) Lead (Pb)	ug/L	1.1	<0.5	<0.5	0.5	9126553
Leachable (SPLP) Molybdenum (Mo)	ug/L	1	1	2	1	9126553
Leachable (SPLP) Nickel (Ni)	ug/L	<1	<1	<1	1	9126553
Leachable (SPLP) Selenium (Se)	ug/L	<2	<2	<2	2	9126553
Leachable (SPLP) Silver (Ag)	ug/L	<0.1	<0.1	<0.1	0.1	9126553
Leachable (SPLP) Thallium (Tl)	ug/L	<0.05	<0.05	<0.05	0.05	9126553
Leachable (SPLP) Uranium (U)	ug/L	<0.1	0.1	0.1	0.1	9126553
Leachable (SPLP) Vanadium (V)	ug/L	2	3	<1	1	9126553
Leachable (SPLP) Zinc (Zn)	ug/L	<5	<5	<5	5	9126553

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 406 EXCESS SOIL MSPLP PREP (SOIL)

Bureau Veritas ID		XXJ654	XXJ655	XXJ656	
Sampling Date		2023/12/12 09:45	2023/12/12 11:50	2023/12/12 14:10	
COC Number		968100-01-01	968100-01-01	968100-01-01	
	UNITS	**BH1,SS-2**	**BH2,SS-3**	**BH3,SS-3**	**QC Batch**
Inorganics					
Dry Weight	g	100	100	100	9123899
QC Batch = Quality Control Batch					

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O.REG 406 EXCESS SOIL SPLP VOCS (SOIL)

Bureau Veritas ID		XXJ654	XXJ655	XXJ656		
Sampling Date		2023/12/12 09:45	2023/12/12 11:50	2023/12/12 14:10		
COC Number		968100-01-01	968100-01-01	968100-01-01		
	UNITS	**BH1,SS-2**	**BH2,SS-3**	**BH3,SS-3**	**RDL**	**QC Batch**
Charge/Prep Analysis						
Amount Extracted (Wet Weight) (g)	N/A	25	25	25	N/A	9120191
Calculated Parameters						
Leachable (ZHE) 1,3-Dichloropropene (cis+trans)	ug/L	<0.42	<0.42	<0.42	0.42	9118757
Volatile Organics						
Leachable (SPLP) Bromomethane	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) Carbon Tetrachloride	ug/L	<0.19	<0.19	<0.19	0.19	9123431
Leachable (SPLP) Chloroform	ug/L	<0.90	<0.90	<0.90	0.90	9123431
Leachable (SPLP) 1,2-Dichlorobenzene	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) 1,4-Dichlorobenzene	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) 1,1-Dichloroethane	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) 1,2-Dichloroethane	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) 1,1-Dichloroethylene	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) cis-1,2-Dichloroethylene	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) trans-1,2-Dichloroethylene	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) 1,2-Dichloropropane	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	<0.30	0.30	9123431
Leachable (SPLP) trans-1,3-Dichloropropene	ug/L	<0.30	<0.30	<0.30	0.30	9123431
Leachable (SPLP) Ethylene Dibromide	ug/L	<0.19	<0.19	<0.19	0.19	9123431
Leachable (SPLP) 1,1,1,2-Tetrachloroethane	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) 1,1,2,2-Tetrachloroethane	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) Tetrachloroethylene	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) 1,1,2-Trichloroethane	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Leachable (SPLP) Trichloroethylene	ug/L	<0.40	<0.40	<0.40	0.40	9123431
Surrogate Recovery (%)						
Leachable (SPLP) 4-Bromofluorobenzene	%	100	100	105		9123431
Leachable (SPLP) D4-1,2-Dichloroethane	%	105	108	105		9123431
Leachable (SPLP) D8-Toluene	%	89	89	88		9123431

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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SODIUM ADSORPTION RATIO (SAR)

Bureau Veritas ID		XXJ654	XXJ655	XXJ656	XXJ657	XXJ658	
Sampling Date		2023/12/12 09:45	2023/12/12 11:50	2023/12/12 14:10	2023/12/12 15:45	2023/12/12 16:30	
COC Number		968100-01-01	968100-01-01	968100-01-01	968100-01-01	968100-01-01	
	UNITS	**BH1,SS-2**	**BH2,SS-3**	**BH3,SS-3**	**BH4,SS-2**	**BH5,SS-2**	**QC Batch**
Calculated Parameters							
Sodium Adsorption Ratio	N/A	1.3	4.5	0.27 (1)	0.28 (1)	0.24 (1)	9118729

QC Batch = Quality Control Batch

(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

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Bureau Veritas Job #: C3BJ588
Report Date: 2023/12/27

Englobe Corp.
Client Project #: 2311183.000.0200.0201
Sampler Initials: VT

RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		XXJ654			XXJ654			XXJ655		
Sampling Date		2023/12/12 09:45			2023/12/12 09:45			2023/12/12 11:50		
COC Number		968100-01-01			968100-01-01			968100-01-01		
	UNITS	**BH1,SS-2**	**RDL**	**QC Batch**	**BH1,SS-2 Lab-Dup**	**RDL**	**QC Batch**	**BH2,SS-3**	**RDL**	**QC Batch**
Inorganics										
Conductivity	mS/cm	0.58	0.002	9125824				0.29	0.002	9125824
Moisture	%	22	1.0	9122800	22	1.0	9122800	16	1.0	9122602
Available (CaCl2) pH	pH	7.55		9125802				7.68		9125802

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		XXJ655			XXJ656		XXJ657	XXJ658		
Sampling Date		2023/12/12 11:50			2023/12/12 14:10		2023/12/12 15:45	2023/12/12 16:30		
COC Number		968100-01-01			968100-01-01		968100-01-01	968100-01-01		
	UNITS	**BH2,SS-3 Lab-Dup**	**RDL**	**QC Batch**	**BH3,SS-3**	**QC Batch**	**BH4,SS-2**	**BH5,SS-2**	**RDL**	**QC Batch**
Inorganics										
Conductivity	mS/cm				0.17	9125824	0.14	0.18	0.002	9125824
Moisture	%	15	1.0	9122602	10	9122796	17	15	1.0	9122761
Available (CaCl2) pH	pH				7.65	9125802	7.77	7.76		9125802

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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TEST SUMMARY

Bureau Veritas ID: XXJ654
Sample ID: BH1,SS-2
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in SPLP Leachates	GC/MS	9127088	2023/12/21	2023/12/22	Wendy Zhao
1,3-Dichloropropene Sum	CALC	9118757	N/A	2023/12/21	Automated Statchk
Conductivity	AT	9125824	2023/12/21	2023/12/21	Leily Karimi
Dinitrotoluene Sum	CALC	9118759	N/A	2023/12/27	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	9122600	N/A	2023/12/20	Ravinder Gaidhu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9124343	2023/12/20	2023/12/21	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9125772	2023/12/21	2023/12/21	Daniel Teclu
Total Metals in SPLP Leachate by ICPMS	ICP/MS	9126553	2023/12/21	2023/12/21	Prempal Bhatti
Moisture	BAL	9122800	N/A	2023/12/20	Joe Thomas
Modified SPLP extraction - Weight		9123899	N/A	2023/12/21	Jian (Ken) Wang
pH CaCl2 EXTRACT	AT	9125802	2023/12/21	2023/12/21	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9118729	N/A	2023/12/21	Automated Statchk
SPLP Zero Headspace Extraction		9120191	2023/12/19	2023/12/20	Archit Prajapati
Volatile organics in SPLP leachates	HS/MS	9123431	N/A	2023/12/20	Gabriella Morrone

Bureau Veritas ID: XXJ654 Dup
Sample ID: BH1,SS-2
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	9122800	N/A	2023/12/20	Joe Thomas

Bureau Veritas ID: XXJ655
Sample ID: BH2,SS-3
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in SPLP Leachates	GC/MS	9127088	2023/12/21	2023/12/22	Wendy Zhao
1,3-Dichloropropene Sum	CALC	9118757	N/A	2023/12/21	Automated Statchk
Conductivity	AT	9125824	2023/12/21	2023/12/21	Leily Karimi
Dinitrotoluene Sum	CALC	9118759	N/A	2023/12/27	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	9122600	N/A	2023/12/20	Ravinder Gaidhu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9124343	2023/12/20	2023/12/21	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9125521	2023/12/21	2023/12/21	Thuy Linh Nguyen
Total Metals in SPLP Leachate by ICPMS	ICP/MS	9126553	2023/12/21	2023/12/21	Prempal Bhatti
Moisture	BAL	9122602	N/A	2023/12/19	Nisargsinh Takhatsinh Parihar
Modified SPLP extraction - Weight		9123899	N/A	2023/12/21	Jian (Ken) Wang
pH CaCl2 EXTRACT	AT	9125802	2023/12/21	2023/12/21	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9118729	N/A	2023/12/21	Automated Statchk
SPLP Zero Headspace Extraction		9120191	2023/12/19	2023/12/20	Archit Prajapati
Volatile organics in SPLP leachates	HS/MS	9123431	N/A	2023/12/20	Gabriella Morrone

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TEST SUMMARY

Bureau Veritas ID: XXJ655 Dup
Sample ID: BH2,SS-3
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	9122600	N/A	2023/12/20	Ravinder Gaidhu
Moisture	BAL	9122602	N/A	2023/12/19	Nisargsinh Takhatsinh Parihar

Bureau Veritas ID: XXJ656
Sample ID: BH3,SS-3
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in SPLP Leachates	GC/MS	9127088	2023/12/21	2023/12/22	Wendy Zhao
1,3-Dichloropropene Sum	CALC	9118757	N/A	2023/12/21	Automated Statchk
Conductivity	AT	9125824	2023/12/21	2023/12/21	Leily Karimi
Dinitrotoluene Sum	CALC	9118759	N/A	2023/12/27	Automated Statchk
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	9122600	N/A	2023/12/20	Ravinder Gaidhu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9124343	2023/12/20	2023/12/21	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9125772	2023/12/21	2023/12/21	Daniel Teclu
Total Metals in SPLP Leachate by ICPMS	ICP/MS	9126553	2023/12/21	2023/12/21	Prempal Bhatti
Moisture	BAL	9122796	N/A	2023/12/20	Joe Thomas
Modified SPLP extraction - Weight		9123899	N/A	2023/12/21	Jian (Ken) Wang
pH CaCl2 EXTRACT	AT	9125802	2023/12/21	2023/12/21	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9118729	N/A	2023/12/21	Automated Statchk
SPLP Zero Headspace Extraction		9120191	2023/12/19	2023/12/20	Archit Prajapati
Volatile organics in SPLP leachates	HS/MS	9123431	N/A	2023/12/20	Gabriella Morrone

Bureau Veritas ID: XXJ656 Dup
Sample ID: BH3,SS-3
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ABN Compounds in SPLP Leachates	GC/MS	9127088	2023/12/21	2023/12/22	Wendy Zhao
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9124343	2023/12/20	2023/12/21	(Kent) Maolin Li

Bureau Veritas ID: XXJ657
Sample ID: BH4,SS-2
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	9125824	2023/12/21	2023/12/21	Leily Karimi
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	9124948	N/A	2023/12/20	Georgeta Rusu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9124343	2023/12/20	2023/12/21	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9125521	2023/12/21	2023/12/21	Thuy Linh Nguyen
Moisture	BAL	9122761	N/A	2023/12/20	Joe Thomas
pH CaCl2 EXTRACT	AT	9125802	2023/12/21	2023/12/21	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9118729	N/A	2023/12/21	Automated Statchk

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TEST SUMMARY

Bureau Veritas ID: XXJ658
Sample ID: BH5,SS-2
Matrix: Soil

Collected: 2023/12/12
Shipped:
Received: 2023/12/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	9125824	2023/12/21	2023/12/21	Leily Karimi
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	9122600	N/A	2023/12/20	Ravinder Gaidhu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9124343	2023/12/20	2023/12/21	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9125521	2023/12/21	2023/12/21	Thuy Linh Nguyen
Moisture	BAL	9122761	N/A	2023/12/20	Joe Thomas
pH CaCl2 EXTRACT	AT	9125802	2023/12/21	2023/12/21	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9118729	N/A	2023/12/21	Automated Statchk

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C

Sample XXJ654 [BH1,SS-2] : F1/BTEX analysis: Soil weight exceeds the protocol specification of approximately 5g in the field preserved vial. Additional methanol was added to the vial to ensure extraction efficiency

Sample XXJ655 [BH2,SS-3] : F1/BTEX analysis: Soil weight exceeds the protocol specification of approximately 5g in the field preserved vial. Additional methanol was added to the vial to ensure extraction efficiency

Sample XXJ656 [BH3,SS-3] : F1/BTEX analysis: Soil weight exceeds the protocol specification of approximately 5g in the field preserved vial. Additional methanol was added to the vial to ensure extraction efficiency

Sample XXJ657 [BH4,SS-2] : F1/BTEX analysis: Soil weight exceeds the protocol specification of approximately 5g in the field preserved vial. Additional methanol was added to the vial to ensure extraction efficiency.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
9122600	1,4-Difluorobenzene	2023/12/20	97	60 - 140	97	60 - 140	102	%				
9122600	4-Bromofluorobenzene	2023/12/20	101	60 - 140	99	60 - 140	96	%				
9122600	D10-o-Xylene	2023/12/20	118	60 - 140	94	60 - 140	82	%				
9122600	D4-1,2-Dichloroethane	2023/12/20	93	60 - 140	93	60 - 140	100	%				
9123431	Leachable (SPLP) 4-Bromofluorobenzene	2023/12/20	101	70 - 130	104	70 - 130	101	%				
9123431	Leachable (SPLP) D4-1,2-Dichloroethane	2023/12/20	100	70 - 130	98	70 - 130	103	%				
9123431	Leachable (SPLP) D8-Toluene	2023/12/20	105	70 - 130	104	70 - 130	90	%				
9124343	o-Terphenyl	2023/12/20	106	60 - 130	102	60 - 130	97	%				
9124948	1,4-Difluorobenzene	2023/12/20	100	60 - 140	99	60 - 140	101	%				
9124948	4-Bromofluorobenzene	2023/12/20	101	60 - 140	101	60 - 140	102	%				
9124948	D10-o-Xylene	2023/12/20	94	60 - 140	88	60 - 140	84	%				
9124948	D4-1,2-Dichloroethane	2023/12/20	95	60 - 140	101	60 - 140	107	%				
9127088	Leachable (SPLP) 2,4,6-Tribromophenol	2023/12/22	110	30 - 130	119	30 - 130	76	%				
9127088	Leachable (SPLP) 2-Fluorobiphenyl	2023/12/22	77	30 - 130	76	30 - 130	80	%				
9127088	Leachable (SPLP) D14-Terphenyl (FS)	2023/12/22	117	30 - 130	117	30 - 130	113	%				
9127088	Leachable (SPLP) D5-Nitrobenzene	2023/12/22	92	30 - 130	95	30 - 130	93	%				
9127088	Leachable (SPLP) D5-Phenol	2023/12/22	48	30 - 130	53	30 - 130	43	%				
9122600	Benzene	2023/12/20	106	50 - 140	86	50 - 140	<0.020	ug/g	NC	50		
9122600	Ethylbenzene	2023/12/20	119	50 - 140	97	50 - 140	<0.020	ug/g	NC	50		
9122600	F1 (C6-C10) - BTEX	2023/12/20					<10	ug/g	NC	30		
9122600	F1 (C6-C10)	2023/12/20	117	60 - 140	91	80 - 120	<10	ug/g	NC	30		
9122600	o-Xylene	2023/12/20	116	50 - 140	93	50 - 140	<0.020	ug/g	NC	50		
9122600	p+m-Xylene	2023/12/20	110	50 - 140	89	50 - 140	<0.040	ug/g	NC	50		
9122600	Toluene	2023/12/20	104	50 - 140	85	50 - 140	<0.020	ug/g	NC	50		
9122600	Total Xylenes	2023/12/20					<0.040	ug/g	NC	50		
9122602	Moisture	2023/12/19							8.3	20		
9122761	Moisture	2023/12/20							0.69	20		
9122796	Moisture	2023/12/20							0.31	20		
9122800	Moisture	2023/12/20							1.4	20		
9123431	Leachable (SPLP) 1,1,1,2-Tetrachloroethane	2023/12/20	107	70 - 130	98	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) 1,1,2,2-Tetrachloroethane	2023/12/20	114	70 - 130	104	70 - 130	<0.40	ug/L	NC	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
9123431	Leachable (SPLP) 1,1,2-Trichloroethane	2023/12/20	107	70 - 130	97	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) 1,1-Dichloroethane	2023/12/20	106	70 - 130	98	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) 1,1-Dichloroethylene	2023/12/20	101	70 - 130	93	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) 1,2-Dichlorobenzene	2023/12/20	101	70 - 130	94	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) 1,2-Dichloroethane	2023/12/20	98	70 - 130	90	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) 1,2-Dichloropropane	2023/12/20	105	70 - 130	97	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) 1,4-Dichlorobenzene	2023/12/20	108	70 - 130	101	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) Bromomethane	2023/12/20	100	60 - 140	89	60 - 140	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) Carbon Tetrachloride	2023/12/20	100	70 - 130	92	70 - 130	<0.19	ug/L	NC	30		
9123431	Leachable (SPLP) Chloroform	2023/12/20	108	70 - 130	100	70 - 130	<0.90	ug/L	NC	30		
9123431	Leachable (SPLP) cis-1,2-Dichloroethylene	2023/12/20	106	70 - 130	99	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) cis-1,3-Dichloropropene	2023/12/20	100	70 - 130	89	70 - 130	<0.30	ug/L	NC	30		
9123431	Leachable (SPLP) Ethylene Dibromide	2023/12/20	109	70 - 130	99	70 - 130	<0.19	ug/L	NC	30		
9123431	Leachable (SPLP) Tetrachloroethylene	2023/12/20	100	70 - 130	94	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) trans-1,2-Dichloroethylene	2023/12/20	102	70 - 130	97	70 - 130	<0.40	ug/L	NC	30		
9123431	Leachable (SPLP) trans-1,3-Dichloropropene	2023/12/20	105	70 - 130	90	70 - 130	<0.30	ug/L	NC	30		
9123431	Leachable (SPLP) Trichloroethylene	2023/12/20	103	70 - 130	97	70 - 130	<0.40	ug/L	NC	30		
9124343	F2 (C10-C16 Hydrocarbons)	2023/12/21	NC (1)	60 - 130	105	80 - 120	<10	ug/g	44 (2)	30		
9124343	F3 (C16-C34 Hydrocarbons)	2023/12/21	113	60 - 130	110	80 - 120	<50	ug/g	NC	30		
9124343	F4 (C34-C50 Hydrocarbons)	2023/12/21	111	60 - 130	109	80 - 120	<50	ug/g	NC	30		
9124948	Benzene	2023/12/20	84	50 - 140	79	50 - 140	<0.020	ug/g	NC	50		
9124948	Ethylbenzene	2023/12/20	99	50 - 140	89	50 - 140	<0.020	ug/g	NC	50		
9124948	F1 (C6-C10) - BTEX	2023/12/20					<10	ug/g	NC	30		
9124948	F1 (C6-C10)	2023/12/20	93	60 - 140	90	80 - 120	<10	ug/g	NC	30		
9124948	o-Xylene	2023/12/20	96	50 - 140	89	50 - 140	<0.020	ug/g	NC	50		
9124948	p+m-Xylene	2023/12/20	93	50 - 140	83	50 - 140	<0.040	ug/g	NC	50		
9124948	Toluene	2023/12/20	83	50 - 140	76	50 - 140	<0.020	ug/g	NC	50		
9124948	Total Xylenes	2023/12/20					<0.040	ug/g	NC	50		
9125521	Acid Extractable Antimony (Sb)	2023/12/21	98	75 - 125	95	80 - 120	<0.20	ug/g				
9125521	Acid Extractable Arsenic (As)	2023/12/21	95	75 - 125	97	80 - 120	<1.0	ug/g	12	30		
9125521	Acid Extractable Barium (Ba)	2023/12/21	100	75 - 125	98	80 - 120	<0.50	ug/g				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
9125521	Acid Extractable Beryllium (Be)	2023/12/21	95	75 - 125	92	80 - 120	<0.20	ug/g				
9125521	Acid Extractable Boron (B)	2023/12/21	90	75 - 125	87	80 - 120	<5.0	ug/g				
9125521	Acid Extractable Cadmium (Cd)	2023/12/21	94	75 - 125	93	80 - 120	<0.10	ug/g				
9125521	Acid Extractable Chromium (Cr)	2023/12/21	94	75 - 125	95	80 - 120	<1.0	ug/g				
9125521	Acid Extractable Cobalt (Co)	2023/12/21	92	75 - 125	95	80 - 120	<0.10	ug/g				
9125521	Acid Extractable Copper (Cu)	2023/12/21	92	75 - 125	95	80 - 120	<0.50	ug/g				
9125521	Acid Extractable Lead (Pb)	2023/12/21	99	75 - 125	99	80 - 120	<1.0	ug/g				
9125521	Acid Extractable Molybdenum (Mo)	2023/12/21	93	75 - 125	90	80 - 120	<0.50	ug/g				
9125521	Acid Extractable Nickel (Ni)	2023/12/21	95	75 - 125	100	80 - 120	<0.50	ug/g				
9125521	Acid Extractable Selenium (Se)	2023/12/21	99	75 - 125	99	80 - 120	<0.50	ug/g				
9125521	Acid Extractable Silver (Ag)	2023/12/21	95	75 - 125	95	80 - 120	<0.20	ug/g				
9125521	Acid Extractable Thallium (Tl)	2023/12/21	97	75 - 125	98	80 - 120	<0.050	ug/g				
9125521	Acid Extractable Uranium (U)	2023/12/21	101	75 - 125	102	80 - 120	<0.050	ug/g	8.2	30		
9125521	Acid Extractable Vanadium (V)	2023/12/21	92	75 - 125	98	80 - 120	<5.0	ug/g				
9125521	Acid Extractable Zinc (Zn)	2023/12/21	95	75 - 125	99	80 - 120	<5.0	ug/g				
9125772	Acid Extractable Antimony (Sb)	2023/12/21	93	75 - 125	100	80 - 120	<0.20	ug/g				
9125772	Acid Extractable Arsenic (As)	2023/12/21	93	75 - 125	99	80 - 120	<1.0	ug/g	2.5	30		
9125772	Acid Extractable Barium (Ba)	2023/12/21	89	75 - 125	94	80 - 120	<0.50	ug/g				
9125772	Acid Extractable Beryllium (Be)	2023/12/21	91	75 - 125	94	80 - 120	<0.20	ug/g				
9125772	Acid Extractable Boron (B)	2023/12/21	85	75 - 125	90	80 - 120	<5.0	ug/g				
9125772	Acid Extractable Cadmium (Cd)	2023/12/21	92	75 - 125	95	80 - 120	<0.10	ug/g				
9125772	Acid Extractable Chromium (Cr)	2023/12/21	90	75 - 125	95	80 - 120	<1.0	ug/g				
9125772	Acid Extractable Cobalt (Co)	2023/12/21	92	75 - 125	99	80 - 120	<0.10	ug/g				
9125772	Acid Extractable Copper (Cu)	2023/12/21	101	75 - 125	94	80 - 120	<0.50	ug/g				
9125772	Acid Extractable Lead (Pb)	2023/12/21	97	75 - 125	97	80 - 120	<1.0	ug/g				
9125772	Acid Extractable Molybdenum (Mo)	2023/12/21	92	75 - 125	95	80 - 120	<0.50	ug/g				
9125772	Acid Extractable Nickel (Ni)	2023/12/21	91	75 - 125	99	80 - 120	<0.50	ug/g				
9125772	Acid Extractable Selenium (Se)	2023/12/21	97	75 - 125	100	80 - 120	<0.50	ug/g				
9125772	Acid Extractable Silver (Ag)	2023/12/21	98	75 - 125	101	80 - 120	<0.20	ug/g				
9125772	Acid Extractable Thallium (Tl)	2023/12/21	96	75 - 125	102	80 - 120	<0.050	ug/g				
9125772	Acid Extractable Uranium (U)	2023/12/21	98	75 - 125	101	80 - 120	<0.050	ug/g	8.1	30		

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
9125772	Acid Extractable Vanadium (V)	2023/12/21	88	75 - 125	96	80 - 120	<5.0	ug/g				
9125772	Acid Extractable Zinc (Zn)	2023/12/21	NC	75 - 125	102	80 - 120	<5.0	ug/g				
9125802	Available (CaCl2) pH	2023/12/21			100	97 - 103			0.54	N/A		
9125824	Conductivity	2023/12/21			104	90 - 110	<0.002	mS/cm	1.4	10		
9126553	Leachable (SPLP) Antimony (Sb)	2023/12/21	102	80 - 120	102	80 - 120	<0.5	ug/L	NC	35	<0.5	ug/L
9126553	Leachable (SPLP) Arsenic (As)	2023/12/21	96	80 - 120	96	80 - 120	<1	ug/L	NC	35	<1	ug/L
9126553	Leachable (SPLP) Barium (Ba)	2023/12/21	96	80 - 120	96	80 - 120	<5	ug/L	NC	35	<5	ug/L
9126553	Leachable (SPLP) Beryllium (Be)	2023/12/21	95	80 - 120	92	80 - 120	<0.5	ug/L	NC	35	<0.5	ug/L
9126553	Leachable (SPLP) Boron (B)	2023/12/21	95	80 - 120	94	80 - 120	<10	ug/L	0.15	35	<10	ug/L
9126553	Leachable (SPLP) Cadmium (Cd)	2023/12/21	96	80 - 120	95	80 - 120	<0.1	ug/L	NC	35	<0.1	ug/L
9126553	Leachable (SPLP) Chromium (Cr)	2023/12/21	96	80 - 120	97	80 - 120	<5	ug/L	NC	35	<5	ug/L
9126553	Leachable (SPLP) Cobalt (Co)	2023/12/21	97	80 - 120	97	80 - 120	<0.5	ug/L	NC	35	<0.5	ug/L
9126553	Leachable (SPLP) Copper (Cu)	2023/12/21	97	80 - 120	97	80 - 120	<1	ug/L	NC	35	<1	ug/L
9126553	Leachable (SPLP) Lead (Pb)	2023/12/21	96	80 - 120	96	80 - 120	<0.5	ug/L	NC	35	<0.5	ug/L
9126553	Leachable (SPLP) Molybdenum (Mo)	2023/12/21	101	80 - 120	100	80 - 120	<1	ug/L	0.39	35	<1	ug/L
9126553	Leachable (SPLP) Nickel (Ni)	2023/12/21	95	80 - 120	96	80 - 120	<1	ug/L	NC	35	<1	ug/L
9126553	Leachable (SPLP) Selenium (Se)	2023/12/21	100	80 - 120	97	80 - 120	<2	ug/L	NC	35	<2	ug/L
9126553	Leachable (SPLP) Silver (Ag)	2023/12/21	96	80 - 120	95	80 - 120	<0.1	ug/L	NC	35	<0.1	ug/L
9126553	Leachable (SPLP) Thallium (Tl)	2023/12/21	97	80 - 120	96	80 - 120	<0.05	ug/L	NC	35	<0.05	ug/L
9126553	Leachable (SPLP) Uranium (U)	2023/12/21	95	80 - 120	95	80 - 120	<0.1	ug/L	2.3	35	<0.1	ug/L
9126553	Leachable (SPLP) Vanadium (V)	2023/12/21	96	80 - 120	98	80 - 120	<1	ug/L	NC	35	<1	ug/L
9126553	Leachable (SPLP) Zinc (Zn)	2023/12/21	98	80 - 120	98	80 - 120	<5	ug/L	NC	35	<5	ug/L
9127088	Leachable (SPLP) 2,4,6-Trichlorophenol	2023/12/22	98	10 - 130	104	10 - 130	<0.70	ug/L	NC	40		
9127088	Leachable (SPLP) 2,4-Dinitrophenol	2023/12/22	88	10 - 130	84	10 - 130	<5.0	ug/L	NC	40		
9127088	Leachable (SPLP) 2,4-Dinitrotoluene	2023/12/22	104	30 - 130	108	30 - 130	<3.0	ug/L	NC	40		
9127088	Leachable (SPLP) 2,6-Dinitrotoluene	2023/12/22	96	30 - 130	98	30 - 130	<3.0	ug/L	NC	40		
9127088	Leachable (SPLP) 3,3'-Dichlorobenzidine	2023/12/22	84	30 - 130	102	30 - 130	<0.40	ug/L	NC	40		
9127088	Leachable (SPLP) Bis(2-chloroethyl)ether	2023/12/22	98	30 - 130	101	30 - 130	<2.0	ug/L	NC	40		
9127088	Leachable (SPLP) Bis(2-chloroisopropyl)ether	2023/12/22	89	30 - 130	92	30 - 130	<2.0	ug/L	NC	40		
9127088	Leachable (SPLP) Diethyl phthalate	2023/12/22	107	30 - 130	109	30 - 130	<1.0	ug/L	NC	40		
9127088	Leachable (SPLP) Dimethyl phthalate	2023/12/22	104	30 - 130	106	30 - 130	<1.0	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
9127088	Leachable (SPLP) p-Chloroaniline	2023/12/22	80	30 - 130	97	30 - 130	<5.0	ug/L	NC	40		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Matrix spike recovery is outside the acceptance limit due to matrix Interference.

(2) Duplicate results exceeded RPD acceptance criteria for flagged analytes. Sample extract was reanalyzed with the same results. This is likely due to sample heterogeneity.

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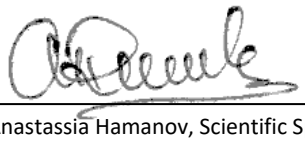
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Bureau Veritas
109 & 110, 4023 Meadowbrook Drive, London, Ontario Canada N6L 1E7 Tel:(519) 652-9444 Toll-free:800-563-6266 Fax:(519) 652-8189 www.bvna.com

ONT-2023-12-1328

Bottle Order #: 968100

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#1457 Englobe Corp.	Company Name:		Quotation #:	C30975
Attention:	Accounts Payable	Attention:	Mathew Quick	P.O. #:	
Address:	605 Hewitson Street	Address:		Project:	2311183.000.0200.0201
	Thunder Bay ON P7B 5V5			Project Name:	
Tel:	(807) 623-2929 Fax: (807) 623-1792	Tel:	Fax:	Site #:	
Email:	AP-ONT@englobecorp.com	Email:	mquick@dstgroup.com	Sampled By:	

COC #: C#968100-01-01

Project Manager: Ankita Bhalla

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO ☐ Reg 406 Table ___
- ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 406 Excess Soil SPLP Metals	O.Reg 406 Excess Soil SPLP ABNs	O.Reg 406 Excess Soil SPLP VOCs	O.Reg 406 Excess Soil Bulk BTEX/F1-F4	O.Reg 406 Excess Soil Bulk ICPMS Metals	SAR - ICP Metals	Conductivity	pH CaCl2 EXTRACT			# of Bottles	Comments
1		BH 1, SS-2	Dec, 12	9:45	Soil		✓	✓	✓	✓	✓	✓	✓	✓			5	
2		BH 2, SS-3	Dec, 12	11:50	Soil		✓	✓	✓	✓	✓	✓	✓	✓			5	
3		BH 3, SS-3	Dec, 12	14:10	Soil		✓	✓	✓	✓	✓	✓	✓	✓			5	
4		BH 4, SS-2	Dec, 12	15:45	Soil					✓	✓	✓	✓	✓			3	
5		BH 5, SS-2	Dec, 12	16:30	Soil					✓	✓	✓	✓	✓			3	
6																		
7																		
8																		
9																		
10																		

Rec'd In Thunder Bay

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Vipin - T. Parambath	23/12/15	9:10	Sherrie Bramwell	2023/12/15	10:50	
				2023/12/16	10:00	

Laboratory Use Only Cooling media present

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	3.5,5	Present	✓	
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

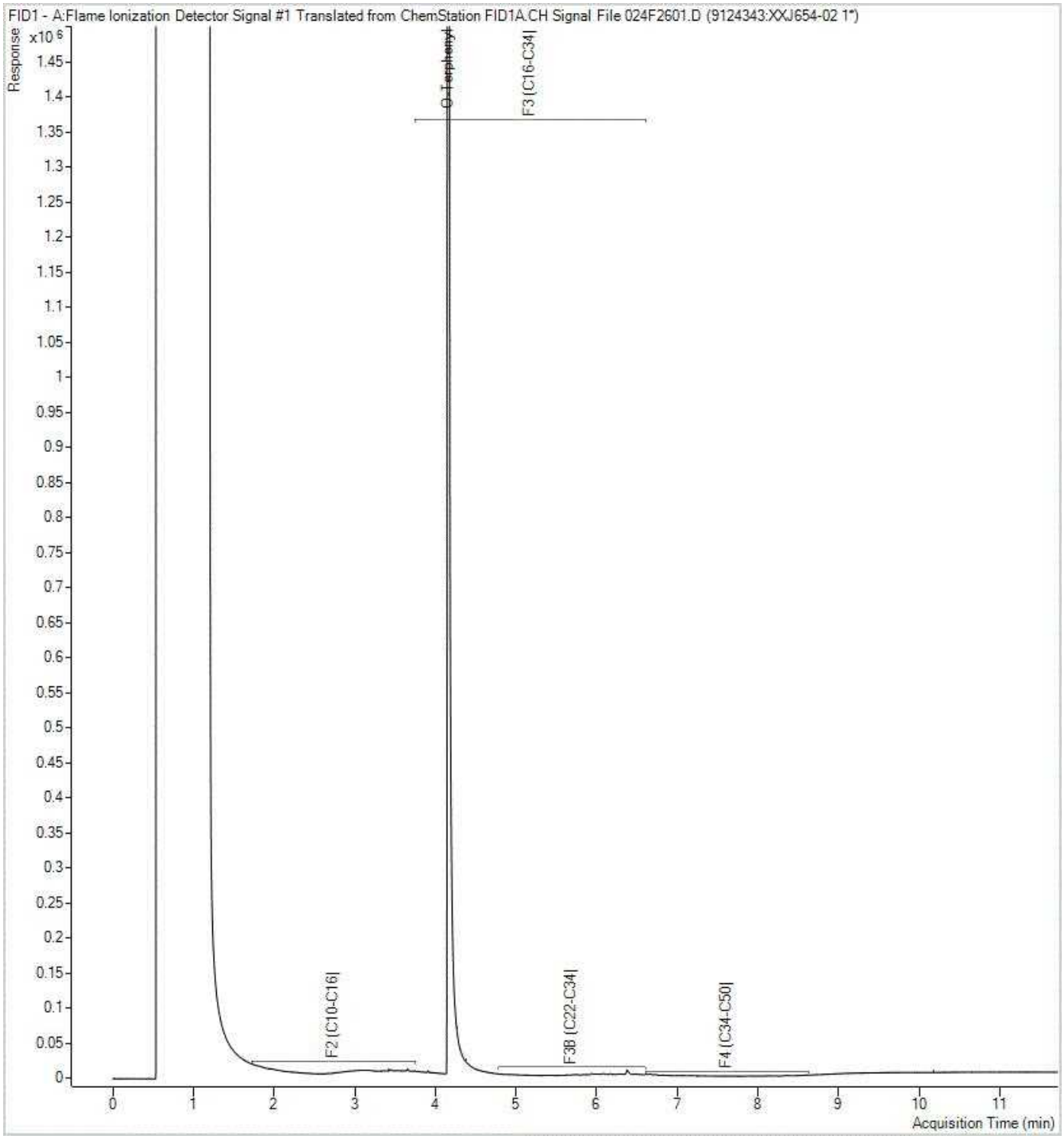
SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

3/4/2 ice

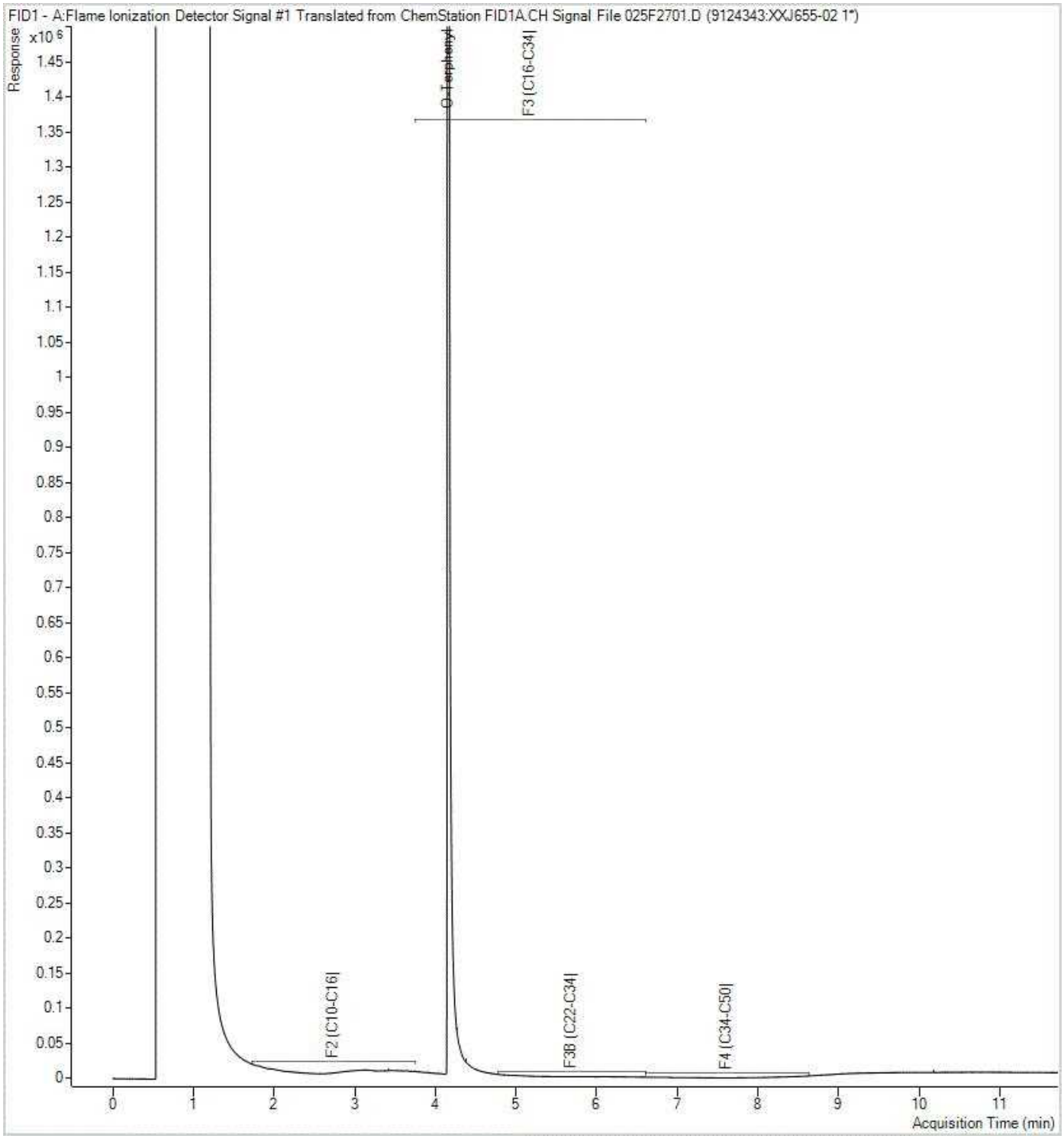
Bureau Veritas Canada (2019) Inc.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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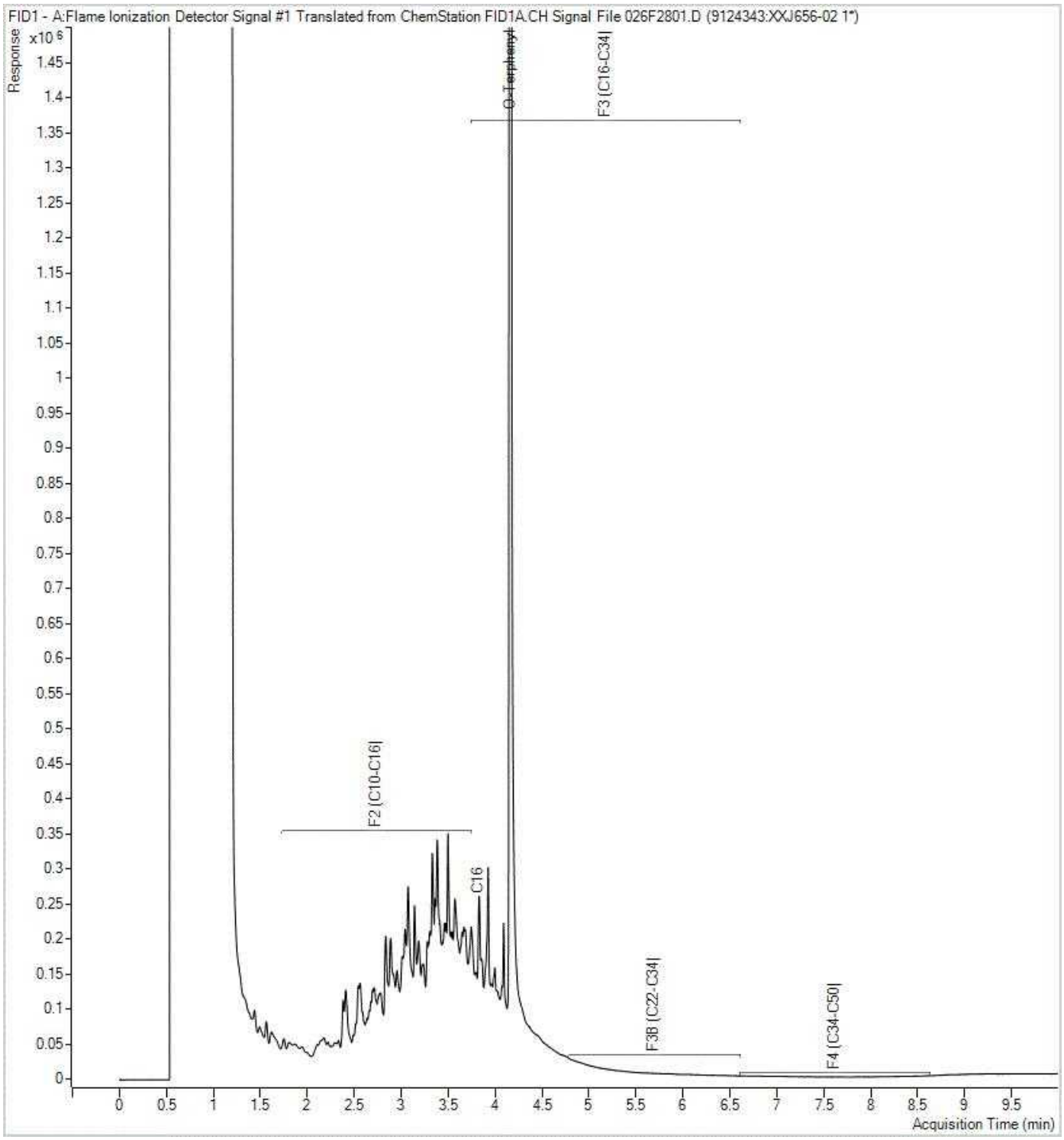
Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

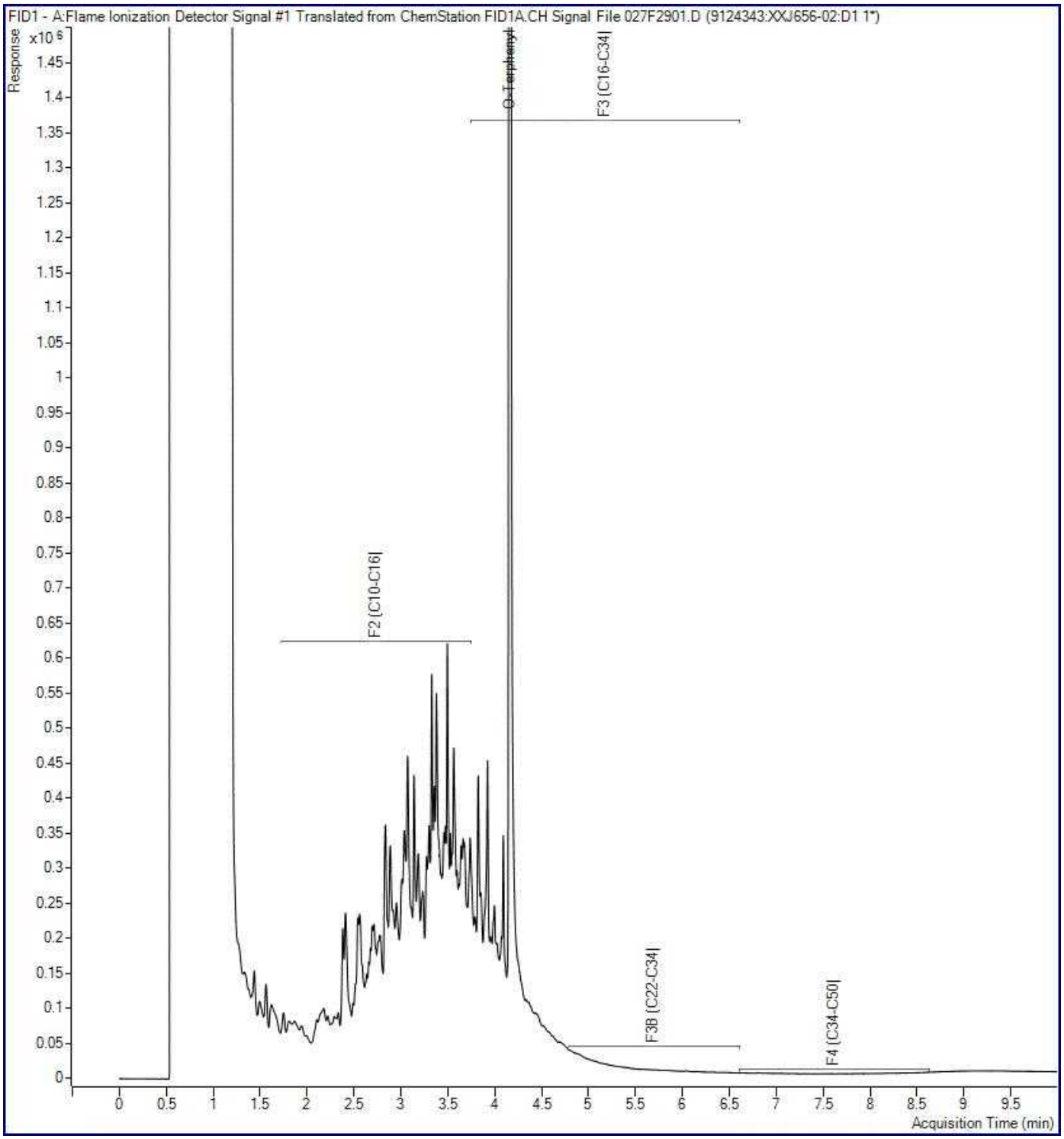


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C3BJ588
Report Date: 2023/12/27
Bureau Veritas Sample: XXJ656 Lab-Dup

Englobe Corp.
Client Project #: 2311183.000.0200.0201
Client ID: BH3,SS-3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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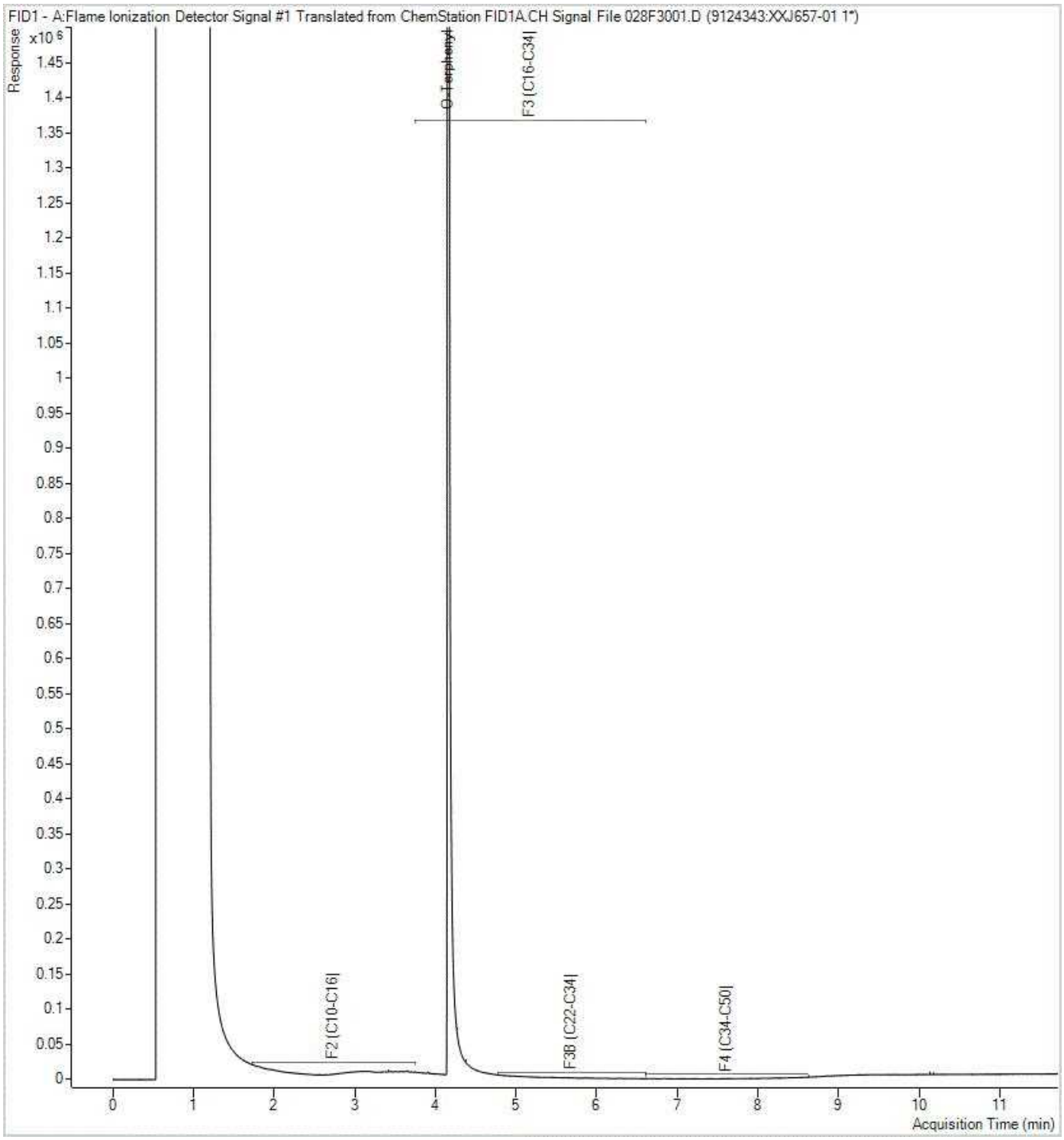
Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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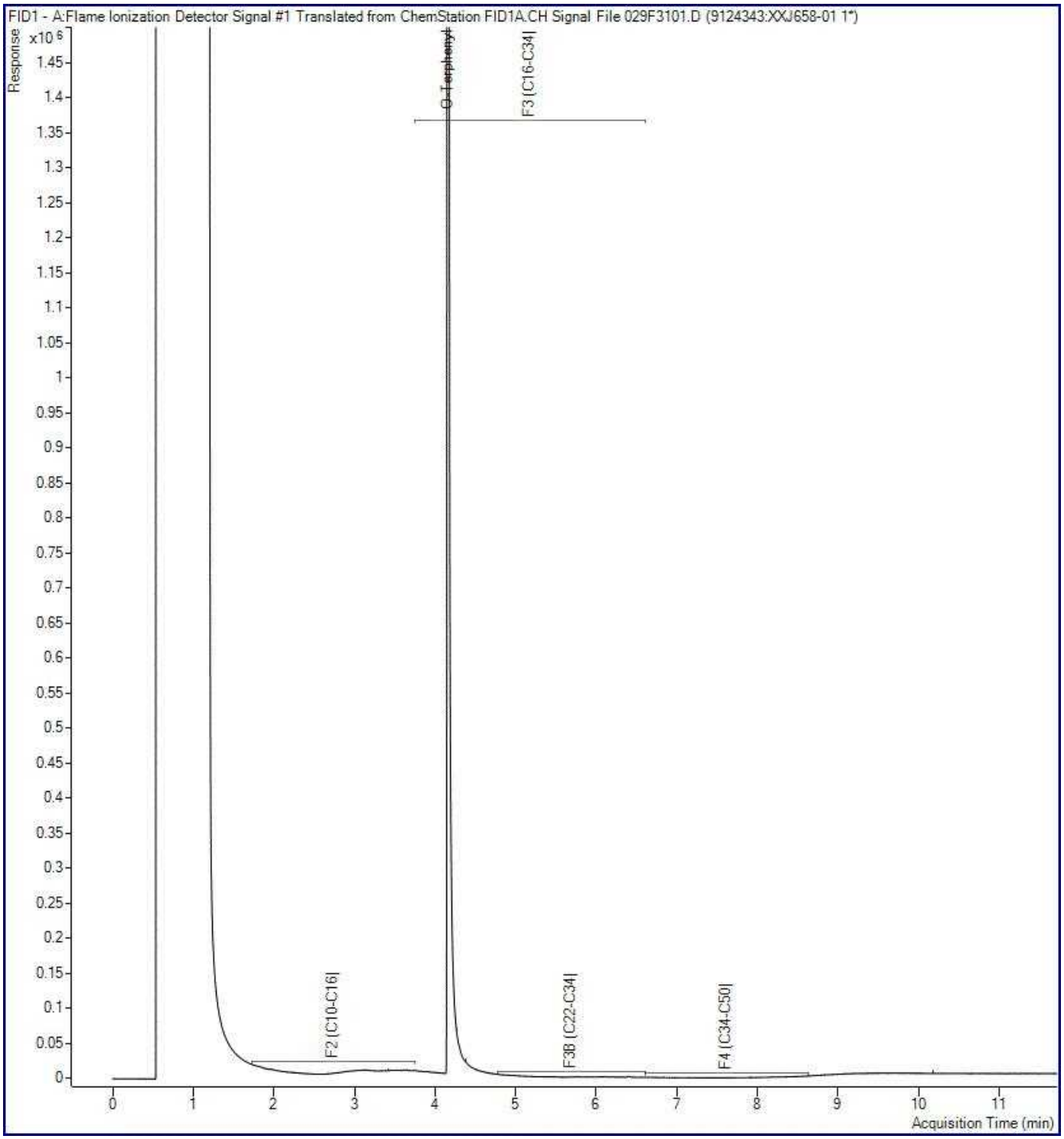
Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

PRIVATE UTILITY LOCATE REPORT

Auxiliary Locate Sheet

73 Sinclair Blvd., Brantford, ON N3S 7X6
Toll Free:855-586-3545
info@landsharkgroup.ca

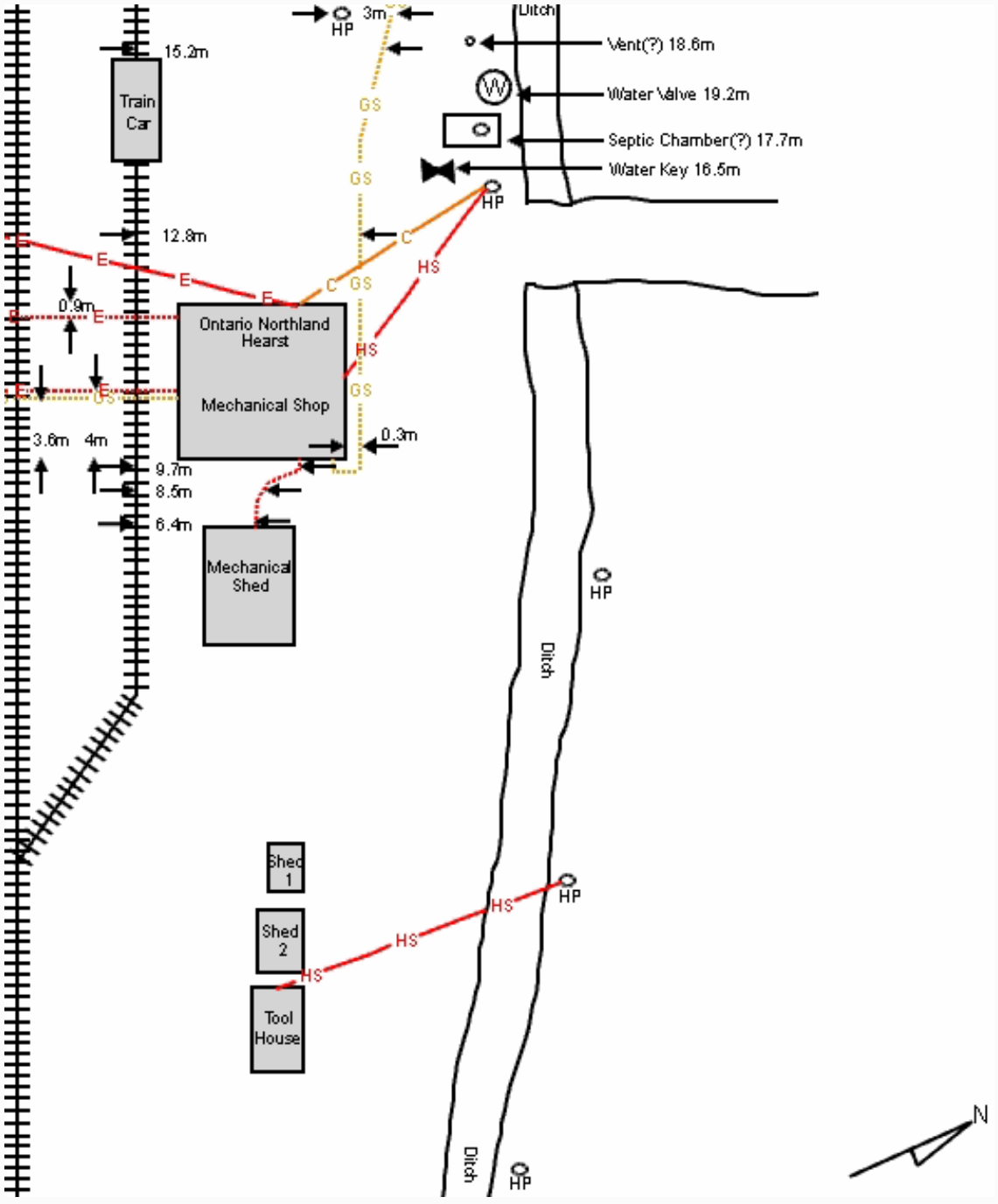
Locate Sheet 2 of ____
Job # 24-0298
Sub # 2213

From: For Survey Purposes Only	To:
From:	To:

LEGEND

BORE HOLE / TEST PIT	⊕
PROPERTY LINE	PL
BOLLARD	B
POST INDICATOR VALVE	PIV
CURB LINE	CL
ROAD EDGE	RE
BUILDING LINE	BL
RAILWAY	++++
SIDEWALK	SW
HYDRO POLE	HP
LIGHT STANDARD	LS
MANHOLE	◯
CATCH BASIN	⊞
FIRE HYDRANT	FH
TRANSFORMER	FH
VAULT	V
WATER VALVE	WV
WATER	- W -
HYDRO	- H -
GAS	- G -
ELECTRICAL	- E -
COMMUNICATION	- C -
FIBRE OPTIC	- FO -
SPRINKLER	- SP -
SANITARY	- SAN -
STORM	- STM -
UNKNOWN TYPE	- ? -
KIOSK	K
OVER HEAD	OH
BELL PEDESTAL	⊠
GAS MAIN	- GM -
GAS SERVICE	- GS -
WATER SERVICE	- WS -
WATER MAIN	- WM -
HYDRO SERVICE	- HS -
CABLE TV	- CATV -
BELL	- B -
OVERHEAD HYDRO	OH
FENCE LINE	-X-X-X-
UNKNOWN UTILITY	???
ROGERS / COGECO	TVFO
BELL FO	BFO
WELL	Ⓦ

DRAWING NOT TO SCALE
DEPTHS TO BURIED UTILITIES MAY VARY. DAYLIGHT OR HAND DIG WITHIN TWO METERS OF ALL MARKINGS
LOCATE VALID FOR 60 DAYS.
NO LOCATE METHOD IS 100% EFFECTIVE AND CANNOT DETECT ALL BURIED SERVICES.
MARKS MUST BE PRESENT FOR LOCATE TO BE VALID



ANY PUBLIC UTILITIES SHOWN HERE ARE FOR REFERENCE ONLY. THESE PUBLIC UTILITIES HAVE BEEN MARKED BY OTHERS OR MARKED BY LANDSHARK LOCATES WITH PINK PAINT / FLAGS. UTILITIES MARKED IN PINK WITHIN THE LOCATE AREA ARE FOR SURVEY PURPOSES ONLY AND REQUIRE A PUBLIC LOCATE

PRIVATE UTILITY LOCATE REPORT

Auxiliary Locate Sheet

73 Sinclair Blvd., Brantford, ON N3S 7X6
Toll Free:855-586-3545
info@landsharkgroup.ca

Locate Sheet 3 of ____
Job # 24-0298
Sub # 2213

From:	To:
From:	To:

LEGEND

BORE HOLE / TEST PIT	⊕
PROPERTY LINE	PL
BOLLARD	B
POST INDICATOR VALVE	PIV
CURB LINE	CL
ROAD EDGE	RE
BUILDING LINE	BL
RAILWAY	+++++
SIDEWALK	SW
HYDRO POLE	HP
LIGHT STANDARD	LS
MANHOLE	◯
CATCH BASIN	⊞
FIRE HYDRANT	◯ FH
TRANSFORMER	FH △
VAULT	V
WATER VALVE	WV
WATER	- W -
HYDRO	- H -
GAS	- G -
ELECTRICAL	- E -
COMMUNICATION	- C -
FIBRE OPTIC	- FO -
SPRINKLER	- SP -
SANITARY	- SAN -
STORM	- STM -
UNKNOWN TYPE	- ? -
KIOSK	K
OVER HEAD	OH
BELL PEDESTAL	☒
GAS MAIN	- GM -
GAS SERVICE	- GS -
WATER SERVICE	- WS -
WATER MAIN	- WM -
HYDRO SERVICE	- HS -
CABLE TV	- CATV -
BELL	- B -
OVERHEAD HYDRO	~~OH~~
FENCE LINE	-X-X-X-
UNKNOWN UTILITY	~~???~~
ROGERS / COGECO	~~TVFO~~
BELL FO	~~BFO~~
WELL	Ⓦ

DRAWING NOT TO SCALE
DEPTHS TO BURIED UTILITIES MAY VARY. DAYLIGHT OR HAND DIG WITHIN TWO METERS OF ALL MARKINGS
LOCATE VALID FOR 60 DAYS.
NO LOCATE METHOD IS 100% EFFECTIVE AND CANNOT DETECT ALL BURIED SERVICES.
MARKS MUST BE PRESENT FOR LOCATE TO BE VALID

SITE LIMITATIONS;

* Abandoned Utilities Within Located Area
- PVC Pipe Within Septic Chamber Running North/South (3m Depth)
- Metal Pipe Within Septic Chamber (Recessed/No Access)
- PVC Pipe/Hand Pump Within Mechanical Shop
- Severed Electrical Around Crane Shed
- Severed Electrical In Shed 2

* Unable to Locate Water Service to Mechanical Shop
- Attempted Clip onto Water Meter In Building / Clip onto Water Key + Water Key - No Tone
- Recently Repaired With PVC - No Tracer Wire Found

* Main Hydro + Comm Overhead to Mechanical Shop
- Overhead Hydro to Tool House

ANY PUBLIC UTILITIES SHOWN HERE ARE FOR REFERENCE ONLY. THESE PUBLIC UTILITIES HAVE BEEN MARKED BY OTHERS OR MARKED BY LANDSHARK LOCATES WITH PINK PAINT / FLAGS. UTILITIES MARKED IN PINK WITHIN THE LOCATE AREA ARE FOR SURVEY PURPOSES ONLY AND REQUIRE A PUBLIC LOCATE

PRIVATE UTILITY LOCATE REPORT

Primary Locate Sheet

Locate Sheet 1 of ____
Job # 24-0298
Sub # 2213

73 Sinclair Blvd., Brantford, ON N3S 7X6
Toll Free:855-586-3545
info@landsharkgroup.ca

Customer: Ontario Northland	Site Address: 1112 Front Street	
Contact Name: Ontario Northland	Phone: 2493130482	City: Hearst
Email: Alain.Tremblay@OntarioNorthland.ca	Depth:	Requestor Type: OTHER
PO #:	Type of Work: Engineering	
Utilities Located: Private		
Work Description: SUE LocatesThis is a Sub Utility Engineering Locate - All markings to be in pink paint. Offset measurements of :		

NOTES/WARNINGS: CUSTOMER MUST OBTAIN PUBLIC UTILITY CLEARANCES PRIOR TO EXCAVATION

COLOR CODE FOR MARKING UNDERGROUND UTILITY LINES

- Proposed Excavation
- Temporary Survey Markings
- Electric power lines, cables, conduit & lighting cables
- Gas, oil, steam, petroleum or gaseous materials
- Communications, alarm or signal lines, cables or conduit
- Potable water
- Reclaimed water, irrigation & slurry lines
- Sewers & drain lines

Important Notice to Excavator:

POSSIBLE UNTONEABLE / ABANDONED UTILITIES IN LOCATED AREA

WATER MAIN / SERVICE NOT ABLE TO BE TONED

STORM / SANITARY LINES ARE NOT MARKED IN THE FIELD

PUBLIC UTILITIES HAVE BEEN CHECKED ON SITE. PLEASE SEE ONTARIO ONE CALL LOCATES FOR AUTHORIZED DOCUMENTATION

*** Locate For Survey Purposes Only ***

*** Please Review Public Locates If Breaking Ground ***

*** Measurements Taken From Northern Most Rail ***
* Unless Otherwise Noted *

Comments to Excavator:

Unable to Locate Water Service to Mechanical Shop. No Tracer Wire Found - No Signal @ Water Meter Inside Building / @ Water Key + Water Valve - Pipe Was Repaired With PVC.
SEE PAGE 3

Utility locate Methods Used: ☑ Active ☑ Passive ☑ Inductive Sweep Private Detectable Services: ☑ As above ☐ None

Sewer Lines: ☐ Traced ☑ Not Traced ☑ Inverts Marked Where Visible ☐ GPR ☐ Conquest

LIMITATIONS / SPECIAL INSTRUCTIONS: INDICATED LIMITATIONS ELEVATE RISK OF STRIKING A BURIED UTILITY. THE CLIENT REPRESENTATIVE IS TO NOTIFY ALL INVOLVED WITH (INCLUDING AND NOT LIMITED TO ALL FIELD STAFF, PROJECT MANAGERS, THEIR CLIENT AND/OR PROPERTY OWNER OF THE SUBJECT PROPERTY IF THE SAME). A "NO" CHECKED INDICATES A LIMITATION WHICH TRANSLATES INTO AN INCREASED RISK OF NOT FINDING ALL BURIED UTILITIES WITHIN THE WORK AREA.

As-Built or Utility Drawing requested from: Fred

Site Plan (showing work area): ☐ Yes ☑ No As-Built Utility Drawings: ☐ Yes ☑ No Building Access: ☑ Yes ☐ No ☐ N/A Ground Snow Covered: ☑ Yes ☐ No

LIST ALL OTHERS:

Start Time: 2023-11-21 7:30:00AM
Finish Time: 2023-11-21 1:00:00PM

Inversion Collection: 0 hrs
Per diem : 0 days

THE CLIENT ACKNOWLEDGES THAT ANY **PUBLIC UTILITY OWNED** SERVICES WITHIN THE LIMITS OF THIS LOCATE, MARKED BY LANDSHARK LOCATES ARE FOR SURVEY PURPOSES ONLY AND REQUIRE PUBLIC LOCATES. **BY SIGNING BELOW, THE CLIENT AGREES TO ALL THE TERMS AND CONDITIONS AND LIMITATIONS ON ALL PAGES AND REVERSE OF THE LOCATE REPORTS.**

Located By: Phil L.	Send to Emails:
Completion Date & Time: 21-Nov-2023	

A copy of the Primary Locate Sheet and the Auxiliary Locate Sheet must be on site and in the hands of the machine operator during the work operations. In the event that sketch and markings do not coincide, a new locate must be obtained.

PLAN SHOWING TOPOGRAPHICAL DETAIL OF

ONTARIO NORTHLAND RAILWAY HEARST YARD
TOWN OF HEARST

DISTRICT OF COCHRANE

SCALE 1 : 400 METRES

0 2 4 6 8 10 15 20 30 40

NOTE

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

ELEVATIONS SHOWN HEREON ARE REFERRED TO VCM0011981U414, HAVING AN ELEVATION OF 239.185 METRES, CGVD2013.

CONTOURS SHOWN HEREON ARE DRAWN AT 0.30 METRE INTERVALS.

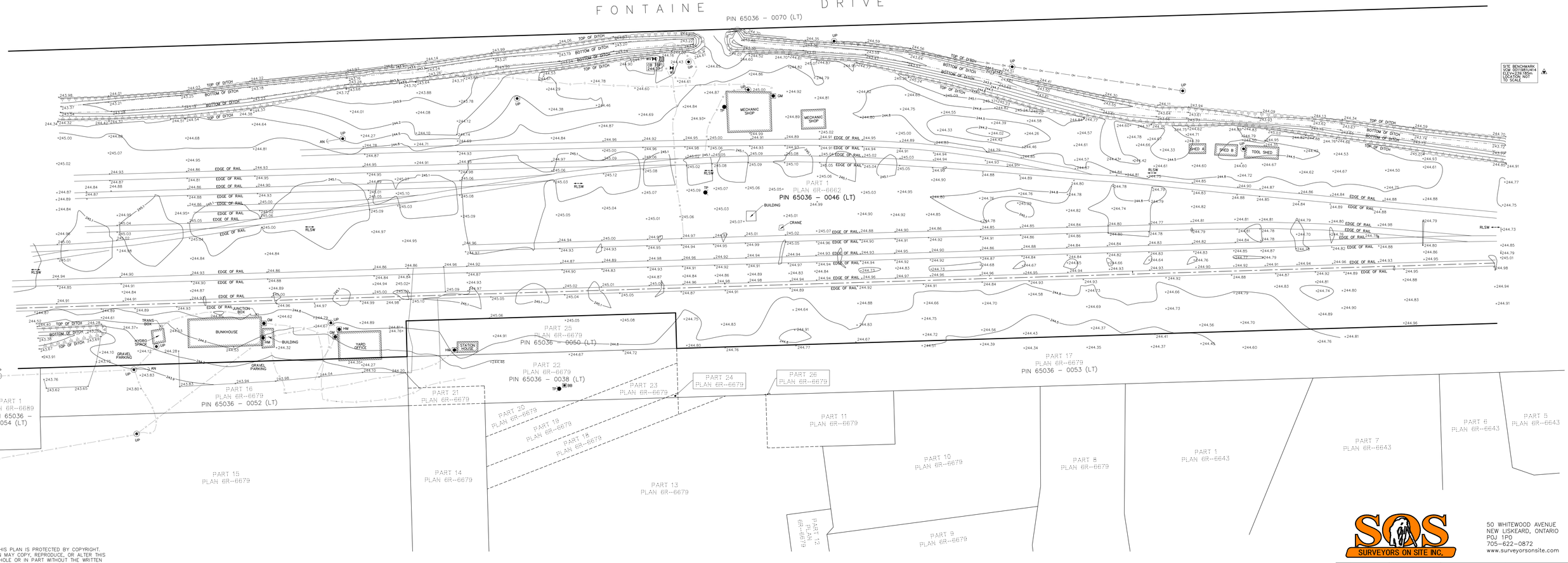
THE INFORMATION SHOWN ON THIS SKETCH WAS COLLECTED ON JANUARY 23, 2024.

LEGEND

⟵AN	ANCHOR POINT
BB	BELL BOX
GM	GAS METER
HM	HYDRO METER
RLSW	RAILWAY SWITCH
TP	TRAFFIC LIGHT
UP	UTILITY POLE
WV	WATER VALVE
–C–	UNDERGROUND CABLE LINE
–H–	UNDERGROUND HYDRO LINE
–G–	UNDERGROUND GAS LINE
–OH–	OVERHEAD UTILITY WIRES
–W–	UNDERGROUND WATER LINE
× 123.45	SPOT ELEVATION

CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK



SURVEYORS ON SITE INC.
50 WHITEWOOD AVENUE
NEW LISKEARD, ONTARIO
P0J 1P0
705-622-0872
www.surveyorsonsite.com

DRAWN BY: BS	CHECKED BY: RWS	DATE: MARCH 8, 2024	FILE: NL2024-002_TOPO_v1

July 2023

DESIGNATED SUBSTANCES SURVEY REPORT

ONTARIO NORTHLAND
HEARST MAINTENANCE BUILDINGS
HEARST, ONTARIO

Prepared by:

THOMAS CONTRACTING

Project No. TC-201608

Table of Contents

TABLES

APPENDICES

THOMAS CONTRACTING
212 A Birchgrove Dr. East
Callander, Ontario
P0H 1H0

PHONE : (705) 499 – 8006
EMAIL : asbestos@vianet.ca

ENVIRONMENTAL MANAGEMENT EXPERTS

Reference: TC - 201608

July 25th, 2023

ONTARIO NORTHLAND
555 Oak Street East
North Bay, ON
P1B 8L3

ATTENTION: Alain Tremblay – Project Manager – Facilities

Dear Sirs:

DESIGNATED SUBSTANCES SURVEY
Hearst Maintenance Buildings
Hearst, Ontario

1.0 INTRODUCTION

Thomas Contracting was commissioned by the Ontario Northland Transportation Commission (ONTC) to complete a designated substances survey (DSS) of their five maintenance of way buildings located in Hearst, Ontario. The objective of this study was to determine whether any designated substances, as defined under the Ontario Occupational Health and Safety Act, were present within the buildings prior to up-coming total demolition work. This survey does not include and was not intended to cover any investigation of subsurface hazardous materials / designated substances.

Eleven substances have been "designated" in Ontario - acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica and vinyl chloride. Mould and PCB containing materials are also harmful to the environment if handled improperly and therefore are included in our study.

The Ontario Occupational Health and Safety Act requires that a list of all designated substances at a project site be provided to all bidders at the tendering stage. A Designated Substance Survey (DSS) identifies the designated substances present, their locations and concentrations. This information allows contractors involved in demolition or renovation activities to take appropriate steps to control exposure of workers and the general public to the designated substances that are present.

This survey satisfies requirements of the Occupational Health and Safety Act with regards to the presence / absence of designated substances identified within this report.

The study area, methodology and findings are outlined in the sections, which follow.

2.0 STUDY AREA

The study area under this assessment consisted of five (5) separate buildings (see photos #1 to #5 in Appendix 'A') located on the subject property consisting of the following.

- ***Shed #1*** *– wood structure*
- ***Shed #2*** *– metal clad*
- ***Tool House*** *– metal clad*
- ***Mechanical Dept. Shed*** *– metal clad, slab on-grade*
- ***Mechanical Building*** *– metal clad, slab on-grade*

3.0 STUDY METHODOLOGY

On May 25th, 2023, Thomas Contracting personnel conducted the DSS fieldwork of the buildings noted above, focusing primarily on asbestos-containing materials, lead painted surfaces and mercury containing materials (thermostatic controls and fluorescent light tubes).

Access to suspected designated substances was made following industry-standard, testing protocols. All collected samples were subsequently labeled and the retrieval location(s) identified. All collected samples of suspected asbestos-containing material and lead-containing paint were forwarded to our laboratory subconsultant for positive identification of asbestos fibres and lead content levels.

4.0 ASBESTOS-CONTAINING MATERIALS (ACM's)

The DSS fieldwork resulted in the retrieval of five (5) representative samples of potential asbestos-containing building material of which eleven (11) tests were required/performed under Ont. Reg. 278/05). The potential ACM sampled consisted of blown in insulation, caulking, window glazing, roofing shingles and "Transite" wall board. All samples were submitted to our laboratory sub-consultant (Lex Scientific Inc., Ontario) for PLM bulk analysis with photos of each sample material and laboratory transcripts of the findings presented in Appendix 'A'.

A summary of sample locations and type of building material is presented in Table 1 (below) with the raw laboratory results and photos given in Appendix 'A'. Locations containing ACM's representative of the obtained bulk samples are shown in the "Building by Building DSS" table in Appendix 'D'.

Table 1
Summary of Asbestos Bulk Sample Results

Sample No.	***Photo No.*** *(Appendix 'A')*	***Location***	***Material***	***Asbestos Content***
HA – 1	*6*	*Mechanical Building*	*Blown-in insulation located within the attic space above office and washroom*	*None Detected*
HA – 1A	*-*	*Mechanical Building*	*Blown-in insulation located within the attic space above office and washroom*	*None Detected*
HA – 1B	*-*	*Mechanical Building*	*Blown-in insulation located within the attic space above office and washroom*	*None Detected*
HA – 2	*7*	*Mechanical Building*	*Window glazing (white)*	*< 0.5 Chrysotile*
HA – 2A	*-*	*Mechanical Building*	*Window glazing (white)*	*< 0.5 Chrysotile*
HA – 2B	*-*	*Mechanical Building*	*Window glazing (white)*	*< 0.5 Chrysotile*
HA – 3	***8***	***Mechanical Department Shed***	***"Transite" wall board***	***15% Chrysotile***
HA – 3A	*-*	*Mechanical Department Shed*	*"Transite" wall board*	*Stop Positive*
HA – 3B	*-*	*Mechanical Department Shed*	*"Transite" wall board*	*Stop Positive*

Sample No.	***Photo No.*** *(Appendix 'A')*	***Location***	***Material***	***Asbestos Content***
HA – 4	*9*	*Shed #1*	*Tar roofing shingles (black)*	*None detected*
HA – 4A	*-*	*Shed #1*	*Tar roofing shingles (black)*	*None detected*
HA – 4B	*-*	*Shed #1*	*Tar roofing shingles (black)*	*None detected*
HA – 5	***10***	***Tool House***	***Exterior window caulking (white)***	***3% Chrysotile***
HA – 5A	*-*	*Tool House*	*Exterior window caulking (white)*	*Stop Positive*
HA – 5B	*-*	*Tool House*	*Exterior window caulking (white)*	*Stop Positive*

4.1 Asbestos Findings

Based on our site assessment and laboratory results, the following asbestos findings are presented in Table 2 (below) with a further detailed "Building by Building DSS" table of our findings presented in Appendix 'D'.

Table 2
Summary of Asbestos Findings

Building	***Asbestos Findings***
Shed #1	• ***NO ASBESTOS-CONTAINING MATERIALS FOUND.*** • *Timber foundation* • *Exterior walls and roofing are wood* • *Tar roofing shingle are not asbestos* • *No insulation or caulking* • *Interior wood floor & walls, no ceiling – open to roof deck* • *No other building materials found or suspected to contain asbestos.*
Shed #2	• ***NO ASBESTOS-CONTAINING MATERIALS FOUND.*** • *Timber foundation* • *Exterior walls and roofing are metal clad* • *No insulation or caulking* • *Interior wood floor, walls and ceiling* • *No other building materials found or suspected to contain asbestos.*
Tool House	• ***All exterior window caulking (non-friable) is asbestos-containing.*** • *Timber foundation* • *Exterior walls and roofing are metal clad* • *All wall and ceiling insulation is fiberglass (non-asbestos)* • *Interior wood floor, walls and ceiling* • *No other building materials found or suspected to contain asbestos.*

Mechanical Department Shed	• ***All "Transite" board (non-friable) located on the interior walls and ceiling is asbestos-containing.*** • *Concrete slab on-grade* • *Exterior walls and roofing are metal clad* • *No caulking observed* • *All wall and ceiling insulation is fiberglass (non-asbestos)* • *No other building materials found or suspected to contain asbestos.*
Mechanical Building	• ***NO ASBESTOS-CONTAINING MATERIALS FOUND.*** • *Concrete slab on-grade* • *Exterior walls and roofing are metal clad* • *No caulking observed* • *All window glazing is not asbestos-containing* • *Blown-in attic insulation (white) and attic batt insulation is fiberglass (non-asbestos)* • *All pipes black foam insulated (non-asbestos)* • *Interior concrete floor and wood, concrete block or metal walls and ceilings* • *All wall insulation is fiberglass (non-asbestos)* • *Ceiling space open to metal pan decking within the garage area* • *No other building materials found or suspected to contain asbestos.*

5.0 LEAD-CONTAINING BUILDING MATERIALS

The survey resulted in the retrieval of twelve (12) representative samples of paint observed on/in the five buildings under this DSS. These paint samples were submitted to our laboratory sub-consultant (Caduceon Environmental Laboratories, Ottawa, Ontario) for follow-up lead analysis. Photo of the sampled paint(s) and the laboratory transcript of the findings are presented in Appendix 'B'.

A summary of sample location, surface paint colour and lead content is presented in Table 3 (below).

Table 3
Summary of Paint Sample Result

Sample No.	***Photo No.*** *(Appendix 'B')*	***Location***	***Sample Description***	***Lead Content (µg/g)***
HL – 1	*11*	*Mechanical Building*	*Exterior Wall Paint (surface colour = beige)*	***7500***
HL – 2	*12*	*Mechanical Building*	*Interior Wall & Ceiling Paint (surface colour = dark beige)*	***2110***
HL – 3	*13*	*Mechanical Building*	*Interior Wall Paint (surface colour = off white)*	***1900***
HL – 4	*14*	*Mechanical Building*	*Garage - Interior Wall Paint (surface colour = dark grey)*	***22900***
HL – 5	*15*	*Mechanical Building*	*Garage - Door Paint (surface colour = black)*	***2120***
HL – 6	*16*	*Mechanical Building*	*Floor Paint (surface colour = grey)*	***1090***

Sample No.	***Photo No.*** *(Appendix 'B')*	***Location***	***Sample Description***	***Lead Content (µg/g)***
HL – 7	*17*	*Mechanical Department Shed*	*Exterior Wall Paint (surface colour = beige)*	***9840***
HL – 8	*18*	*Mechanical Department Shed*	*Interior Wall Paint (surface colour = off white)*	***566***
HL – 9	*19*	*Mechanical Department Shed*	*Exterior Door Paint (surface colour = black & grey)*	***11800***
HL – 10	*20*	*Shed #1*	*Exterior Wall Paint (surface colour = light blue)*	***1350***
HL – 11	*21*	*Shed #2*	*Exterior Wall Paint (surface colour = silver)*	***681***
HL – 12	*-*	*Tool House*	*Interior Wall & Ceiling Paint (surface colour = off white)*	***1410***

5.1 Lead Paint Definition

In absence of a Canadian regulated definition of what constitutes a lead-based paint, the "Lead Guideline for Construction, Renovation, Maintenance or Repair", issued in October 2014 by the Environmental Abatement Council of Ontario (EACO) was followed.

Term	***Definition***	***Guideline Requirements***
Low-level lead paints and surface coatings	*Paint or surface coating containing less than or equal to 0.1% lead by dry weight (1000 µg/g, mg/kg, ppm).*	*If these materials (and the surfaces to which they are applied) are disturbed in a non-aggressive manner, performed using normal dust control procedures and are completed so that the TWA for PNOS is not exceeded, then worker protection from the inhalation of lead is not required. General health and safety precautions must still be implemented, which may include, in part, prohibiting eating, drinking, smoking and chewing in the work area, implementing dust suppression techniques and washing facilities for workers to wash hands and face.*
Lead-containing paints and surface coatings	*Paint or surface coating containing greater than 0.1% lead by dry weight (1000 µg/g, mg/kg, ppm) and less than 0.5% lead by dry weight (5000 µg/g, mg/kg, ppm).*	*Tasks performed that disturb these materials must be completed in accordance with the Classifications of Work Operations (in Section 7) and corresponding procedures (in Section 8). Alternatively, a hygiene or exposure assessment can be performed to determine procedures that are required.*
Lead-based paints and surface coatings	*Paint or surface coating containing equal to or greater than 0.5% lead by dry weight (5000 µg/g, mg/kg, ppm).*	*Tasks must always be completed in accordance with the procedures listed in the Classifications of Work Operations (in Section 7) and corresponding procedures (in Section 8). Alternatively, a hygiene or exposure assessment can be performed to determine procedures that are required.*

5.2 Lead Paint Findings

Based on our site assessment and laboratory results, the following general lead findings are presented in Table 4 (below) with a further detailed "Building DSS" table of our findings presented in Appendix 'C'.

Table 4
Summary of Lead Findings

Building	***Lead Findings***
Shed #1	• *Exterior wall paint (light blue) is classed as **Lead-containing paint**.*
Shed #2	• *Exterior wall paint (silver) is classed as **Low-level lead paint**.*
Tool House	• *Interior wall and ceiling paint (off white) is classed as **Lead-containing paint**.* • *Metal clad walls and roof paint are factory applied finishes and are not "suspected" to contain lead based paint.*
Mechanical Department Shed	• *Exterior wall paint (beige) is classed as **Lead-based paint**.* • *Exterior door paint (black & grey) is classed as **Lead-based paint**.* • *Interior wall paint (off white) is classed as **Low-level lead paint**.*
Mechanical Building	• *Exterior wall paint (beige) is classed as **Lead-based paint**.* • *Interior wall and ceiling paints (off white & dark beige) are classed as **Lead-containing paints**.* • *Garage - Interior wall paint (dark grey) is classed as **Lead-based paint**.* • *Garage - Door Paint (black) is classed as **Lead-containing paint**.* • *Floor paint (grey) is classed as **Lead-containing paint**.*

Should future activities (demolition/renovation) occur within the buildings noted above which would disturb the lead materials noted in this report, Thomas Contracting recommends that the affected material(s) be address prior to these activities. Total mechanical demolition work could be carried out under a Class 1 operation as outlined in "Lead Guideline for Construction, Renovation, Maintenance or Repair", issued in October 2014 by the Environmental Abatement Council of Ontario (EACO).

5.3 Lead Pipes / Solder

Although not sampled due to inflicting damage / leaks to the existing plumbing within the Mechanical Building, it is Thomas Contracting opinion based on visual inspection that lead may also be present as a component in solder used on pipe fittings.

5.4 Lead Precautions

Prior to any renovations or demolition activities that may disturb materials identified to contain lead of any concentration, precautions must be taken as described in Ontario Regulation 213/91 as amended, Regulations for Construction Projects - made under the Occupational Health and Safety Act. This may include conducting an assessment of the potential exposure of airborne lead by a qualified person.

Exposure to lead-containing materials is regulated under the Revised Regulation of Ontario 843/90 as amended, Regulation respecting Lead - made under the Occupational Health and Safety Act including disposal of such material Ontario Regulation 347/90 Schedule 4 – Leachate Quality Criteria (Acceptable Lead Concentrations of < 5.0 mg/l). Care must be taken to prevent lead-containing particles from becoming airborne during the disturbance of lead-containing surfaces (i.e., during renovation or demolition projects). All lead abatement work must follow procedures outlined in both the "Guideline for Lead on Construction Projects", issued in September 2004 by the Occupational Health and Safety branch of the Ministry of Labour and the "Lead Guideline for Construction, Renovation, Maintenance or Repair", issued in October 2014 by the Environmental Abatement Council of Ontario (EACO).

6.0 MERCURY

Mercury is a naturally occurring metal. At room temperature it is a shiny, silver coloured odourless liquid. When heated it becomes a colourless, odourless gas. Mercury can be found in fluorescent light tubes, electrical switches, thermostats, thermometers, dental fillings, certain batteries and some manufacturing processes. The nervous system is very sensitive to all forms of mercury; however, vapour is especially harmful as it directly reaches the brain. Exposure to high levels of mercury may permanently damage the brain, kidneys and a developing fetus. Short-term exposure may cause lung damage, nausea, vomiting, skin rashes, and eye irritation.

6.1 Fluorescent Light Tubes Findings

Numerous fluorescent T8 light tubes (24) were observed within both the Mechanical Department Shed and the Mechanical Building. All of which contain small amounts of mercury.

6.2 Thermostatic Control Switch Findings

Thomas Contracting observed the presence of a single make wall mounted thermostatic control switches under this DSS as follows.

- *"Honeywell" thermostatic control switch located within the Mechanical Building which contains no mercury (see photo #22 in Appendix 'C').*

6.3 General Notes

Prior to any renovations or demolition activities that may disturb materials identified or suspected to contain mercury of any concentration, precautions must be taken to prevent mercury vapours from becoming airborne or liquid mercury contaminating the surrounding environment. Exposure to airborne mercury is regulated under the Revised Regulation of Ontario 844/90 as amended, Regulation respecting Mercury - made under the Occupational Health and Safety Act.

Mercury waste must be handled and disposed of according to the Revised Regulation of Ontario 347/90 as amended - made under the Environmental Protection Act, and may be subject to Leachate Criteria (Schedule 4) of this regulation. Therefore, it is our recommendation that prior to any demolition / renovation activity or if the fluorescent tubes will not be utilized in the future, the fluorescent tubes shall be disposed of properly or recycled by a licensed contractor.

7.0 POLYCHLORINATED BIPHENYLS (PCBS)

Although not a designated substance, the disposal of PCB's is regulated. Information labels on electrical equipment such as fluorescent light ballasts, transformers and capacitors for motors were examined to assist in determining PCB content. The data was compared against information available in the "Handbook on PCB's in Electrical Equipment" issued by Environment Canada, in order to determine PCB content of materials. No bulk sampling was performed at live PCB impregnated cables, or on dielectric fluids or materials on live ballasts, transformers or capacitors.

7.1 Fluorescent Light Ballast Findings

All T8 fluorescent light ballasts noted within both the Mechanical Department Shed and the Mechanical Building consisted of "Sylvania" QHE 4x32T8 ballasts which are label marked as non-PCB (see photo # 23 in Appendix 'C').

7.2 Electrical Transformer Findings

Thomas Contracting observed the presence of a "MagneTek" electrical transformer located within the Mechanical Building which is a "dry type" model and does not contain PCB's (see photo #24 & #25 in Appendix 'C').

7.3 General Notes

Prior to any renovations or demolition activities that may disturb materials identified or suspected to contain PCB's of any concentration, precautions must be taken to prevent the PCB material from contaminating personal or the surrounding environment. Exposure handling and disposal of PCB material is regulated under the EPA's PCB Regulations –SOR/2008-273 and Regulation 362 - EPA, WASTE MANAGEMENT, PCBS - made under the Occupational Health and Safety Act and shall be conducted by a licensed contractor.

8.0 MOULD

No mould growth was identified within the five buildings under this DSS.

9.0 SILICA

Although not sampled under this study, it is our opinion that free crystalline silica (common construction sand) may be present a component of concrete, mortar, brick, masonry, ceramics, granite, slate, stone, asphalt, etc., used in the construction of the buildings. Precautions must be taken to prevent silica-containing particles from becoming airborne during the disturbance of silica-containing surfaces, such as during renovation or demolition projects.

Exposure to airborne silica is regulated under the Revised Regulation of Ontario. 845/90 as amended, Regulation respecting Silica - made under the Occupational Health and Safety Act. All work being carried with silica containing materials should be conducted following the Guide Silica on Construction Projects issued September 2004 by the Occupational Health and Safety branch of the Ministry of Labour. Silica waste must be handled and disposed of according to the Revised Regulation of Ontario 347/90 as amended - made under the Environmental Protection Act.

10.0 OTHER DESIGNATED SUBSTANCES

10.1 Acrylonitrile

No source was identified. Acrylonitrile or CAN (also known as vinyl cyanide) is an explosive, flammable liquid used in the manufacture of acrylic fibres, robber-like materials and pesticide fumigants.

10.2 Arsenic

No source was identified. Arsenic is used in metallurgy for hardening copper, lead and alloys, in pigment production, in the manufacture of certain types of glass, in insecticides, fungicides and rodenticides, as a by-product in the smelting of copper ores, and as a dopant material in semiconductor manufacturing.

10.3 Benzene

No source was identified. Benzene or benzol is a colourless liquid. It is used as an intermediate in the production of styrene, phenol, cyclohexane, and other organic chemicals, and in the manufacture of detergents, pesticides, solvents, and paint removers. It is also found in gasoline.

10.4 Coke Oven Emissions

Not applicable for the surveyed site.

10.5 Ethylene Oxide

No source was identified. Ethylene oxide is a colourless gas liquefying below 12°C. It is used generally as a fumigant and sterilizing agent for medical equipment.

10.6 Isocyanates

No source was identified. Isocyanates (HDI, MDI and TDI) are used in the production of polyurethane and as an elastomer in casting compounds, mastics, and textile coatings (IPDI).

10.7 Vinyl Chloride

No source was identified. Vinyl chloride, also known as chloroethylene, is a colourless gas but is usually handled as a liquid under pressure. It is used in the production of PVC resins and in organic synthesis.

11.0 SUMMARY

A designated substances survey of the ONTC – Hearst Maintenance Buildings (5) located in Hearst, Ontario, confirmed the presence of the following:

- *Asbestos-containing exterior window caulking (non-friable) located on the Tool House Building.*
- *Asbestos-containing "Transite" board (non-friable) located on the interior walls and ceiling within the Mechanical Department Building.*

- *Lead-based paint present on exterior walls and doors of the Mechanical Department Shed as well as both the interior and exterior walls of the Mechanical Building.*
- *Lead materials "suspected" to be present as components in solder used in pipe fittings within the Mechanical Building.*
- *Mercury in fluorescent light tubes present within both the Mechanical Department Shed and the Mechanical Building.*
- *Possible silica in concrete, mortar, brick, masonry, ceramics, granite, slate, asphalt, etc.*

12.0 RECOMMENDATIONS

12.1 Asbestos-containing Material (ACM's)

Based on our field observations, the asbestos-containing exterior window caulking (non-friable) located on the Tool House Building as well as the "Transite" board (non-friable) located on the interior walls and ceiling within the Mechanical Department Shed do not pose a health hazard in their present state. However, the removal and disposal of these materials be undertaken, all work must be performed under a Type 1 operation in accordance with Ont. Reg. 278, "Regulation respecting Asbestos on Construction Projects and in Building and Repair Operations" and all applicable Federal and Provincial statutes as noted in our report.

12.2 Lead-containing Materials & Paints

Based on our observations, both the identified lead-based paints, lead-containing paints and "possible" lead containing pipe solder located within the 5 maintenance buildings under this study do not pose a health hazard in their present state. However, should removal and disposal of any lead containing paints and/or "possible" lead containing pipes be undertaken, work should be performed in accordance with applicable Federal and Provincial statutes as noted in our report and as outlined in "Lead Guideline for Construction, Renovation, Maintenance or Repair", issued in October 2014 by the Environmental Abatement Council of Ontario (EACO).

Total mechanical demolition work could be carried out under a Class 1 operation as outlined in "Lead Guideline for Construction, Renovation, Maintenance or Repair", issued in October 2014 by the Environmental Abatement Council of Ontario (EACO). However, general health and safety precautions must still be implemented, which include, prohibiting eating, drinking, smoking and chewing in the work area(s), implementing dust suppression techniques and washing facilities for workers to wash hands and face.

12.3 Mercury-containing Materials

Based on our observations, the identified mercury-containing fluorescent light tubes located within both the Mechanical Department Building and the Mechanical Building does not pose a health hazard in their present condition. All maintenance, removal and disposal of any mercury-containing materials must be performed in accordance with applicable Federal and Provincial statutes as noted in this report.

12.4 Silica-containing Materials

Based on our observations, the identified silica-containing materials do not pose a health hazard in their present condition. All maintenance, removal and disposal of any silica-containing materials must be performed in accordance with applicable Federal and Provincial statutes as noted in this report.

13.0 LIMITATIONS AND WARRANTY

- *This report is for the exclusive use of the client, their agents, and is neither an endorsement nor condemnation of the subject property.*
- *The findings contained in this report are based upon conditions as they were observed at the time of investigation. No assurance is made regarding changes in conditions subsequent to the time of the investigation.*

- *Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such parties. Thomas Contracting accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. In particular, any contractors bidding on site demolition or renovation work should not rely solely upon the present report for volume or quantity estimates, and should satisfy themselves of the exact quantities and conditions encountered on-site before bidding or initiating any project work, and adapt the appropriate work practices needed to comply with the applicable Federal / Provincial codes and regulations. Proper, detailed, tender packages should be prepared and supplied to contractors prior to the initiation of any renovation or demolition activities.*

- *The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by qualified professionals currently practicing in this area of environmental assessment. No other warranty, expressed or implied, is made.*

- *Please note that the above survey was limited to the extent of the visual observation and discrete samples collected. Inaccessible areas could not be investigated, and should renovation / demolition work encounter conditions not reported in this document, Thomas Contracting should be retained to provide comments and guidelines on how to proceed.*
- *Some findings contained in this report may be based upon information provided by occupants or employees. No guarantee is made regarding the accuracy of this information. All attempts have been made to independently verify the accuracy of such information unless specifically noted in our report.*
- *If new information is developed in future work, Thomas Contracting should be contacted to re-evaluate the conclusions of this report and to provide amendments as required.*

14.0 CLOSURE

We trust this report meets your current requirements. Should you have any questions in this regard or require further clarification, please do not hesitate to contact the undersigned at this office.

Yours truly,
Thomas Contracting

Grant Johnson
Manager Environmental Services

APPENDIX 'A'

Asbestos Lab Transcripts
&
Sample Photos

CERTIFICATE OF ANALYSIS

Company Name:	Thomas Contracting	**Report Date:**	06-Jun-23
Company Contact:	Grant Johnson	**Analysis Date:**	05-Jun-23
Company Address:	212 A Birchgrove Dr. East, Callander, ON	**Received Date:**	31-May-23
Company Reference:	ONTC DSS - Hearst Site	**LEX Job Number:**	08231711
Sampling Date:	2023-05-24	**No of Analysis:**	11

Analysis

Analysis of Bulk Materials for Asbestos by Polarized Light Microscopy (PLM)

Narrative

The analysis was completed using a polarized light microscope. All sample collection is completed outside of LEX and is the sole responsibility of the client. Any deviation from the sampling requirements in the analytical method could prevent the interpretation of results as per the method and render the results invalid. Samples are disposed of 90 days following the delivery of the Certificate of Analysis.
LEX Scientific is ISO/IEC 17025: 2017 accredited by the National Voluntary Laboratory Accreditation Program for asbestos fibre analysis (NVLAP Lab code 101949-0).

Method

The analysis was performed in accordance with the U.S. Environmental Protection Agency, App. E to Sub. E of 40 CFR Part 763 as well as EPA 600/R-93/116: Method for Determination of Asbestos in Bulk Building Materials, adopted in the Ontario Occupational Health and Safety Act, Ontario Regulation 278/05.

Notes

ND = None Detected at the method detection limit.
PLM method detection limit = 0.1%
Trace = Less than 0.5% of the specified type of Fibrous Asbestos Content was detected in the sample.
ACM = Asbestos-Containing Material
MMVF = Man Made Vitreous Fibres such as Fibreglass, Mineral Wool, Rockwool and Glasswool.
Asbestos TremAct = A type of asbestos amphibole, termed Asbestos Tremolite / Actinolite.
Asbestos Anth= Anthophyllite. A type of asbestos amphibole

Laboratory Manager
German Leal

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Client Sample / Description:	HA-1 Blown-In Insulation Located Within The Attic Space Above Office And Washroom Areas In Mechanical Building	**LEX :1**

Layer :1.1 *Insulation (Homogenous, Fibrous, Yellow)*

Asbestos Chrysotile:	0	%	Cellulose:	3	%
Asbestos Amosite:	0	%	MMVF:	90	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	7	%
Asbestos Detected:	**No**		ACM per Ontario Reg 278/05:	**No**	

Client Sample / Description:	HA-1A Blown-In Insulation Located Within The Attic Space Above Office And Washroom Areas In Mechanical Building	**LEX :2**

Layer :2.1 *Insulation (Homogenous, Fibrous, Yellow)*

Asbestos Chrysotile:	0	%	Cellulose:	3	%
Asbestos Amosite:	0	%	MMVF:	90	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	7	%
Asbestos Detected:	**No**		ACM per Ontario Reg 278/05:	**No**	

Client Sample / Description:	HA-1B Blown-In Insulation Located Within The Attic Space Above Office And Washroom Areas In Mechanical Building	**LEX :3**

Layer :3.1 *Insulation (Homogenous, Fibrous, Yellow)*

Asbestos Chrysotile:	0	%	Cellulose:	3	%
Asbestos Amosite:	0	%	MMVF:	90	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	7	%
Asbestos Detected:	**No**		ACM per Ontario Reg 278/05:	**No**	

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Client Sample / Description:	HA-2 Window Glazing (Interior) On Mechanical Building	LEX :4

Layer :4.1 *Plaster (Homogenous, Fine, Grey)*

Asbestos Chrysotile:	Trace	%	Cellulose:	0	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	100	%
Asbestos Detected:	**Trace**		ACM per Ontario Reg 278/05:		**No**

Client Sample / Description:	HA-2A Window Glazing (Interior) On Mechanical Building	LEX :5

Layer :5.1 *Plaster (Homogenous, Fine, Grey)*

Asbestos Chrysotile:	Trace	%	Cellulose:	0	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	100	%
Asbestos Detected:	**Trace**		ACM per Ontario Reg 278/05:		**No**

Client Sample / Description:	HA-2B Window Glazing (Interior) On Mechanical Building	LEX :6

Layer :6.1 *Plaster (Homogenous, Fine, Grey)*

Asbestos Chrysotile:	Trace	%	Cellulose:	0	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	100	%
Asbestos Detected:	**Trace**		ACM per Ontario Reg 278/05:		**No**

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Client Sample / Description: HA-3 "Transite" Wall Baord Located Within The Mechanical Department Buildinng **LEX :7**

Layer :7.1 *Transite (Homogenous, Hard, Grey)*

Asbestos Chrysotile:	15	%	Cellulose:	0	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	85	%
Asbestos Detected:	**Yes**		ACM per Ontario Reg 278/05:	**Yes**	

Client Sample / Description: HA-3A "Transite" Wall Baord Located Within The Mechanical Department Buildinng **LEX :8**

Layer :8.1 *Transite (Homogenous, ,) Sample Not Analyzed due to Positive Stop*

Client Sample / Description: HA-3B "Transite" Wall Baord Located Within The Mechanical Department Buildinng **LEX :9**

Layer :9.1 *Transite (Homogenous, ,) Sample Not Analyzed due to Positive Stop*

Client Sample / Description: HA-4 Tar Roofing Shingles (Black) Located On Shed #1 **LEX :10**

Layer :10.1 *Shingle (Homogenous, Resinous, Black)*

Asbestos Chrysotile:	0	%	Cellulose:	15	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	85	%
Asbestos Detected:	**No**		ACM per Ontario Reg 278/05:	**No**	

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Client Sample / Description: HA-4A Tar Roofing Shingles (Black) Located On Shed #1 **LEX :11**

Layer :11.1 *Shingle (Homogenous, Resinous, Black)*

Asbestos Chrysotile:	0	%	Cellulose:	15	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	85	%
Asbestos Detected:	**No**		ACM per Ontario Reg 278/05:		**No**

Client Sample / Description: HA-4B Tar Roofing Shingles (Black) Located On Shed #1 **LEX :12**

Layer :12.1 *Shingle (Homogenous, Resinous, Black)*

Asbestos Chrysotile:	0	%	Cellulose:	15	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	85	%
Asbestos Detected:	**No**		ACM per Ontario Reg 278/05:		**No**

Client Sample / Description: HA-5 Exterior Window Caulking Located On The Toolhouse Building **LEX :13**

Layer :13.1 *Caulking (Homogenous, Compact, Multicolor)*

Asbestos Chrysotile:	3	%	Cellulose:	0	%
Asbestos Amosite:	0	%	MMVF:	0	%
Asbestos Crocidolite:	0	%	OtherFibres:	0	%
Asbestos TremAct:	0	%	NonFibrous:	97	%
Asbestos Detected:	**Yes**		ACM per Ontario Reg 278/05:		**Yes**

Client Sample / Description: HA-5A Exterior Window Caulking Located On The Toolhouse Building **LEX :14**

Layer :14.1 *Caulking (Homogenous, ,) Sample Not Analyzed due to Positive Stop*

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Company: Thomas Contracting	Page 6 of 6	08231711
Client Sample / Description:	HA-5B Exterior Window Caulking Located On The Toolhouse Building	**LEX :15**

Layer :15.1 *Caulking (Homogenous,) Sample Not Analyzed due to Positive Stop*

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PHOTO # 1
Shed #1 – Hearst Site

PHOTO # 2
Shed #2 – Hearst Site

PHOTO # 3
Tool House – Hearst Site

PHOTO # 4
Mechanical Department Shed – Hearst Site

PHOTO # 5
Mechanical Building – Hearst Site

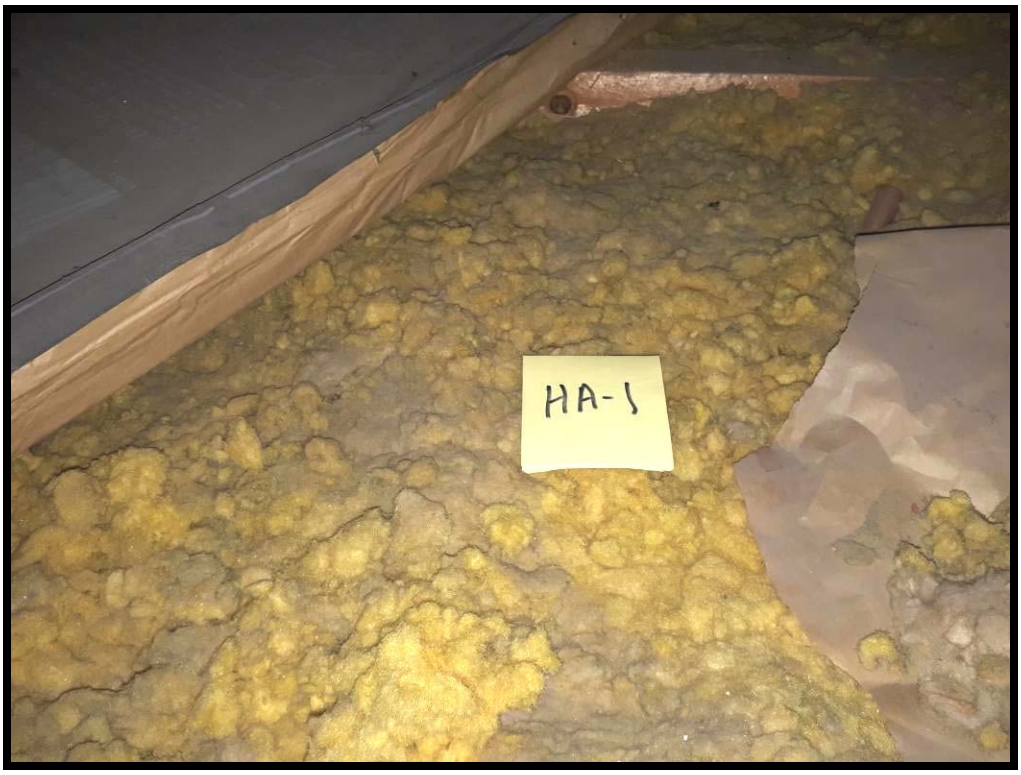


PHOTO # 6
Sample # HA – 1 : Non-asbestos blown-in insulation located within the attic space above office and washroom of the Mechanical Building.

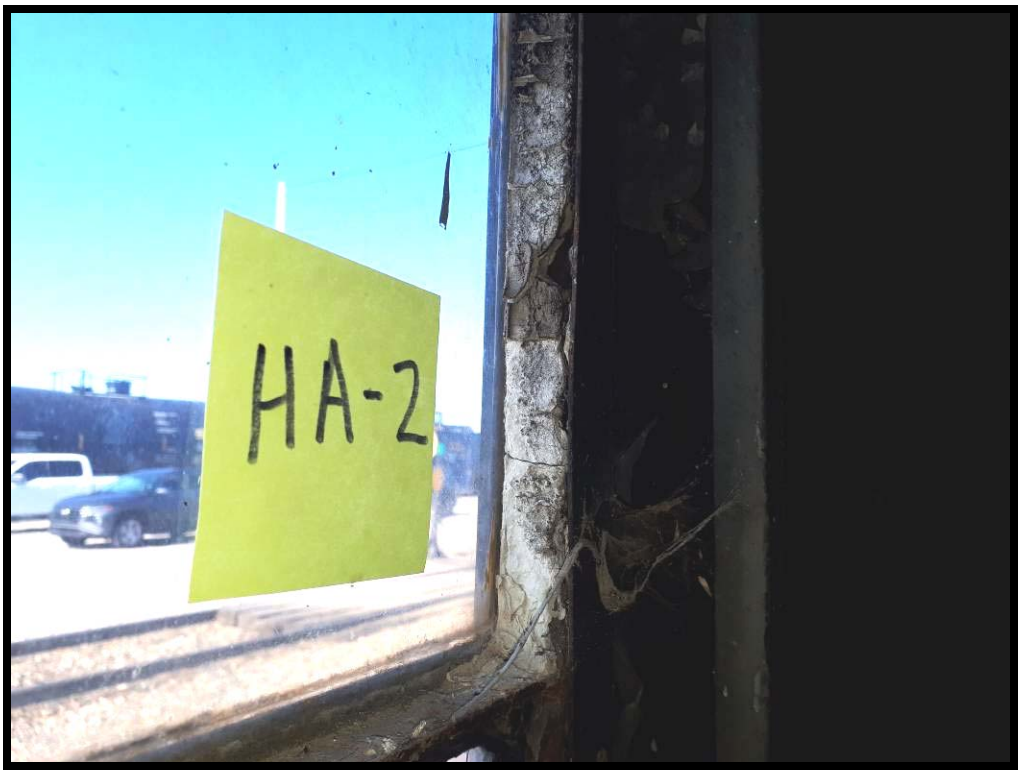


PHOTO # 7
Sample # HA – 2 : Non-asbestos window glazing (white) located on the Mechanical Building.

PHOTO # 8
Sample # HA – 3 : Asbestos-containing "Transite" wall board (non-friable) located within the Mechanical Department Shed. (15% chrysotile asbestos)

PHOTO # 9
Sample # HA – 4 : Non-asbestos tar roofing shingles (black) located on Shed #1.

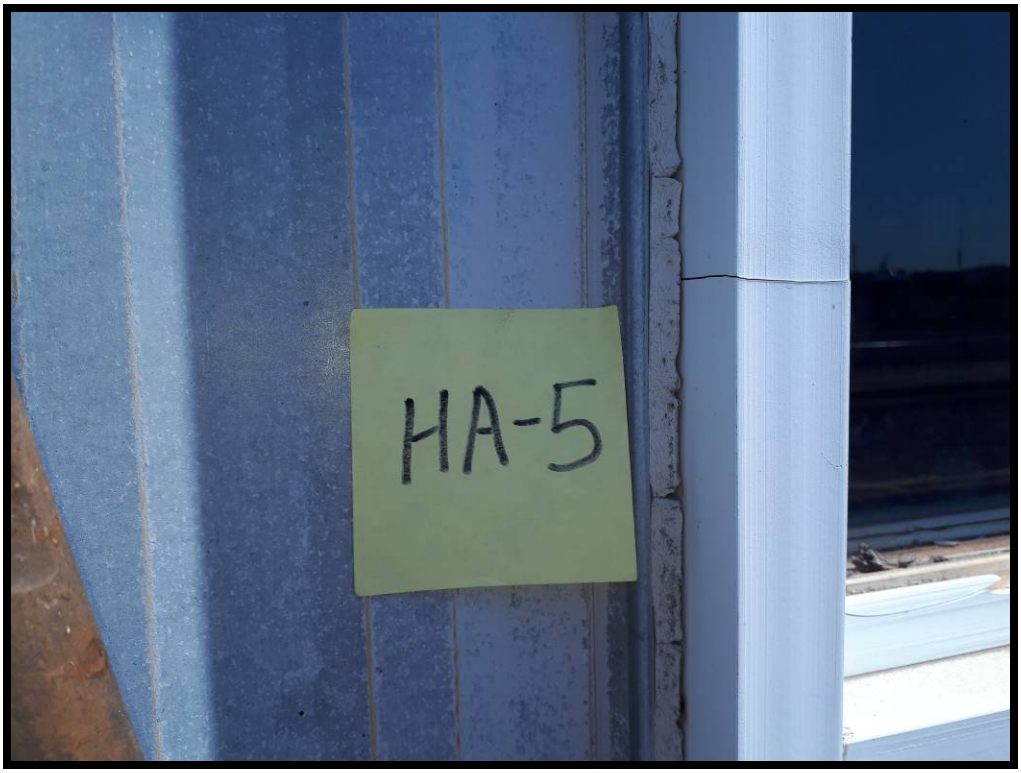


PHOTO # 10
Sample # HA – 5 : Asbestos-containing exterior window caulking (white) located on the Tool House Building. (3% chrysotile asbestos)

APPENDIX 'B'

Lead Lab Transcripts
&
Sample Photos

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B23-03667

Report To:
Thomas Contracting
72 Ninovan Road,
Callander ON P0H 1H0 Canada
Attention: Grant Johnson

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 31-May-23
DATE REPORTED: 22-Jun-23
SAMPLE MATRIX: Paint Chips

JOB/PROJECT NO.: ONTC-Hearst-DSS
P.O. NUMBER: TC-201608
WATERWORKS NO.

	Parameter		Lead				
	Units		ppm (mass)				
	R.L.		5				
	Reference Method		EPA 6010				
	Date Analyzed/Site		05-Jun-23/O				
Client I.D.	**Sample I.D.**	**Date Collected**					
HL-1	B23-03667-1	24-May-23	7500				
HL-2	B23-03667-2	24-May-23	2110				
HL-3	B23-03667-3	24-May-23	1900				
HL-4	B23-03667-4	24-May-23	22900				
HL-5	B23-03667-5	24-May-23	2120				
HL-6	B23-03667-6	24-May-23	1090				
HL-7	B23-03667-7	24-May-23	9840				
HL-8	B23-03667-8	24-May-23	566				
HL-9	B23-03667-9	24-May-23	11800				
HL-10	B23-03667-10	24-May-23	1350				
HL-11	B23-03667-11	24-May-23	681				
HL-12	B23-03667-12	24-May-23	1410				

Steve Garrett
Director of Laboratory Services

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Page 1 of 1.

Photo # 11
Sample # HL – 1 : Exterior wall and trim paint located on the Mechanical Building. Deem to be Lead-based paint. (surface colour = beige)

Photo # 12
Sample # HL – 2 : Interior wall and ceiling paint located within the Mechanical Building. Deem to be Lead-containing paint. (surface colour = dark beige)

Photo # 13
Sample # HL – 3 : Interior wall paint located on the Mechanical Building.
Deem to be Lead-containing paint. (surface colour = off white)

Photo # 14
Sample # HL – 4 : Interior wall paint within garage area of the Mechanical Building.
Deem to be Lead-based paint. (surface colour = dark grey)

Photo # 15
Sample # HL – 5 : Door and trim paint within garage area of the Mechanical Building.
Deem to be Lead-containing paint. (surface colour = black)

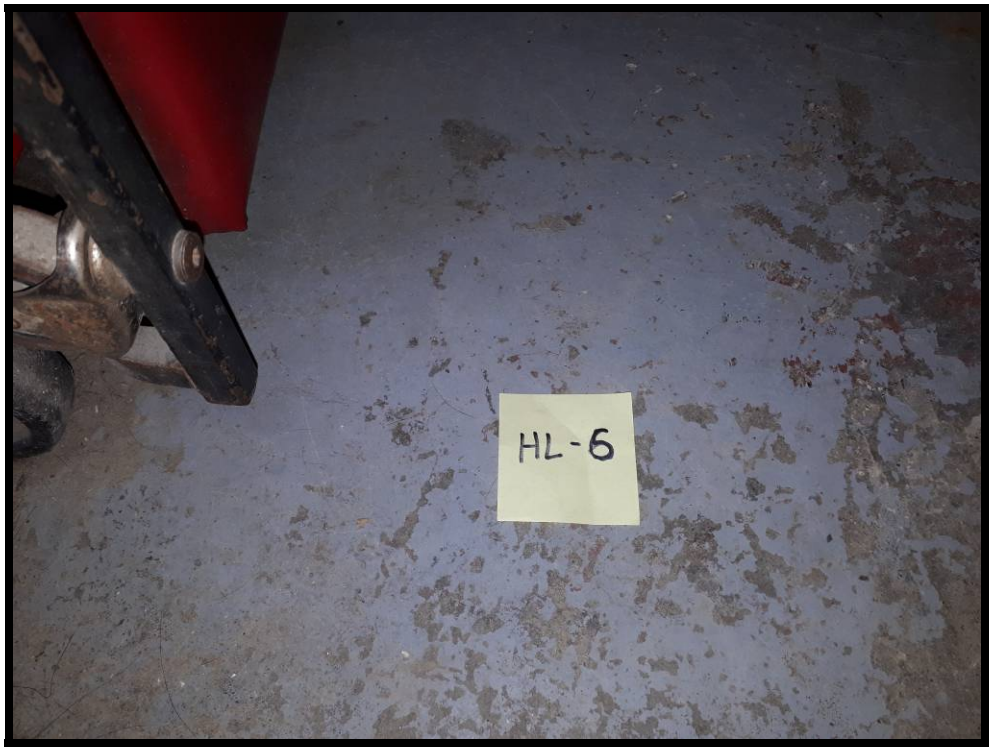


Photo # 16
Sample # HL – 6 : Floor paint within the Mechanical Building.
Deem to be Lead-containing paint. (surface colour = grey)

Photo # 17
Sample # HL – 7 : Exterior wall paint within the Mechanical Department Shed.
Deem to be Lead-based paint. (surface colour = beige)

Photo # 18
Sample # HL – 8 : Interior wall paint within the Mechanical Department Shed.
Deem to be Low-level lead paint. (surface colour = off white)

Photo # 19
Sample # HL – 9 : Exterior door paint on the Mechanical Department Shed.
Deem to be Lead-based paint. (surface colour = black & grey)

Photo # 20
Sample # HL – 10 : Exterior wall and door paint on Shed #1.
Deem to be Lead-containing paint. (surface colour = light blue)

Photo # 21
Sample # HL – 11 : Exterior wall and door paint on Shed #2.
Deem to be Low-level lead paint. (surface colour = silver)

APPENDIX 'C'

Fluorescent Light Ballast Photo
&
Thermostatic Control Switch Photo
&
Electrical Transformer Photos

Photo # 22
"Honeywell" thermostatic control switch located within the Mechanical Building. (no mercury)

Photo # 23
Typical "Sylvania" T8 light ballast located within both the Mechanical Department Shed and the Mechanical Building (marked as non-PCB).

Photo # 24
"MagneTek" electrical transformer located within the Mechanical Building ("dry type" model and does not contain PCB's).

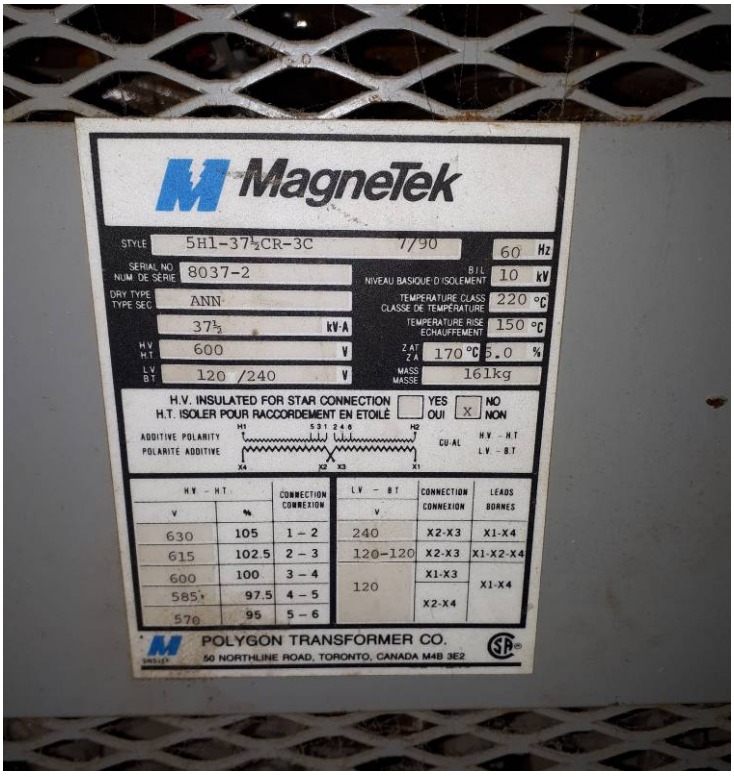


Photo # 25
"MagneTek" electrical transformer located within the Mechanical Building ("dry type" model and does not contain PCB's).

APPENDIX 'D'

Building by Building DSS Assessment

BUILDING by BUILDING DSS ASSESSMENT

Hearst Site

Building	***Asbestos-Containing Materials***	***Lead-Containing Materials***	***Silica***	***Mercury***
Shed #1	• *None detected*	• *Exterior wall paint (light blue) is classed as Lead-containing paint.*	• *None detected*	• *None detected*
Shed #2	• *None detected*	• *Exterior wall paint (silver) is classed as Low-level lead paint.*	• *None detected*	• *None detected*
Tool House	• *Asbestos-containing (non-friable) exterior window caulking (3% chrysotile).*	• *Interior wall and ceiling paint (off white) is classed as Lead-containing paint.*	• *None detected*	• *None detected*
Mechanical Department Shed	• *Asbestos-containing (non-friable) interior wall and ceiling "Transite" board (15% chrysotile).*	• *Exterior wall paint (beige) is classed as Lead-based paint.* • *Exterior door paint (black & grey) is classed as Lead-based paint.* • *Interior wall paint (off white) is classed as Low-level lead paint.*	• *Concrete floor / foundation*	• *Fluorescent Light Tubes*
Mechanical Building	• *None detected*	• *Exterior wall paint (beige) is classed as Lead-based paint.* • *Interior wall and ceiling paints (off white & dark beige) are classed as Lead-containing paints.* • *Garage - Interior wall paint (dark grey) is classed as Lead-based paint.* • *Garage - Door Paint (black) is classed as Lead-containing paint.* • *Floor paint (grey) is classed as Lead-containing paint.*	• *Concrete floor / foundation*	• *Fluorescent Light Tubes*

Note: This table is to be read in conjunction with Thomas Contracting Report TC - 201608, and requires interpretation assistance before use by others.

PART 3 – RFQ SPECIFICATIONS

SCHEDULE 3-A-4
TECHNICAL SPECIFICATIONS
AND IFT DRAWINGS

Specifications
6083D – 24.03.20 – ONTC Hearst Mechanical Shop – IFT Specs
6083D Hearst Mechanical Shop – IFT Specs
ONTC – Hearst Mechanical Building – Complete Package
Specification – ONTC Hearst Mechanical Building – Man Door
Specification – ONTC Hearst Mechanical Building – OH Door
Specification – ONTC Hearst Mechanical Building – Windows and Glazing

ONTC HEARST
MECHANICAL SHOP
HEARST, ON
PROJECT NO. 6083D
MARCH 2024

Piotrowski Consultants Ltd.
1820 Bond Street
North Bay, ON P1B 4V6

I N D E X

PART 1- GENERAL

1.1. GENERAL

1. This section covers items common to all sections of Division 15 and is supplementary to requirements of Division 1.

2. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

3. Coordinate all requirements with General Contractor.

1.2. CODE OF STANDARDS

1. Do complete installation in compliance with latest editions and all amendments of the following Codes and Standards. Where conflicts in requirements occur, the higher standard shall apply:

    1. ASHRAE

    2. SMACNA

    3. CSA

    4. Ontario Building Code

    5. All governing municipal requirements

    6. ULC

    7. LEED Canada for New Construction and Major Renovations 2009.

1.3. DEFINITIONS

1. “Provide” means supply and install.

2. “Approved” means approved in writing by Consultant.

3. “Consultant” means designated qualified professional engineer acting as representative of Owner for monitoring of work.

4. “Manual” means Operations and Maintenance manual.

1.4. CARE, OPERATION, START-UP AND INSTRUCTION TO OWNERS

1. Provide certified personnel to instruct Owner of operation mechanical equipment. Provide maintenance specialist personnel to instruct on maintenance and adjustment of mechanical equipment and any changes or modification equipment must be under terms of guarantee.

2. Provide instruction during regular work hours prior to acceptance and turn over to Owner's staff for regular operation.

3. Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

4. Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn three manuals over to the Owner.

5. Operation and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

6. Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

1.5. PERMITS, CERTIFICATES, FEES AND INSPECTIONS

1. Submit to the Building Department the necessary number of drawings and specifications for examination prior to commencement of work to obtain a building/plumbing permit. Obtain and pay for all building/plumbing permits. Include all costs in the tender price.

2. Submit Notice of Project to Ministry of Labour.

3. Contractor shall be responsible to pay associated fees.

4. Notify Consultant of changes required by Building Department prior to making changes.

5. Notify Consultant upon completion of work.

1.6. COORDINATION WITH EXISTING UTILITIES

1. Before commencing any Work, the Contractor shall determine the locations of all underground utilities and structures indicated in or inferable from the Contract Documents, or that are inferable from an inspection of the Place of the Work.

2. All existing utilities are to be maintained and protected for the length of construction.

3. Contractor to notify consultant if any conflicts arise and allow for minimum 48 hours for consultants review.

1.7. EQUIPMENT REQUIREMENTS AND INSTALLATION

1. Permit equipment maintenance and disassembly by use of unions or flanges to minimize disturbance to connecting piping and duct systems and without interference from building structure or other equipment.

2. Provide accessible means for lubricating equipment including permanent lubricated "lifetime" bearings.

3. Pipe drain lines to drains.

4. Line-up equipment, rectangular cleanouts and similar items with building walls wherever possible.

5. Provide equipment commissioning and preliminary balancing and confirm the proper operation of all equipment and related systems.

1.8. RESPONSIBILITY FOR TRIAL USAGE

1. Obtain written permission to start and test permanent equipment and systems prior to acceptance by Consultant.

2. Consultant may use ventilating equipment and systems for testing.

3. Protect equipment and systems' openings from dirt, dust and other foreign materials during test usage.

1.9. ELECTRICAL

1. Division 15 shall supply and install motors, controls and control wiring, supply starters, switches and relays, for all motor driven equipment under Division 15. Starters, switches and relays shall be handed over to Division 16 for installation and wiring.

2. Electrical equipment not supplied by Division 15 is listed on the drawings or elsewhere in the Specification for quality of material and workmanship.

3. Safety disconnect switches shall be supplied for each rotating equipment unless within viewing distance for motor control but max 6 m (20') supplied by Division 15 and installed by Division 16.

4. Wiring and controls for connections below 50 V, which are related to control systems are the responsibility of Division 15. Refer to Division 16 for quality of materials and workmanship.

    1. Control cables, type LVT, soft annealed copper conductors with thermoplastic insulation and colour coding. Installation in EMT conduit.

    2. Two conductors parallel with an overall thermoplastic jacket; three or more conductors twisted with an overall thermoplastic jacket.

    3. Cable to be installed in EMT conduit or to be plenum rated FT6 type.

1.10. THERMOSTATS AND SENSORS

1. All thermostats, sensors etc to be mounted at 1200mm (47”) above finished floor to centre line of device. Any interference with other devices such as switches, etc to be coordinated with Consultant.

1.11. MOTORS

1. Provide motors for mechanical equipment as specified.

2. If delivery of specified motor will delay delivery of installation of any equipment, install an acceptable motor for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

3. Motors under 373 W (1/2 HP) speed as indicated, continuous duty high efficiency, built in overload protection, resilient mount, single phase, 120 V unless otherwise specified or indicated.

4. Motors 373 W (1/2 HP) to 150 kW (200 HP) T frame, to or exceeding the current Ontario Hydro Motor Efficiency Levels and be listed in the current Ontario Hydro Motor Efficiency Levels Guide as tested to CSA C390M 1985 or IEEE 112B and approved under the Canadian Safety Code, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C (72°F), 3 phase, 208 V or 600 V unless otherwise specified or indicated.

5. Provide a suitable manual or magnetic starter for each piece of equipment supplied under this Division.

6. Provide safety disconnect switches for the above equipment.

7. Division 16 will install all starters, disconnects and line voltage control devices and perform all wiring under supervision of this Division.

1.12. PIPE HANGERS AND SUPPORTS

1. See Section 15140 – Hangers and Supports.

1.13. BELT DRIVES

1. Fit reinforced belts in sheaves matched to drive. Multiple belts to be matched set.

2. Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

3. For motors up to 7.5 kW (10 HP) standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid position of range for specified r/min. Use fixed sheaves for motors 7.6 kW (10 HP) and over. Replace sheaves during balancing if required.

4. Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturers design requirements on prime mover shafts.

5. Motor slide rail adjustment plates to allow for centre line adjustment.

1.14. GUARDS

1. Provide guards for unprotected drives.

2. Guards for belt drives:

1. Expanded metal screen welded to steel frame.

2. Minimum 1.3 mm (18 GA) galvanized sheet metal tops and bottoms.

3. 40 mm (1 1/2") dia holes on both shaft centres for insertion of tachometer.

4. Removable for servicing.

3. Provide means to permit lubrication and use of test instruments with guards in place.

4. Install belt guards to permit movement of motors for adjusting belt tension.

1.15. BUILDING PERMIT

1. Prepare permit application and apply for building permit at local Building Department. Include all costs in tender price. Consultant will provide contract documents in PDF format, contractor responsible to produce hard copies.

1.16. DRAIN VALVES

1. Locate at low points and at section isolating valves unless otherwise specified.

2. Minimum NPS 3/4 unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

1.17. PENETRATIONS

1. Where pipes pass through fire rated walls, floors or partitions, maintain fire rating of assembly in compliance with OBC. Submit shop drawings and details on all products.

2. Provide pipe sleeves at penetrations where pipes pass through masonry or concrete, or where protection is required from galvanic action or physical abrasion.

    1. Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc-rich paint.

    2. Where sleeves pass through masonry or concrete: backfill space around sleeve with masonry or concrete.

    3. Where sleeves pass through walls or floors: caulk space between insulation and sleeve or between pipe and sleeve with waterproof fire retardant non-hardening mastic.

    4. In foundation walls and below grade floors: pipe sleeve to be 1.25x pipe outside diameter or minimum 50mm. Fill space between pipe and sleeve with soft foam insulation.

3. Ensure no contact between copper tube or pipe and ferrous material or sleeve.

4. Continue insulation through penetrations where pipe is required to be insulated.

5. Temporarily plug all openings during construction.

1.18. SLEEVES

1. Size:

    1. Provide 5 mm (1/4") clearance between sleeve and pipe or between sleeve and insulation.

    2. Where piping passes below footings, provide min clearance of 50 mm (2") between sleeve and pipe. Fill void with elastic, water proof material. Backfill up to underside of footing with concrete of same strength as footing.

2. Provide sleeves of minimum 1.0 mm (20 GA) galvanized sheet steel with lock seam joints or use PVC pipe in non rated walls.

3. Use cast iron or steel pipe sleeves with annular fin continuously welded at mid-point through foundation walls.

1.19. ESCUTCHEONS AND PLATES

1. Provide on pipes passing through finished walls, partitions, floors and ceilings.

2. Use split type chrome plated brass, with set screws for ceiling or wall mounting.

3. Inside diameter shall fit around finished pipe. Outside diameter shall cover opening or sleeve.

4. Where sleeve extends above finished floor, escutcheons or plates shall clear sleeve extension.

5. Secure to pipe or finished surface but not insulation.

1.20. TESTS

1. Provide the following supplementary requirements to tests specified:

    1. Give 48 h notice of date when tests will be made.

    2. Do not insulate or conceal work until tested and approved.

    3. Conduct tests in presence of Consultant.

    4. Bear costs including retesting and make good.

    5. Pipe pressure:

        1. Hydraulically test water supply systems at 1-1/2 times system operating pressure or minimum 1050 kPa (150 psig).

2. Maintain test pressures without loss of 4 h unless otherwise specified.

3. Record pressure test results, indicating:

    1. Portion of piping tested.

    2. Test pressure.

    3. Test duration.

    4. Results/Comments.

    5. Type of pipe.

    6. Type of system.

    7. Size of pipe.

4. Submit results to Consultant.

1.21. PAINTING

1. Apply at least one coat of corrosion resistant primer paint to supports, and equipment fabricated from ferrous metals.

2. Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.22. SPECIAL TOOLS

1. Provide one set of special tools required to service equipment as recommended by manufacturers.

1.23. ACCESS DOORS

1. Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

2. Flush mounted 600 mm x 600 mm for body entry and 300 mm x 300 mm for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

3. Material:

    1. Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.

    2. Remaining areas: use prime coated steel.

4. Installation:

1. Locate so that concealed items are accessible.

2. Locate so that hand or body entry (as applicable) is achieved.

3. Installation is specified in applicable sections.

5. Acceptable Material: Nailor 0900 or approved equal.

1.24. DIELECTRIC COUPLINGS

1. Provide wherever pipes of dissimilar metals are joined.

2. Provide felt or rubber gaskets to prevent dissimilar metal contact.

1.25. CUTTING AND PATCHING

1. All cutting and patching shall be by Division 2, coordinated by Division 15. Coordinate with other trades. Notify Structural Engineer before cutting any structural members and obtain written permission.

1.26. CONCRETE WORK

1. Provide 100mm concrete housekeeping pads for all floor mounted equipment, including: boilers, air handlers, pumps, heat and energy ventilators, tanks and furnaces.

1.27. EXCAVATION AND BACKFILLING

1. This Division shall be responsible for coordination for bedding of lines or equipment and for backfilling and compaction to 98% Standard Proctor Density.

1.28. EXISTING SYSTEMS

1. Before submitting tender price verify on job site location of all accessible existing systems affecting execution of this contract. Difficulties arising during construction will not be considered as grounds for additional payment.

2. Where work involves breaking into or connecting to existing systems, carry out work at times directed by governing authorities, with minimum of disturbance to pedestrian traffic.

3. Submit schedule to and obtain approval from Consultant for any shut down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

4. Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

1.29. INSTRUCTIONS TO OWNERS

1. Provide certified personnel to instruct Owner of operation mechanical equipment. Provide maintenance specialist personnel to instruct on maintenance and adjustment of mechanical equipment and any changes or modification equipment must be under terms of guarantee.

2. Training plans to be submitted prior to the execution of the training. At a minimum, training plans to include the list of systems and equipment which are to be trained on. Instructor's name and qualifications and allotted time for training. Training plans to be reviewed and approved by Owner and Consultant prior to commencement of training.

3. Provide instruction during regular work hours prior to acceptance and turn over to Owner's staff for regular operation.

4. Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn three manuals over to the Owner.

5. Operation and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

1.30. OPERATION & MAINTENANCE MANUALS

1. Provide one (1) paper copy and one "PDF" format on USB stick of Mechanical Operation and Maintenance Manuals complete with As-built Drawings, in accordance to the following and Section 01300 - Submittals.

2. Mechanical Operation and Maintenance Manuals to be delivered to the Engineer's office in accordance with Section 01300 - Submittals.

3. Manuals to be bound in hard cover neatly labeled: "OPERATING AND MAINTENANCE INSTRUCTIONS".

4. The Operation and Maintenance Manuals shall be divided into sections with neatly labeled and tabbed dividers between each section. The sections to be included in the manual are:

    1. Section I – General

    2. Section II – Piping and Pump Systems

    3. Section III – Heating, Air Conditioning and Ventilation

    4. Section IV – Automatic Controls

    5. Section V – Sprinkler System

    6. Section VI – Air and Hydronic Balancing Report

5. The following information shall be contained within the sections:

    1. SECTION I: A list giving name, address and telephone number of the Consultant, Engineers, Construction Manager, Mechanical Trade and Controls Trade. Written guarantees for the Mechanical Systems. A copy of the Valve directory giving number, valve location, normal valve position, and purpose of valve. A framed copy of valve directory to be hung in Mechanical Room. Equipment lists and certificates

shall be provided. Certificates shall be signed and sealed by the appropriate suppliers. All major equipment including but not limited to boilers, cooling towers, chillers, air handling units, isolators, silencers, pumps and humidifiers are to be inspected by the manufacturer to ensure the equipment has been installed in accordance with their recommendations.

2. SECTION II, III and IV: A copy of all pressure tests and operational tests for pumping system. A copy of Gas Operational Tests for gas fired equipment. A list giving name, address and telephone number of all suppliers. A copy of all approved Shop Drawings. Copies of warranties.

3. SECTION IV: Complete Control Diagrams, Wiring Diagrams and description of Control system and the functioning of the system. A copy of all shop drawings and all calibration certificates. Shop drawings shall be the updated record drawings.

4. SECTION V: A copy of all shop drawings. Copies of all warranties. Maintenance information.

5. SECTION VI: Provide complete air balance report including pump and fan curves, measured values and floor plans showing location of all traverse readings and grille measurements. Provide copies of all pressure tests completed on the systems.

6. MAINTENANCE MATRIX

1. A maintenance matrix is to be provided in the Operation and Maintenance Manuals. The matrix shall indicate each piece of equipment and the required maintenance tasks and the frequency at which they are to be carried out.

1.31. OWNER OCCUPANCY SCHEDULE

1. The existing building will remain occupied during normal occupancy hours.

2. Provide temporary protection for all finishes, appliances or equipment in the existing building.

3. Protect and maintain existing boiler room and electrical room operations during the work.

1.32. AS-BUILT DRAWINGS

1. Site records:

1. One set to be kept on site and all changes to be recorded on daily basis. At the completion of the project, all changes shall be transferred to clean set, signed and passed to the Consultant. Provide “PDF” format of As-Built Drawings on USB stick with Maintenance Manuals at completion of project.

2. Make these drawings available for reference purposes and to inspection at all times.

2. Submit 2 copies of as-built marked up prints with final TAB report.

3. As-built drawings must be delivered before system acceptance.

1.33. BUILDING SERVICE CONNECTIONS

1. Make arrangements with all Utilities for building service connections and include all costs in tender price.

1.34. SPARE PARTS

1. Provide three (3) sets of spare filters for each air handling unit, heat recovery ventilator.
2. One (1) set of belts from any motor driven mechanical components.
3. Leave spare parts on site. Coordinate storage location with the Owner.

1.35. TRAINING

1. Provide minimum of two 6 hour training sessions on systems.
2. Include for training in Fall to winterize system.

END OF SECTION 15010

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate on manufacturer's catalogue literature the following:
    1. Thermometers.
    2. Pressure gauges.
    3. Stop cocks.
    4. Wells.

1.3. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified.

PART 2- PRODUCTS

2.1. GENERAL

1. Thermometers and pressure gauges to operate at mid point of scale or range.

2.2. DIRECT READING THERMOMETERS

1. Industrial, variable angle type, liquid in glass, cast aluminum case, lens front, 225 mm (9”) scale length, dual °F and °C range. Stem lengths to be 50% of pipe i.d. Thermometers to meet: CAN/CGSB 14.4, ASME B40.4.

2.3. REMOTE READING THERMOMETERS

1. 100 mm diameter activated dial type, accuracy within one scale division, brass movement, stainless steel capillary, stainless steel spiral armour, stainless steel bulb and polished brass or stainless steel case for wall mounting. Capillary to have an extra length of at least 5 ft. Thermometers to meet: CAN/CGSB 14.4, ASME B40.

2.4. THERMOMETER WELLS

1. Copper pipe: copper or bronze.
2. Steel pipe: brass or stainless steel.
3. Provide extension necks where insulation is present.
4. Acceptable Product: WIKA TI.901; Winters TIM.

2.5. PRESSURE GAUGES

1. 112 mm, dial type, grade A, 1% accuracy full scale unless otherwise specified. Wetted parts to be of phosphor bronze bourdon tube. Dual scale PSI/Kpa.
2. Acceptable Material: WIKA 213.53.
3. Provide liquid fill on all pump systems
4. Provide siphons for steam service
5. Provide bronze stop cocks for isolation
6. Provide diaphragm seals for corrosive services.

PART 3- EXECUTION

3.1. GENERAL

1. Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.
2. Install engraved lamicoid nameplates as specified in Section 15190 - Identification, identifying medium.
3. Install between equipment and first fitting or valve.

3.2. THERMOMETERS

1. Install in wells on all piping. Provide heat conductive material for inside of well.
2. Install in locations as indicated and on:
    1. Common return to boilers.
    2. Outlet of every boiler.
    3. On each return and supply.

4. On every heating coil.

5. Outlets of heat exchanger.

3. Use extensions where thermometers are installed through insulation.

4. Provide well in supply pipe header for indoor/outdoor controller temp. sensor.

3.3. PRESSURE GAUGES

1. Install in following locations:

    1. Suction and discharge of pumps.

    2. In other locations as indicated.

2. Use extensions where pressure gauges are installed through insulation.

END OF SECTION 15130

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ASME B31.1-2012, (SI), Power Piping, (SI Edition).
2. MSS-SP-58-2009, Pipe Hangers and Supports - Materials, Design and Manufacture.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate on manufacturer's catalogue literature the following:
    1. Upper attachment.
    2. Middle attachment.
    3. Pipe attachment.
    4. Riser clamps.
    5. Shields and saddles.
    6. Sway braces.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.

PART 2- PRODUCTS

2.1. GENERAL

1. Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58.
2. Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

2.2. UPPER ATTACHMENTS

1. Concrete:
    1. Anchors for existing concrete roof structure, heavy duty anchors Hilti HSL.
2. Steel beam (bottom flange):
    1. Cold piping NPS 2 and under: malleable iron C clamp to MSS-SP-58, type 19. ULC listed.
    2. Cold piping NPS 2-1/2 and larger and all hot piping: malleable iron beam clamp to MSS-SP-58, type 28 or 29. ULC listed.
3. Steel beam (top):
    1. Cold piping NPS 2 and under: malleable iron "top of beam" C clamp to MSS-SP-58, type 19. ULC listed.
    2. Cold piping NPS 2-1/2 and larger and all hot piping: steel jaw, hook rod with nut, spring washer and plain washer, to MSS-SP-58, type 25. ULC listed.
4. Steel joist:
    1. Cold piping NPS 2 and under: steel washer plate with double locking nuts.
    2. Cold piping NPS 2-1/2 and larger and all hot piping: steel washer plates with double locking nut, carbon steel clevis and malleable iron socket.
5. Steel channel or angle (bottom):
    1. Cold piping NPS 2 and under; malleable iron C clamp to MSS-SP-58, type 23. ULC listed.
    2. Cold piping NPS 2-1/2 and larger and all hot piping; universal channel clamp. ULC listed.
6. Wood trusses and joists.
    1. Hold piping NPS2 and under. Secure angle iron 32 x 32 x 3 mm (1 1/2" x 1 1/2" x 3/16") on top of joist or bottom chord trusses. Space min. 2 joints. Use rod hanger with locking nut and clevis hanger.
    2. Cold piping NPS 2 1/2 and larger. Secure angle iron 50 x 50 x 4 mm on top of joists or bottom chord of trusses. Span min. 4 members. Use rod hangers with locking nut and clevis hanger.

2.3. MIDDLE ATTACHMENT (ROD)

1. Carbon steel threaded rod black finish, galvanized in mechanical rooms.

2.4. PIPE ATTACHMENT

1. Cold piping, steel or cast iron: hot piping steel, with less than 25 mm, 1" horizontal movement; hot piping, steel, with more than 300 mm, 12" middle attachment rod length: adjustable clevis to MSS-SP-58, type 1. ULC listed.

2. Cold copper piping; hot copper piping with less than 25 mm, 1" horizontal movement; hot copper piping with more than 300 mm, 12" middle attachment rod length: adjustable clevis to MSS-SP-58, type 1. Copper plated.

3. Suspended hot piping, steel and copper, with horizontal movement in excess of 25 mm, 1"; hot steel piping with middle attachment rod 300 mm, 12" or less; pipe roller to MSS-SP-58, type 43.

4. Bottom supported hot piping, steel and copper: pipe roller stand to MSS-SP-58, type 45.

2.5. RISER CLAMPS

1. Steel or cast iron pipe: black carbon steel to MSS-SP-58, type 42. ULC listed.

2. Copper pipe: carbon steel copper finished to MSS-SP-58, type 42.

2.6. SADDLES AND SHIELDS

1. Hot and Cold piping NPS 1-1/4 and over: protection shield with high density insulation under shield with uninterrupted vapour barrier.

PART 3- EXECUTION

3.1. HANGER SPACING

1. Spacing and middle attachment rod diameter as specified in paragraphs below or as in table below, whichever is more stringent.

    1. Plumbing piping: most stringent requirements of Ontario Building Code, or authority having jurisdiction.

    2. Fire protection: to applicable fire code.

    3. Gas piping: up to NPS 1/2: every 6', 1.8 m

    4. Copper piping: up to NPS 1/2: every 5' 1.5 m

    5. Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

    6. Within 12" of each horizontal elbow.

Pipe Size (Nominal)	Rod Diameter	Maximum Steel	Spacing Cooper
NPS 1/2	10 mm 3/8"	1.8m 6'	5' 1.5m
NPS 3/4, 1	10 mm 3/8"	2.1m 7'	6' 1.8m
NPS 1-1/4	10 mm 3/8"	2.1m 7'	8' 2.4m
NPS 1-1/2	10 mm 3/8"	2.7m 9'	8' 2.4m
NPS 2	10 mm 3/8"	3.0m 10'	9' 2.7m
NPS 2-1/2	10 mm 3/8"	3.0m 10'	10' 3.0m
NPS 3 to 4	10 mm 3/8"	4.6m 15'	12' 3.6m
NPS 6	19 mm 3/4"	5.1 m 17'	--

3.2. HANGER INSTALLATION

1. Offset hanger so that rod is vertical in operating position.

2. Adjust hangers to equalize load.

3. Loads suspended from steel structure to be reviewed and analyzed with structural engineer/general contractor.

END OF SECTION 15140

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. CGSB 1-GP-60M, Enamel, Interior, Gloss, Alkyd Type.
2. CGSB 24-GP-3a Identification and Classification of Piping Systems.

1.3. SAMPLES

1. Submit samples in accordance with Section 01300 - Submittals.
2. Submit samples and lists of proposed wording for approval before engraving.

PART 2– PRODUCTS

2.1. MANUFACTURERS NAMEPLATES

1. Provide metal nameplate on each piece of equipment, mechanically fastened complete with raised or recessed letters.
2. Indicate size, equipment model, manufacturer's name, serial number, voltage, cycle, phase and power of motors.

2.2. SYSTEM NAMEPLATES

1. Colour:
    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, square corners, letters accurately aligned and machine engraved into core.
3. Sizes:

1. Conform to following table:

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

2. Use average of 25 letters/numbers (maximum) per nameplate.

3. Use size #6 for terminal cabinets and control panels.

4. Use size #9 for equipment in mechanical rooms.

5. Facilities Inspection Program (FIP) identification:

1. General: use system of Main Identifier, Source Identifier, Destination Identifier.

2. Equipment and Mechanical Rooms: Main Identifier: size #9; Source and Destination Identifiers: size #5.

3. Elsewhere: Sizes as appropriate.

2.3. PIPING

1. General

1. To CGSB 24-GP-3a.

2. Identify medium by lettered legend, classification by primary and secondary colours, direction of flow by arrows.

2. Sizes:

1. Legend: block capitals to following table:

Outside Dia. of Pipe or Insulation mm	in	Size of Letters mm	in
30	1-1/4	13	1/2
50	2	19	3/4
150	6	32	1-1/4
250	7	63	2-1/2
Over 250	8	88	3

2. Primary colour bands:

    1. At valves and fittings: 460 mm, 18" long.

    2. Elsewhere: 1.8 m, 42" long.

    3. Secondary colour bands: 50 mm, 2" wide, 75 mm, 3" in from one end of primary colour band.

3. Arrows:

    1. Outside diameter of pipe/insulation 75 mm and greater: 150 mm, 6" long x 50 mm, 2" high.

    2. Outside diameter of pipe/insulation less than 75 mm, 3": 100 mm, 4" long x 50 mm, 2" high.

    3. Use double headed arrows where flow is reversible.

3. Material:

    1. Paint: to CGSB 1-GP-60M.

    2. Legend markers, arrow colour bands: plastic coated cloth material with protective overcoating and waterproof contact adhesive undercoating, suitable for 100% RH and continuous operating temperature of 150°C (300°F). Apply to prepared surfaces. Wrap tape around pipe or pipe covering with ends overlapping one (1) pipe diameter.

    3. Waterproof and heat resistant plastic marker tags: for pipes and tubing 3/4" nominal and smaller.

    4. Acceptable material: Brady

4. Colours:

    1. Where not covered by table below, submit legend, primary and secondary classification colours to Consultant for approval.

5. Table:

    1. Pipe and valve identification.

Pipe Marker Legend	Valve Tag Legend	Primary Colour	Secondary Colour
Hot Water Htg Supply	H.W.H.S	Green	None
Hot Water Htg Return	H.W.H.R.	Green	None
Glycol Heating Supply	G.H.S.	Green	None

Glycol Heating Return	G.H.R.	Green	None
Gas Line	Gas	Green	None
Cold Water	C.W.	Green	None
Hot Water	H.W.	Green	None
Recirc. Hot Water	R.H.W.	Green	None

2. Legend and arrows:

    1. Black or white to contrast with primary colour.

    2. Fire protection: white on red background.

3. Fire protection system:

    1. Exposed piping identify only.

4. Natural gas:

    1. Paint entire system.

5. Low voltage control wiring installed by Division 15.

2.4. DUCTWORK

1. 2" high black stencilled letters and directional flow arrows 6" long x 2" high.

2.5. VALVES AND CONTROLLERS

1. Brass tags with 1/2" stamped code lettering and numbers filled with black paint.

2. Furnish Consultant with six identification flow diagrams of approved size for each system. Include valve tag schedule, designating number, service, function and location of each tagged item and normal operating position of valves.

2.6. CONTROLS IDENTIFICATION

1. Identify all systems, equipment, components, controls and sensors.

2. Inscription to identify function and fail-safe position.

PART 3- EXECUTION

3.1. GENERAL

1. Do identification work in accordance with CGSB 24-GP-3a except where specified otherwise.

2. Provide ULC and/or CSA registration plates, as required by respective agency.

3. Identify systems and equipment to conform to PWC, FIP.

3.2. LOCATION OF NAMEPLATES

1. In conspicuous location to facilitate easy reading from operating floor and to properly identify equipment and/or system.

2. Provide stand-offs for nameplates on hot surfaces and insulated surfaces.

3. Do not insulate or paint over plates.

3.3. PIPING

1. Locations:

    1. On long straight runs in open areas in boiler rooms, mechanical room, and tunnel so that at least one is clearly visible from any one viewpoint in operating areas or walking aisles and not at more than 15 m, 50' intervals.

    2. Adjacent to all changes in direction.

    3. At least once in each small room through which piping passes.

    4. On both sides of visual obstruction or where run is difficult to follow.

    5. On both sides of any separation such as walls, floors and partitions.

    6. Where piping is concealed in pipe chase, ceiling space, or other confined space, at entry and leaving points and adjacent to each access opening.

    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. Where this is not possible, place identification as close to valve as possible, preferably on upstream side.

    9. Legend to be easily and accurately readable from usual operating areas and all readily accessible points.

    10. Plane of legend to be approximately at right angles to most convenient line of sight with consideration of operating positions, lighting conditions, reduced visibility of colour or legends caused by dust and dirt and risk of physical damage.

3.4. DUCTWORK

1. Stencil over final finish only.

2. Locations of ductwork identification:

    1. On long straight runs in open areas in boiler rooms, equipment rooms, so that at least one is clearly visible from any one viewpoint in operating areas or walking isles and not at more than 15 m, 50' intervals.

    2. Adjacent to all changes in direction.

    3. At least once in each small room through which ductwork passes.

    4. On both sides of visual obstruction or where run is difficult to follow.

    5. On both sides of any separation such as walls, floors and partitions.

    6. Where ductwork is concealed in duct chase, or other confined space, at entry and leaving points and adjacent to each access opening.

    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 dampers. Where this is not possible, place identification as close to damper as possible, preferably on upstream side.

    9. Legend to be easily and accurately readable from usual operating areas and all readily accessible points.

    10. Plane of legend to be approximately at right angles to most convenient line of sight with consideration of operating positions, lighting conditions, reduced visibility of colour or legends caused by dust and dirt and risk of physical damage.

    11. Beside each access door.

3.5. VALVES AND CONTROLLERS

1. Secure tags with non-ferrous chains or closed "S" hooks for valves and operating controllers except at plumbing fixtures and radiation.

2. Install one copy of flow diagram and valve schedule mounted in frame with non-glare glass where directed by Consultant. Provide one copy in each operating and maintenance instruction manual.

3. Consecutively number valves system.

END OF SECTION 15190

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. Do thermal insulation in accordance with ACNBC, ASTM E96-66(1972) and ASTM C411-61 (1975).

2. Fire hazard rating:

    1. Meet NFPA 90A-2002, NFPA 225-1984 and CAN4-S102-M83 for all components of insulation system.

3. LEED Canada for New Construction and Major Renovations 2009.

1.3. DEFINITIONS

1. “CONCEALED” - insulated mechanical services in chases, furred spaces, pipe shafts or hung ceilings.

2. “EXPOSED” - will mean “not concealed” as defined herein.

PART 2- PRODUCTS

2.1. FORMED FIBROUS GLASS TO 200°C

1. Application: insulation system for piping, valves, heat exchangers, headers, fittings, etc. maximum temperature 200°C. On domestic hot water and recirculating piping, fittings and all hydronic heating hot water and glycol systems.

2. Materials:

    1. CGSB 51-GP-9M, rigid mineral fibre sleeving for piping, including foilcraft laminate packet with open mesh fibre scrim reinforcing.

    2. Acceptable materials: Knauff; Fibreglass Rigid-Wrap pipe insulation.

3. Thickness:

    1. Domestic hot water and recirculating lines – located in conditioned spaces:

Line Size Nominal	Thickness Nominal
Up to NPS 1 1/4"	25 mm (1")

NPS 1 1/2" and larger	40 mm (1 1/2")
Run-outs to fixtures	
For max. of 2.4 m (8')	25 mm (1")

2. Hydronic hot water and glycol heating media temperature up to 200°F/93°C:

Line Size Nominal	Thickness Nominal
Run-outs Up to	
3.7 m (12')	38 mm (1 1/2")
NPS 3/4" to 1 1/4"	38 mm (1 1/2")
NPS 1 1/2" to 8"	50 mm (2")

3. Steam and condensate piping systems:

Line Size Nominal	Thickness Nominal
Run-out up to 1"	63 mm (2 1/2")
NPS 1" to 4"	63 mm (2 1/2")
NPS 4" to 8"	76 mm (3")

2.2. FORMED FIBROUS GLASS WITH V.B. -14 TO 37°C

1. Application: insulation system for piping, valves, heat exchangers, headers, fittings, etc., for temperature range - 14 to 37°C. On domestic cold water, rain water leaders, above grade storm and condensate lines.

   Media Temperature 41 to 56°F / 5 to 13°C

Line Size Nominal	Thickness Nominal
Up to NPS 1 1/4"	13 mm (1/2")
NPS 1 1/2 and over	25 mm (1")

2. Materials:

   1. CGSB 51-GP-9M, rigid mineral fibre sleeving for piping, and CGBS 51-GP-52M vapour barrier jacket. Complete with factory applied foil laminate, reinforced with open mesh fibre scrim.

3. Thickness – Media temperature <41°F/<5°C:

Line Size Nominal	Thickness Nominal
Up to NPS 3/4"	13 mm (1/2")
Up to NPS 1" - 6"	25 mm (1")
NPS 8" and larger	38 mm (1 ½")

2.3. FLEXIBLE ELASTOMERIC CLOSED CELL FOAM TO 82°C

1. Application – insulation of refrigeration lines, oil cooler piping, purge lines, evaporator heads, and other parts subject to sweating.

2. Material:

1. ASTM C534, sheet self-adhering, roll type, elastomeric closed cell foam, thermal performance 0.04 W/M/C @ 24°C.

3. Acceptable Material:

1. Armstrong – AP Armaflex self-adhering sheet insulation; Rubatex

2. Insulation Thickness – 20 mm

2.4. FASTENINGS

1. Self-adhesive tape and 100% coverage lagging adhesives.

1. Self-adhesive tape rated under 25 for flame spread and under 50 for smoke development.

2. For vapour barrier:

1. Quick-setting adhesive for joints and lamps sealing of vapour barriers. Flame spread 10 smoke development 0.

2.5. JACKETS

1. Fire retardant PVC jackets:

1. Apply in all exposed areas (mechanical, boiler, storage rooms, classrooms, etc,) or other areas as noted on drawings.

2. One-piece moulded type and sheet with pre-formed shapes at elbows, tees, valves, end-caps, reducers etc. as required.

3. Fastening: Use solvent weld adhesive compatible with insulation, tacks, and/or vinyl tape of matching colour to seal laps and joints.

4. Indoor: flame/smoke rating of 25/50 or less.

5. Outdoor: UV rated material at least 0.5 mm thick.

2. Canvas:

1. Compact, firm, ULC listed, fire rated, heavy plain weave cotton fabric at 220g/m^2 (0.83 oz/sq. ft.)

2. On concealed valves and fittings use ULC listed, fire rated, plain weave cotton fabric at 120 g/m^2 (0.38 oz/sq. ft.)

3. Aluminum Outer Jacket:

1. Fabricated weather resistant coating, gauge as manufacturer's recommendation.

2. Apply to piping exposed to weather.

PART 3- EXECUTION

3.1. APPLICATION

1. Apply insulation after required tests have been completed and approved by Consultant. Insulation and surfaces shall be clean and dry when installed and during application of any finish. Apply insulation materials, accessories and finishes in accordance with manufacturer's recommendations and as specified herein.

2. On piping with insulation and vapour barrier, install high density calcium silicate block under hanger shield and metal saddle. Maintain integrity of vapour barrier over full length of pipe without interruption at sleeves, fittings and supports.

3.2. INSTALLATION

1. Install in accordance with ANSI/NFPA 90A and ANSI/NFPA 90B.

2. Perform insulation work using qualified insulation applicators, in accordance with latest trade application methods and to the Consultant’s approval.

3. Work to begin only when building is enclosed preventing insulation from getting wet due to elements such as rain, snow, construction, etc. All damaged or wet insulation to be replaced.

4. All piping (Section 15260) and ductwork (Section 15270) insulation to be continuous except at fire barriers.

5. Preformed: sectional up to NPS 12, sectional or curved segmented above NPS 12.

6. Multi-layered: staggered butt joint construction.

7. Vertical pipe over NPS 3: insulation supports welded or bolted to pipe directly above lowest pipe fitting. Thereafter, locate on 3 m, 15' centres.

8. Expansion joints in insulation: terminate single layer and each layer of multiple layers in straight cut at intervals recommended by manufacturer. Leave void of 25 mm, 1" between terminations. Pack void lightly with flexible mineral insulation.

9. Seal and finish exposed ends and other terminations with insulating cement.

10. Expansion joints in piping: provide for adequate movement of expansion joint without damage to insulation or finishes.

11. Orifice plate mounting flanges, flanges and unions at equipment, expansion joints, valves, other components requiring regular maintenance.

12. Insulation is not required for:

1. Chrome plated piping, valves and fittings.

3.3. FASTENINGS

1. Secure pipe insulation by tape at each end and centre of each section, but not greater than 1 m (36") on centres.

END OF SECTION 15260

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ASTM C411-11, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
2. CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.
3. ANSI/NFPA 90A-2012, Air Conditioning and Ventilating Systems, Installation of.
4. ANSI/NFPA 90B-2012, Warm Air Heating and Air Conditioning Systems.
5. CGSB 51-GP-10M-76, Thermal Insulation, Mineral Fibre, Block or Board, for Ducting, Machinery and Boilers.
6. CGSB 51-GP-11M-76, Thermal Insulation, Mineral Fibre, Blanket for Piping, Ducting, Machinery and Boilers.
7. CGSB 51-GP-52Ma-89, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

1.3. SHOP DRAWINGS

1. Submit shop drawings in accordance with Section 01300 - Submittals.
2. Submit for approval manufacturer's catalogue literature related to installation.

1.4. DEFINITIONS

1. For purposes of this section:
    1. "CONCEALED" - insulated mechanical services and equipment in hung ceilings and non-accessible chases and furred spaces.
    2. "EXPOSED" - will mean "not concealed" as defined herein.

PART 2 - PRODUCTS

2.1. GENERAL

1. All components of insulation system to have maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with CAN/ULC-S102.

2. Materials to be tested in accordance with ASTM C411.

2.2. D-2 MINERAL FIBER BLANKET WITH VAPOUR BARRIER MINUS 40 TO PLUS 150°F

1. Application: on round or oval ducting, either cold or dual temperature.

    1. Supply air conditioning ducting with exception of where exposed to conditioned space.

    2. Fresh air intake from louvre to HRV, ERV and A/H units.

    3. Exhaust and relief air ducting from HRV, ERV and A/H units to exhaust louvre or hood.

    4. Exhaust air from exhaust fan, hood.

    5. Or as indicated.

2. Material:

    1. CGSB 51-GP-11M, mineral fiber blanket; CGSB 51-GP-52M for vapour barrier.

    2. Acceptable material: Fibreglass MDS 103

3. Thickness: 25 mm, 1"

2.3. D-3 MINERAL FIBER BLANKET - ELEVATED TEMPERATURE TO 537°C (1000°F)

1. Application:

    1. Boiler breeching and boiler vent stack - round.

2. Material:

    1. CGSB 51-GP-11M inorganic glass fiber bonded by high temperature thermosetting resin.

3. Thickness: 50 mm (2").

2.4. D-4 MINERAL FIBER RIGID WITH VAPOUR BARRIER TO 65°C

1. Application: on cold or dual temperature rectangular ducting.

    1. Supply air conditioning ducting with exception of where exposed in conditioned space.

2. Fresh air intakes from louvre to HRV, ERV and A/H units.

3. Exhaust and relief air ducting from HRV, ERV and A/H units to exhaust louvre or hood.

4. Exhaust air from exhaust fan, hood.

5. Or as indicated.

2. Material:

1. CGSB 51-GP-10M, rigid mineral fiber board; CGSB 51-GP-52M vapour barrier, jacket and facing material.

2. Acceptable material: Fibreglass MDS 101

3. Thickness:

1. One 25 mm, 1" layer on: supply return and exhaust air ducts.

2. Two-1 1/2" layers on: intake ducts, supply and return ductwork installed on roof or outside.

2.5. FASTENINGS

1. Tape: self adhesive, 100 mm, 4" wide, aluminum, ULC labelled for less than 25 flame spread and less than 50 smoke developed.

2. Contact adhesive: quick-setting.

3. Lap seal adhesive: quick-setting for joints and lap sealing of vapour barriers.

4. For Canvas:

1. Washable adhesive for cementing canvas lagging cloth to duct insulation.

5. Pins.

1. Weld pins 4 mm, 3/16" diameter, with 40 mm, 1 1/2" diameter head for installation through the insulation. Length to suit thickness of insulation.

2.6. JACKET

1. Canvas.

1. Apply in exposed areas (boiler, mechanical, electrical, IT rooms and other areas as noted on drawings): ULC listed, fire rated, plain weave, cotton fabric at 220 g/m^2.

2. Acceptable material: Fatal Thermo Canvas

2. Aluminum Outer Jacket:

    1. Fabricated weather resistant coating, 24 gauge with rising seams.

    2. Apply to ductwork exposed to weather.

    3. Apply to breeching, chimney insulation.

PART 3– EXECUTION

3.1. APPLICATION

1. Apply insulation after required tests have been completed and approved by Consultant. Insulation and surfaces shall be clean and dry when installed and during application of any finish. Apply insulation materials, accessories and finishes to manufacturer's recommendations and as specified.

2. Vapour barriers and insulation to be unbroken over full length of duct or surface, without penetration for hangers, standing duct seams and without interruption at sleeves and supports.

3. Use stand-offs for all duct mounted control accessories.

4. Apply 1 mm. 20 ga galvanized sheet metal corners to all ductwork in mechanical rooms.

3.2. INSTALLATION

1. General:

    1. Install in accordance with ANSI/NFPA 90A and ANSI/NFPA 90B.

    2. Perform insulation work using qualified insulation applicators, in accordance with latest trade application methods and to the Consultant’s approval.

    3. Work to begin only when building is enclosed preventing insulation from getting wet due to elements such as rain, snow, construction, etc. All damaged or wet insulation to be replaced.

    4. All piping (Section 15260) and ductwork (Section 15270) insulation to be continuous except at fire barriers.

    5. Adhere and seal vapour barrier using vapour seal adhesives.

    6. Stagger longitudinal and horizontal joints, on multilayered insulation.

2. Mechanical fastenings:

    1. On rectangular ducts, use 50% coverage of insulating cement and weld pins at not

more than 200 mm, 8" centres, but not less than 2 rows per side and bottom.

END OF SECTION 15270

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ANSI/NFPA 10, Portable Fire Extinguishers.
2. CAN4-S508, Rating and Fire Testing of Fire Extinguishers.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.

PART 2- PRODUCTS

2.1. MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS

1. Cartridge operated type or Stored pressure rechargeable type with hose and shut-off nozzle, ULC labelled for A, B and C class protection. Size 4.5 kg 4-A, 60-BC rated.

2.2. EXTINGUISHER BRACKETS

1. Type recommended by extinguisher manufacturer.

2.3. FIRE EXTINGUISHER CABINETS

1. Flush type or semi recessed as indicated, constructed of 1.6 mm (16 GA) thick steel, 180° opening door of 2.5 mm (12 GA) thick steel with latching device.
2. Cabinet to maintain fire resistive rating of construction in which they occur.
3. Cabinet door: with glass.
4. Finish:

1. Tub: prime coated.

2. Door and frame: brushed stainless steel.

2.4. IDENTIFICATION

1. Identify extinguishers in accordance with recommendations of ANSI/NFPA 10 CAN4-S508.

2. Attach bilingual tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install or mount extinguishers in cabinets or on brackets as indicated.

2. Install fire safety blankets as indicated.

END OF SECTION 15305

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. All brass, bronze fittings and valves shall be “Lead Free Design”.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.

1.3. SHOP DRAWINGS

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following: valves.

PART 2- PRODUCTS

2.1. PIPING

1. Domestic hot, cold and recirculating tubing, within building.
    1. Above ground: copper tube, hard drawn, type L: to ASTM B88M-16.
    2. Buried: soft copper tube, type K soft, with silfoss soldered joints: to ASTM B88M-16.

2.2. FITTINGS

1. Brass or bronze flanges and flanged fittings: to ASME B16.24-2016.
2. Brass or bronze threaded fittings: to ASME B16.15-2013.
3. Cast bronze to ASME B16.18-2012 or wrought copper and bronze to ASME B16.22-2013.

2.3. JOINTS

1. Solder, tin antimony, 95:5 to ASTM B32-08 (2014) or approved type lead free.

2.4. VALVES

1. For Sizes 50mm (2”) and under 1034KPA (150psig) 600 WOG,

    1. Brass Body to NSF/ANSI 61-G (Lead Free Brass) Full Port, PTFE Seats, Double ”O” Ring or Teflon packing. TEA Plated Forged Brass C49300 Vented Solid Ball, Blowout Proof Stem, Lever handle.

    2. Standard of Acceptance:

        1. Kitz 859 (Solder) Kitz 858 (NPT) or approved Equal

2. NPS 2 1/2 and over, grooved ends:

    1. Epoxy Coated Cast Iron Body Grooved ends, Teflon Fused Solid Ball, Full Port Rated 200 WOG @200F Class VI shutoff, 100% Lead Free,Ansi,NSF61-8

    2. Acceptable material: American 3700V or Approved Equal

        1. Option American 3700 Flanged end connection 2” to 8” or Approved Equal

2.5. SWING CHECK VALVES

1. Check Valves- Back Flow Prevention

    1. For sizes 50mm (2”) and under, 860kPa (125psig) 200WOG. Bronze body to ASTM C89530 (Lead Free Bronze) Screwed Cap C49300 (Lead Free Brass) Integral Seat, PTFE Disc.

        1. Swing “ Y” Pattern

        2. Screwed Ends Kitz 822T

        3. Soldered Ends Kitz 823T

    2. For sizes 65mm (2 ½”) and over use Class 150 Stainless Steel A351 CF8M Body, Trim#10, Bolted Cover PTFE Gasket, Flanged.

        1. Swing Check Flanged Kitz 150UOAM or Approved Equal

        2. Option:

            1. Wafer Check
            2. Stainless Steel, A351 CF8M Body, Class 150, 316 Stainless steel Trim

        3. Single Flapper – Moygro W15A-666 or Approved Equal

        4. Double Door

            1. Stainless Steel A351 CF8M body, Class 150, 316 Stainless steel Trim

        5. Mueller Steam Specialty Model # 72HHHTH, or Approved Equal.

2.6. DOMESTIC BALANCING VALVES

1. Lead free 200psi. Non-shock cold working pressure, NSF/ANSI 61 and 372 certified. NIBCO PC-1810-LF or approved equal.

PART 3- EXECUTION

3.1. INSTALLATION

1. Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.

2. Install tubing close to building structure to minimize furring, conserve head room and space. Group exposed piping and run parallel to walls.

3. Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.

4. Lay buried tubing in accordance with AWWA Class "B" bedding.

5. Isolate equipment, fixtures and branches with gate valves.

6. Provide necessary chemicals and equipment and disinfect system to requirements of authority having jurisdiction.

7. Coordinate with the Building Inspector to witness tests and inspect work.

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.
2. LEED Canada for New Construction and Major Renovations 2009.

PART 2- PRODUCTS

2.1. COPPER TUBE AND FITTINGS

1. Above ground sanitary and vent Type DWV to: ASTM B306-13 up to 2 1/2".
    1. Fittings.
        1. Cast brass: to CSA B158.1-1976.
        2. Wrought copper: to ANSI B16.29-2012.
    2. Solder: tin-lead, 50:50, to ASTM B32-08, type 50A.

2.2. CAST IRON PIPING AND FITTINGS

1. Above ground sanitary storm and vent: to CAN3-B70-M86 3" and larger.
    1. Joints.
        1. Mechanical joints.
            1. Neoprene or butyl rubber compression gaskets with stainless steel clamps.
    2. Cast iron couplings.
        1. Complete with neoprene gaskets and stainless steel bolts and nuts.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Install buried pipe on 6" bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. Backfill with 6" of clean washed sand.

2. Install piping parallel and close to walls and ceilings to conserve headroom and space, and to grade indicated.

3. Coordinate with the Building Inspector to witness tests and inspect work.

END OF SECTION 15413

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.

2. LEED Canada for New Construction and Major Renovations 2009.

PART 2- PRODUCTS

2.1. PIPING AND FITTINGS

1. For buried sanitary storm and vent piping up to NPS3 to:

    1. CAN3-B181.2-M87 for PVC DWV with solvent weld joints.

2. For buried sanitary and storm piping NPS 4 and larger to:

    1. CAN/CSA-B182.1 and B182.2, BNQ 3624-130DR35. With Ring-Tite joints.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install buried pipe on 6" bed of washed clean sand, shaped to accommodate fittings, to line and grade as indicated. Backfill with washed clean sand.

2. Pipe referenced in this section for **below grade only**. For above grade refer to Section 15413.

3. Provide ULC or Warnock Hersey listed and labelled fire seals at penetration of fire rated walls, ceilings, etc.

4. Do not install in ceiling spaces used as return air plenums.

5. Installation shall be in accordance with manufacturer's instructions and building code.

6. Coordinate with the Building Inspector to witness tests and inspect work.

END OF SECTION 15414

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.

2. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS

1. Submit shop drawings in accordance with Section 01300 - Submittals.

1.4. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.

2. Indicate dimensions, construction details and materials for the following: floor drains, backflow preventers, hose bibbs, strainers, traps, trap seal primer.

1.5. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.

2. Data to include:

    1. Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

    2. Details of operation, servicing and maintenance.

    3. Recommended spare parts list.

PART 2- PRODUCTS

2.1. FLOOR DRAINS

1. Floor drains and trench drains: to CAN3-B79.

2. Type I: general duty; cast iron body round, adjustable head, nickel bronze strainer, integral seepage pan, and clamping collar.

    1. Acceptable material: Zurn ZN 401B; Watts FD-100-C-A.

3. Type II: general duty where sheet vinyl flooring is used. Cast iron body round, adjustable head, nickel bronze strainer, integral seepage pan, clamping ring suitable for sheet vinyl flooring.

    1. Acceptable material: Zurn ZN-211-R6; Watts FD-200-FC.

4. Type III: combination funnel floor drain; cast iron body with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral funnel.

    1. Acceptable material: Zurn 401B; Watts FD-100-C-EG.

5. Type IV – Shower drain – cast iron body with rectangular 4” x 8” polished nickel bronze strainer, clamping collar, 4” threaded end for strainer, bottom outlet.

    1. Acceptable Material: Zurn #ZN-400-J and ZN-211.

2.2. ROOF DRAINS

1. Standard roof drain with cast iron body with cast iron dome, under-deck clamp to suit roof construction, flashing clamp ring with integral gravel guard.

    1. Acceptable Material: Zurn Z100, Enpoco E2600, Smith 1010.

2.3. CLEANOUTS

1. In floors:

    1. Line size for NPS 2, NPS 3 and NPS 4 and NPS 4 in larger lines

2. Consisting of:

    1. Seal and test plug

    2. Cast iron body with clamp and collar

    3. In unfinished areas:

        1. cast iron frame heavy duty scoriated cast iron round or square tractor cover and internal plug, and

    4. In finished areas:

        1. nickel bronze frame and round or square nickel bronze adjustable access cover

2. recessed for tile infill in tiled areas

3. recessed for carpet infill in carpeted areas

4. deeply recessed for terrazzo infill in terrazzo finished areas, and with

5. extended flange around frame in areas with monolithic floor finishes.

3. Standard of Acceptance: J.R. Smith 4000 series; Mifab C1100 series; Zurn Z-1400 series.

1. In exposed areas, ceiling spaces and accessible pipe chases:

1. Cast iron caulking ferrule with neoprene jacket and plug secured to body with cap screws.

2.4. WALL HYRDANTS

1. Concealed key operated non-freeze type with:

1. vacuum breaker,

2. stainless steel or bronze box,

3. hinged locking door,

4. galvanized casing, and

5. adjustable wall flange.

6. Standard of Acceptance: J.R. Smith 5509QT; Mifab MHY-26; Zurn Z-1320.

2. Key operated non-freeze type with:

1. bronze face,

2. galvanized casing and

3. adjustable wall flange

4. Standard of Acceptance: J.R. Smith 5609QT; Mifab MHY-16; Zurn ZN-1321

2.5. WATER HAMMER ARRESTERS

1. Stainless steel construction with precharged air chamber of nesting bellows.

2. Selected in accordance with Plumbing and Drainage Institute Standard PD1-WH201.

3. Standard of Acceptance: J.R. Smith Hydrotrol 5000 series; Mifab WHB series; Zurn Shocktrol Z-1700 series

2.6. PRESSURE REDUCING VALVES

1. Self-contained type with:

    1. bronze body,

    2. single renewable nickel alloy seat and resilient disc,

    3. diaphragm suitable for 90°C service,

    4. close coupled bronze strainer with stainless steel screen.

2. Standard of Acceptance: Watts, Zurn, Fisher Controls, Conbraco.

2.7. BACK FLOW PREVENTERS

1. Reduced pressure principle type: to CSA B64.11.

2. Double check valve assembly: to CAN3-B64.6/B64.7.

3. Back flow preventer with intermediate atmospheric vent: to CSA B64 Series-2011.

2.8. VACUUM BREAKERS

1. Atmospheric vacuum breaker: to CSA B64 Series-2011.

2. Hose connection vacuum breaker: to CSA B64 Series-2011.

2.9. TRAP SEAL PRIMERS

1. All brass, with integral vacuum breaker, pressure drop (3-5 psi) activated, NPS 1/2 solder ends, NPS 1/2 drip line connection, to be "lead free", NSF 61.

2. Acceptable material: PPP PR-500, MIFAB M500, J.R. Smith 2694 Series.

2.10. STRAINERS

1. 100 psi, Y type with 20 mesh, monel, bronze or stainless steel removable screen.

2. NPS 2 and under, bronze body, screwed ends, with brass cap.

    1. Acceptable material: Watts 7775, Mueller LF351

3. NPS 2 1/2 and over, cast iron body, flanged ends, with bolted cap.

    1. Acceptable material: Watts, Zurn, Mueller LF358

PART 3– EXECUTION

3.1. INSTALLATION

1. Install in accordance with manufacturer's instructions and as specified.
2. Coordinate with the Building Inspector to witness tests and inspect work.

3.2. CLEANOUTS

1. Install at base of soil and waste stacks, and rainwater leaders and at changes in direction. .
2. Extend cleanouts flush to wall or finished floor unless serviceable from below floor.
3. Install cleanouts located in floors clear of obstructions.

3.3. WALL HYDRANTS

1. Install 600 mm above finished grade.

3.4. WATER HAMMER ARRESTERS

1. Select and install in accordance with PDI-WH 201 on branch supplies to each fixture or group of fixtures.

3.5. PRESSURE REDUCING VALVES

1. Install with shut-off valve upstream and 115 mm dia. pressure gauge downstream.

3.6. BACK FLOW PREVENTORS

1. Install and test in accordance with CSA B64.10-11, where indicated and elsewhere as required by code. Submit Certification.
2. Pipe discharge to nearest drain or service sink.

3.7. TRAP SEAL PRIMERS

1. Install on cold water supply to nearest plumbing fixture, in concealed space.
2. Install soft copper tubing to floor drain.
3. Use distribution units as required.

3.8. STRAINERS

1. Allow sufficient room to remove basket.

3.9. COMMISSIONING

1. After start-up, test and adjust to suit site conditions.

END OF SECTION 15430

PART 1- GENERAL

1.1. RELATED WORK

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. See Section 15430 - Plumbing Specialties and Accessories.

PART 2- PRODUCTS

2.1. PLUMBING FIXTURES AND TRIM

1. Plumbing fixtures shall be product of one manufacturer, and of same colour in any one washroom or location, unless listed otherwise.

2. Materials:

    1. Vitreous china to CSA B45.1-02 (R2013).

    2. Stainless steel fixtures to CSA B45.04-02 Class II, type 302 unless otherwise stated.

    3. Plumbing fittings to CSA B125-01.

    4. Exposed plumbing brass and metal work shall be heavy triple chromium plated.

    5. Acceptable manufacturers of same quality, appearance and colour as selected fixtures:

        Crane, Kohler, Fiat, Kindred Industries, Bradley, Symmons, American Standard, AMI, Acudor-Acorn, Zurn, MOEN Commercial.

2.2. COUNTER SINKS

1. CS #1: COUNTERTOP MOUNT SINK - SINGLE HANDLE FAUCET

    Franke Commercial #LBD6408-1/1 Double Bowl Countertop Mount Sink, 1 hole, 794 mm (31-1/4") wide x 521 mm (20-1/2") long x 203 mm (8") high deep, spillway, Counter mounted, backledge, Grade 18-10 20 GA. (0.9 mm) type 302 stainless steel, self-rimming, Satin finish rim and bowls, Mounting kit provided, Fully undercoated to reduce condensation and resonance, factory applied rim seal, 3-1/2" (89 mm) crumb cup waste assembly with 1-1/2" (38 mm) tailpiece.
    Chicago Faucets #430-ABCP Single handle Faucet, Chrome plated finish, Center hole only, ECAST construction lead free (equal or less than 0.25%) ECAST brass construction, volume control and Hot Water Limit Stop cartridge, 5.7 LPM (1.5 GPM) pressure compensating Laminar Flow (non-aerating) outlet, 241 mm (9-1/2") projection rigid cast brass spout, Single metal lever handle. McGuire #LFBV170 Faucet Supplies, Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers. McGuire #8912CB P-Trap, heavy

cast brass adjustable body, with slip nut, 38 mm (1-1/2") size, Box flange and Seamless tubular wall bend.

2.3. LAVATORIES

1. L#1: COUNTER MOUNTED SELF-RIMMING / DROP-IN BASIN - SINGLE HANDLE FAUCET

   American Standard Cadet Universal Access #9494.001.020 Basin, 3 holes, 4" (102 mm) center, 533 mm x 445 mm x 175 mm (21" x 17-1/2" x 6-7/8") high, Oval, Vitreous china, White Finish, Self-rimming / Drop-in, Side rear overflow, faucet ledge. **Provide basin rim sealant. Chicago Faucets #420-E2805-ABCP Single handle Faucet,** Chrome plated finish, ECAST construction lead free (equal or less than 0.25%) ECAST brass construction, 1.9 LPM (0.5 GPM) vandal resistant pressure compensating Econo-Flo non-aerating spray outlet, 117 mm (4-5/8") projection rigid cast brass spout, Single metal lever handle. **McGuire #155A Open Grid Drain,** cast brass one piece top, 17 GA. (1.5 mm) tubular 32 mm (1-1/4") tailpiece. **McGuire #LFH170BV Faucet Supplies,** Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers. **McGuire #8872C P-Trap,** heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, Shallow wall flange and Seamless tubular wall bend.

2. L#2: COUNTER MOUNTED SELF-RIMMING / DROP-IN BASIN - SINGLE HANDLE FAUCET - POINT OF USE THERMOSTATIC WATER MIXING VALVE (Barrier-Free)

   American Standard Cadet Universal Access #9494.001.020 Basin, 3 holes, 4" (102 mm) center, 533 mm x 445 mm x 175 mm (21" x 17-1/2" x 6-7/8") high, Oval, Vitreous china, White Finish, Self-rimming / Drop-in, Side rear overflow, faucet ledge. Provide basin rim sealant. **Chicago Faucets #420-E2805-ABCP Single handle Faucet,** Chrome plated finish, ECAST construction lead free (equal or less than 0.25%) ECAST brass construction, 1.9 LPM (0.5 GPM) vandal resistant pressure compensating Econo-Flo non-aerating spray outlet, 117 mm (4-5/8") projection rigid cast brass spout, Single metal lever handle. **Lawler #570-86820, Point Of Use Thermostatic Water Mixing Valve,** nickel plated bronze body, temperature adjusting spindle, 10 mm (3/8") inlets and outlet FNPT connections, Integral checks, offer temperature range between 35 °C (95 °F) and 46 °C (114.8 °F). Set valve temperature at 46 °C (114.8 °F). Provide tee, adaptors and flex. copper tubing to suit installation. Provide tempered water to hot side of faucet. **McGuire #155WC Offset Open Grid Drain,** cast brass one piece top, 17 GA. (1.5 mm) mm tubular 32 mm (1-1/4") tailpiece. **McGuire #LFH170BV Faucet Supplies,** Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers. **McGuire #8872C P-Trap,** heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, Shallow wall flange and Seamless tubular wall bend. **McGuire PROWRAP #PW2000WC Sanitary Covering vandal-resistant,** flexible seamless moulded closed-cell PVC resin, formulated with anti-microbial additive to limit the growth of fungus and bacteria, to exposed piping (to protect against heat/contusions) as per local codes.

2.4. LAUNDRY SINK

1. LT#1: SCULLERY SINK - TWO HANDLES - MANUAL FAUCET

Franke Commercial #SL2424-1/2 Single Bowl Scullery Sink, 2 hole, 8" (203 mm) center, 695 mm (27-3/8") wide x 691 mm (27-3/16") long x 889 mm (35") high deep, Floor mounted, faucet on backsplash, Grade 18-10 16 GA. (1.5 mm) type 304 stainless steel, rim and bowl polished satin finish, 229 mm (9") high backsplash, radius coved corners on front and back only, rolled rim, stainless steel tubular legs with adjustable feet, 3-1/2" (89 mm) crumb cup waste assembly with 1-1/2" (38 mm) tailpiece.
Chicago Faucets #510-GC613AL12ABCP Wall Mounted Two handles Manual Faucet, Chrome plated finish, solid brass exposed body, 3.8 LPM (1.0 GPM) @ 60 PSI Spray Valve, 12" (305 mm) swing spout with full flow outlet, Quaturn compression operating cartridge and vandal proof lever handle secondary control. **Provide service stops in accessible ceiling space. McGuire #8912CB P-Trap,** heavy cast brass adjustable body, with slip nut, 38 mm (1-1/2") size, Box flange and Seamless tubular wall bend.

2.5. WATER CLOSETS

1. WC #1**:** CADET® PRO™ ELONGATED TOILET

American Standard 215CA174.020 7381231-200.0020A Toilet - Floor mounted, Two Piece, Vitreous china, White finish, Toilet, Elongated, Gravity, Features the Cadet® flushing system, Manual, 3" flush valve, Fully-glazed 2-1/8" trapway, Polished chrome trip lever on left hand 7381231-200.0020A, Generous 9" x 8" water surface area, 1,000 g MaP Score** at 1.28 gpf, 767 x 441 x 733 mm (30-1/8" x 17-3/8" x 28-7/8") , Color match bowl caps, High Efficiency Toilet (HET), ultra-low consumption (4.8 Lpf/1.28 gpf), EverClean® surface included, PowerWash® rim scrubs bowl with each flush, Minimum 305 mm (12") rough-in from wall to the center of waste outlet, THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET, CSA B45.1-08, ASME A112.19.2.
Centoco 1500STSCCFE-001 Seat - FAST-N-LOCK, For elongated bowl, Open front, Heavy duty, For commercial applications, Polypropylene, Toilet seat, Less seat cover, Plastic commercial check hinges, and Stainless steel hinge pin, Specified in White finish, FAST-N-LOCK mounting system takes the guess work out when tightening the hardware. The specially designed fasteners in click" when the appropriate torque is reached. The bolt and nut material shall be stainless steel, Dimensions:32 mm (1-1/4") high, 473 mm (18-5/8") long, 368 mm (14-1/2") wide
McGuire LFH166LK Supply - Lead free, Premiere heavy loose supply, Chrome-plated finish, 10 mm (3/8") I.P.S. x 10 mm (3/8") outer Ø heavy stop valve, 304 mm (12") steel braided risers, Convertible loose key handle, Toilet, Shallow steel flange

2. WC #2: CADET® PRO™ RIGHT HEIGHT® ELONGATED TOILET (Barrier Free)

American Standard 215AA174.020 Toilet - Floor mounted, Two Piece, Vitreous china, White finish, Toilet, Elongated, Gravity, Features the Cadet® flushing system, Manual, 3" flush valve, Fully-glazed 2-1/8" trapway, Polished chrome trip lever on left hand 7381231-200.0020A, Generous 9" x 8" water surface area, 1,000 g MaP Score** at 1.28 gpf, 767 x 441 x 771 mm (30-1/8" x 17-3/8" x 30-3/8") , 16-1/2" rim height for accessible applications, Color match bowl caps, High Efficiency Toilet (HET), ultra-low consumption (4.8 Lpf/1.28 gpf), utilizes 20% less water, EverClean® surface included, PowerWash® rim scrubs bowl with each flush, Minimum 305 mm (12") rough-in from wall to the center of waste outlet, THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET., CSA B45.1-08, ASME A112.19.2.
Centoco 820STSFE-001 Seat - FAST-N-LOCK, For elongated bowl, Open front, Heavy duty, For commercial applications, Polypropylene, Toilet seat, With seat cover, Plastic commercial check hinges, and Stainless steel hinge pin, Specified in White finish, FAST-N-LOCK mounting system takes the guess work out when tightening the hardware. The specially designed fasteners in click" when the appropriate torque is reached. The bolt and

nut material shall be stainless steel, Dimensions:25 mm (1") high, 470 mm (18-1/2") long, 362 mm (14-1/4") wide
McGuire LFH166LK Supply - Lead free, Premiere heavy loose supply, Chrome-plated finish, 10 mm (3/8") I.P.S. x 10 mm (3/8") outer Ø heavy stop valve, 304 mm (12") steel braided risers, Convertible loose key handle, Toilet, Shallow steel flange.

2.6. EYEWASH

1. EW#1: EYE/FACE WASH, WALL MOUNTED, STAINLESS STEEL BOWL

Guardian G1750-T Emergency Equipment - Chrome-plated brass tailpiece and trap with 38 mm (1-1/2") I.P.S. connection, Eye/face wash with stainless steel bowl, Wall mounted, Corrosion resistant powder coated finish, 283 mm (11-1/8") Ø bowl size, Two FS-Plus spray heads with flip top dust cover each, 13 mm (1/2") Ø IPS Chrome plated brass stay open ball valve, 13 mm (1/2") Ø NPT female inlet, 32 mm (1-1/4") Ø NPT female outlet, Heavy duty cast aluminum wall bracket, ANSI compliant.

2.7. MIXING VALVE

1. MV#1: THERMOSTATIC MIXING VALVE MODEL 911®E/F EMERGENCY EYEWASH/FACEWASH

Lawler 911E/F-Unit 84908 Mixing Valve - Emergency mixing valve, Thermostatic High-low master water mixing valve, Rough bronze finish, 9" X 8" X 5" (229 mm X205 mm X127 mm) , Temperature adjustment shall be vandal-resistant, 7.5 LPM (2 GPM) tempered flow rate @ 5 PSI pressure drop, 11 LPM (3 GPM) tempered flow rate @10 PSI pressure drop, 18 LPM (5 GPM) tempered flow rate @ 20 PSI pressure drop, 26 LPM (7 GPM) tempered flow rate @ 20 PSI pressure drop, In the event that the liquid motor fails, the control mechanism closes off the hot water port with the reverse seat and fully opens the internal variable bypass to allow cold water flow, The control mechanism shall employ a liquid-filled thermostatic motor to drive the valve without additional power requirements. The control mechanism shall employ a stainless steel sliding piston control device with reverse seat closure and both fixed and variable cold water bypass, Listed to ASSE 1071, 32 mm (1-1/4") NPT inlet, 32 mm (1-1/4") NPT outlet, In the event of interruption of the hot water supply, the control mechanism shall allow cold flow through both the fixed and variable bypass., Outlet Thermometer, In the event of interruption of the cold water supply, the control mechanism closes off the hot water port, stopping all flow. Positive hot water shut-off, 85 F, 125 PSI max inlet pressure, 70-90 F, 120 F Recommended inlet temperature, 65 PSI recommended operating pressure, 38 LPM (10 GPM) tempered flow rate @ 40 PSI pressure drop.

2.8. SHOWER UNIT

1. SH#1: ACRYLIC SHOWER AND TRIM

Chicago Faucets #1905-VOCCP-CP Thermostatic & pressure balancing Shower Valve set, chrome plated finish, 216 mm (8-1/2") dia trim face plate, On/off and temperature control single lever handle, integral service stops, integral service stops. **Chicago Faucets #620-LCP Shower Head,** Chrome plated finish, 5.7 LPM (1.5 GPM) flow rate @ 80 psi, Pressure compensating flow control device, Swivel ball joint. **Chicago Faucets #749-016JKCP/415-021JKCP Wall Mount Shower Arm,** Round escutcheon. **Watts #FD-100-C-A Floor Drain,** epoxy coated cast iron, 5" (127 mm) adjustable round

nickel bronze strainer, reversible clamping collar with primary & secondary weepholes. **Provide P-Trap,** Same material as the connecting pipe drain. CSA B125.16. 84”h x 48”w x 32”d one piece acrylic shower c/w centre drain, 5-1/2” threshold height, 2” ABS drain with stainless steel strainer, reinforced shower base, self draining shelves, front ledge with drip lip, 30” stainless steel grab bar, and round serenity brass shower drain infinity style, chrome. Longevity Acrylic Waterford 2048. Shower to be complete with stainless steel shower rod.

2. SH#2: ACRYLIC SHOWER AND TRIM (BARRIER FREE)

Chicago Faucets #1905-VOCCP-CP Thermostatic & pressure balancing Shower Valve set, chrome plated finish, 216 mm (8-1/2") dia trim face plate, On/off and temperature control single lever handle, integral service stops, integral service stops. **Chicago Faucets #620-LCP Shower Head,** Chrome plated finish, 5.7 LPM (1.5 GPM) flow rate @ 80 psi, Pressure compensating flow control device, Swivel ball joint. **Chicago Faucets #749-016JKCP/415-021JKCP Wall Mount Shower Arm,** Round escutcheon. **Chicago Faucets #624-LCP Adjustable Hand Shower,** 5.7 LPM (1.5 GPM) flow rate @ 80 psi, Pressure compensating flow control device. **Chicago Faucets #9800-036CP Hand Shower Grab Bar/Slide Bar Combination,** Chrome plated finish Stainless steel construction, 38 mm (1-1/2") dia x 914 mm (36") high bar, Adjustable bracket for personal shower, locking wall flanges, Includes mounting hardware. **Chicago Faucets #24-59NF Hand Shower Metal Hose 1501 mm (59.1") long. Chicago Faucets #E24JKCP Hand Shower In-Line Vacuum Breaker,** Installed between supply outlet and shower hose, maximum hot water temperature of 60 °C (140 °F), maximum working pressure of 861.25 kPa PSI. **Chicago Faucets #622-001CP Hand Shower Wall Supply,** Chrome plated finish, 13 mm (1/2") NPT female thread inlet, 13 mm (1/2") hose connection. **Chicago Faucets #763-CP In-Wall 3-Way Diverter Trim And Valve Kit,** Metal lever handle, brass valve construction, Rotational control to alternate water flow between three (3) different shower outlets. **Watts #FD-100-C-A Floor Drain,** epoxy coated cast iron, 5" (127 mm) adjustable round nickel bronze strainer, reversible clamping collar with primary & secondary weepholes. **Provide P-Trap,** Same material as the connecting pipe drain. 1676mm (66") w x 946mm (37 1/4") d x 2235mm (88")h one piece, barrier free, acrylic shower. Four shelves, grab bars 32mm (1 1/4") stainless steel with concealed mounting, 1016mm (40") horizontal straight grab bar, 762mm (30") horizontal straight grab bar, stainless steel drain, stainless steel shower curtain rod, and factory installed fold up seat with stainless steel supports. Mirolin AROS66L/R.

PART 3 - EXECUTION

3.1. FIXTURE INSTALLATION

1. Connect fixtures complete with supplies and drains, trapped, supported level and square. Each fixture must have lockshield valves on supplies. Hot water faucet shall be on left. Mixing faucets and thermostatically controlled mixing valves to have check valves on supplies. Fixtures on outside walls to have supplies from floor; other fixtures to be served from wall.

2. Provide chrome plated rigid supplies to fixtures with screwdriver or handwheel stops, reducers and escutcheons.

3. Provide supports, required to set fixtures level and square. Mount fixtures so that 200 lb mass will not loosen or distort mounting.

4. Provide shock absorbers for each fixture or group of fixtures.

5. Mounting heights for wall hung fixtures and showers measured from finished floor:

    1. Standard: to comply with manufacturers roughing-in details and Ontario Building Code, unless otherwise indicated or specified.

    2. Physically handicapped: to comply with OBC 2012.

6. Installation to follow manufacturer installation instructions/recommendations.

7. Test all devices and equipment.

END OF SECTION 15440

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ANSI/ASME Boiler and Pressure Vessel Code, Section VIII Pressure Vessels - 1992.
2. ASTM A53-90a, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
3. ASTM A181/181M-87, Specification for Forgings, Carbon Steel, for General Purpose Piping.
4. ANSI/ASME B16.5-1988, Pipe Flanges and Flanged Fittings.
5. ANSI/ASME B16.11-1991, Forged Steel Fittings, Socket-Welded and Threaded.
6. CSA B51-03 - Boiler, Pressure Vessel, and Pressure Piping Code.

1.3. SHOP DRAWINGS

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate:
    1. Equipment including connections, piping and fittings, valves, strainers, control assemblies and ancillaries, identifying factory and field assembled.
    2. Complete wiring diagrams including schematics.
    3. Dimensions, construction details, materials, recommended installation and support, mounting bolt holes, sizes and locations, and point loads.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.
2. Data to include:
    1. Description of equipment giving manufacturer's name, type, model year, capacity and serial numbers.
    2. Details of operation, servicing and maintenance.

3. Recommended spare parts list.

PART 2- PRODUCTS

2.1. AIR COMPRESSOR – Existing to be reused

2.2. PIPING

1. Piping: to ASTM A53, schedule 40 welded black steel.

2. Fittings:

    1. NPS 3" and smaller: to ANSI/ASME B16.11, schedule 40 steel, screwed, or to ANSI/ASME B16.3, malleable iron, screwed.

    2. NPS 2 1/2 and larger: to ANSI/ASME B16.11, schedule 40 steel, butt or socket welded.

3. Couplings: to ANSI/ASME B16.11, socket welded or threaded half coupling type.

4. Unions: 3447 kPA malleable iron with brass-to-iron ground seat.

5. Dissimilar metal junctions: use dielectric unions.

6. Flanges:

    1. NPS 2 and smaller: to ANSI/ASME B16.5, forged steel, raised face and socket welded.

    2. NPS 2 1/2 and larger: to ANSI/ASME B16.5, forged steel, raised face and slip-on or weld neck.

7. Joints:

    1. NPS 2 and smaller: screwed.

    2. NPS 2 1/2 and larger: welded.

2.3. BALL VALVES

1. Three piece design or top entry for ease of in-line maintenance.

    1. To ASTM A181/A181M, Class 70, carbon steel body, screwed ends, carbon steel ball and associated trim suitable for compressed air application.

    2. To withstand 1034 kPa maximum pressure.

2. Acceptable Material: Jamesbury style BWS 2277, Worcester Valve Fig. 4404466TT-SW,

Newman Hattersley Fig. 1969; MAS (MA Stewart) #CSS-F-3-N.

2.4. COUPLERS/CONNECTORS

1. Industrial interchange series, full-bore.
2. Maximum inlet pressure: 1700 kPa.
3. Valve seat: moulded nylon.
4. Body: zinc plated steel.
5. Threads: NPT.
6. Acceptable Material: ARO

PART 3- EXECUTION

3.1. COMPRESSOR STATION

1. Install on vibration isolators on housekeeping pad as indicated.

3.2. COMPRESSED AIR LINE FILTER

1. Install on discharge line from refrigerated air dryer.

3.3. MAIN AIR PRESSURE REGULATORS

1. Install at air compressor station.
2. Install additional regulators on connections to equipment as indicated.

3.4. COMPRESSED AIR PIPING INSTALLATION

1. Install flexible connection in accordance with Section 15516 - Flexible Connections, Expansion Joints, Anchors and Guides.
2. Apply and coordinate for TSSA approval. Submit all required documentation, pay all costs and submit certification to Consultant.
3. Install shut-off valves at outlets, major branch lines and elsewhere as indicated.
4. Install quick-coupler chucks and pressure gauges on drop pipes.
5. Install unions to permit removal or replacement of equipment.

6. Install tees in lieu of elbows at all changes in direction of piping. Install plug in all open ends of tees.

7. Grade piping at 1% slope minimum.

8. Install compressed air trap and pressure equalizing pipe at each moisture collecting point. Drain pipe to nearest floor drain.

9. Make branch connections from top of main.

10. Install compressed air trap at bottom of each riser and at low points in mains, piped to nearest drain. Distance between drain points to be 30 m maximum.

11. Provide automatic condensate drains for refrigerated air dryer and compressor.

12. Welded steel piping.

    1. To ASME Code and requirements of authority having jurisdiction.

    2. Weld all concealed and inaccessible piping regardless of pipe size.

13. Cleaning:

    1. Blow out all piping to clean interior thoroughly of all oil and foreign matter.

14. Testing:

    1. Pressure test in accordance with requirements of Section 15010 - Mechanical General Requirements, for 4 h minimum, to 1100 kPa, with outlets closed and with compressor isolated from system. Pressure drop not to exceed 10 kPa.

15. Commissioning:

    1. Commission system and demonstrate operation to satisfaction of Consultant.

END OF SECTION 15486

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do work in accordance with:
    1. SMACNA HVAC Duct Construction Standards, Metal and Flexible, 2005.
    2. SMACNA HVAC Duct Leakage Test Manual, 2012 Edition.
    3. ASHRAE Handbook, Fundamentals, and Systems Volumes.
    4. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate following:
    1. Sealants
    2. Tape
    3. Proprietary Joints

1.4. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

PART 2– PRODUCTS

2.1. CLASSIFICATION

1. Ductwork classification as follows:

Maximum Pressure		SMACNA Seal
Pa	" WG	Class

500	2	B
250	1	C
125	0.5	C

2.2. SEAL CLASSIFICATION

1. Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

2. Class B: longitudinal seams, transverse joints and connections made airtight with sealant tape or combination thereof.

3. Class C: transverse joints and connections or made air tight with gaskets, sealant tape or combination thereof. Longitudinal seams unsealed.

4. Unsealed seams and joints.

2.3. SEALANT

1. Sealant: water based polymer type flame resistant duct sealant. Temperature range of minus 30°C to plus 93°C.

    1. Acceptable material: Duro-Dyne DWN/water based, 3M Fastbond 900.

2.4. TAPE

1. Tape: polyvinyl treated, open weave fiberglass tape, 50 mm (2") wide.

    1. Acceptable material: Duro-Dyne

2.5. DUCT LEAKAGE

1. In accordance with SMACNA HVAC Duct Leakage Test Manual, 2012 Edition.

2. In accordance with ASHRAE 90.1

2.6. FITTINGS

1. Fabrication: to SMACNA.

2. Radiused elbows: standard radius and or short radius with single thickness turning vanes.

3. Square elbows: to 460 mm (18") with single thickness turning vanes.

4. Square elbows: over 460 mm (18") with double thickness turning vanes.

5. Main supply duct branches with splitter damper.

6. Sub branch duct with 45° entry and balancing damper on branch or sub branch duct with square connection, volume extractor and branch duct balancing damper.

7. Transitions:

    1. Diverging: 20° maximum included angle.

    2. Converging: 30° maximum included angle.

8. Offsets: square elbows or full radiused elbows.

9. Obstruction deflectors: maintain full cross-sectional area. Maximum included angles as for transitions.

2.7. FIRESTOPPING

1. Retaining angles all around duct, on both sides of fire separation.

2. Firestopping material and installation must not distort duct.

2.8. GALVANIZED STEEL

1. Lock forming quality: to ASTM A525M-86, Z90 zinc coating.

2. Thickness: to ASHRAE and SMACNA.

3. Fabrication: to ASHRAE and SMACNA.

4. Joints: to ASHRAE and SMACNA or proprietary manufactured duct joint.

    1. Acceptable material: Duct-Mate

2.9. HANGERS AND SUPPORTS

1. Strap hangers: of same material as duct, but next sheet metal thickness heavier than duct.

2. Hanger configuration: to ASHRAE and SMACNA. Maximum size duct supported by strap hanger 20".

3. Hangers: galvanized steel angle with black steel rods to ASHRAE and SMACNA.

PART 3– EXECUTION

3.1. GENERAL

1. Install ducts in accordance with ASHRAE and SMACNA.

2. Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 100 mm (4") beyond insulated duct.

3. Support risers in accordance with ASHRAE and SMACNA.

4. Install breakaway joints in ductwork on each side of fire separation.

3.2. HANGERS

1. Strap hangers: install in accordance with SMACNA.

2. Angle hangers: complete with locking nuts and washers.

3. Hanger spacing: in accordance with ASHRAE.

3.3. WATERTIGHT DUCT

1. Provide watertight duct for:

    1. Fresh air intake.

    2. Range hood exhaust.

    3. Dishwasher exhaust

    4. Shower areas.

    5. As indicated.

2. Form bottom of horizontal duct without longitudinal seams. Seal all other joints with duct sealer.

3. Slope horizontal branch ductwork down towards hoods served. Slope header ducts down toward risers.

4. Fit base of riser with 100 mm (4") deep drain sump and 1 1/4" drain connected, with deep seal trap and discharging to open funnel drain.

3.4. LEAKAGE TESTS

1. In accordance with SMACNA HVAC Duct Leakage Test Manual, 2012 Edition.

2. Make trial leak test to demonstrate workmanship.

3. Install no additional ductwork until trial test has been passed.

4. Test section minimum of 30 m (100') long with not less then 3 branch takeoffs and 2 90° elbows.

5. Conduct leak testing in accordance with Air Balance Council (AABC) recommended procedures – See Section 15990.

3.5. SEALING AND TAPING

1. Apply sealant to outside of joint to manufacturer's recommendations.

2. Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturer’s recommendations.

END OF SECTION 15891

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. AMCA 99-10, Standards Handbook.
2. AMCA 210-07, Laboratory Methods of Testing Fans for Rating.
3. AMCA 300-08, Reverberant Room Method for Sound Testing of Fans.
4. AMCA 301-06, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
5. CGSB 1-GP-181M, Coating, Zinc Rich, Organic, Ready Mixed.
6. ASHRAE Standard 51-2007 -- Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI/ASHRAE Approved) (ANSI/AMCA Standard 210-07)
7. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Product data to include fan curves and sound rating data, showing point of operation.
3. Indicate the following: motors, wheels, bearings, shafts and enclosures.

1.4. OPERATION AND MAINTENANCE DATA

1. Provide operation and maintenance data for incorporation into manual specified in Section 01300 - Submittals.

1.5. MAINTENANCE MATERIALS

1. Provide maintenance materials in accordance with Section 01300 – Submittals.
    1. Spare parts to include:
        1. Matched sets of belts.
        2. Furnish list of individual manufacturer’s recommended spare parts for

equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

1.6. MANUFACTURED ITEMS

1. Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards in force.

2. Provide confirmation of testing.

PART 2– PRODUCTS

2.1. FANS – GENERAL

1. Capacity, total static pressure, revolutions per minute, power, model, size, sound power data and as indicated.

2. Sound ratings: comply with AMCA (Air Moving and Conditioning Association) 301, tested to AMCA 300. Unit shall bear AMCA certified sound rating seal.

3. Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.

4. Performance ratings: based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51. Unit shall bear AMCA certified rating seal, except for propeller fans smaller than 12" diameter.

5. Motors: for use with variable speed controllers where indicated.

6. Motors: sizes as indicated.

7. Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, coupling guards, fan inlet outlet safety screens, outlet dampers and vanes as indicated.

8. Factory primed before assembly in colour standard to manufacturer.

9. Scroll casing drains: as indicated.

10. Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

11. Provide 18” high roof curbs for all roof mounted fans, unless otherwise specified.

12. Flexible connections: to Section 15911 - Duct Accessories.

13. Acceptable Product: Penn, Cook, Jenco, Greenheck, Broan, Nutone.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install fans as indicated, complete with resilient mountings supplied by manufacturer.

2. Install fan restraining snubbers as indicated.

3. Install fan complete with vibration isolation, flexible electrical wiring, flexible duct connections to inlet and discharge air ductwork.

4. Flexible connections shall not be in tension during running.

5. Provide sheaves and belts required for final air balance.

END OF SECTION 15860

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do work in accordance with the following standards except where specified otherwise:
    1. CAN/ULC S110-13 for fire tests for air ducts.
    2. UL 181-2013 for factory made air ducts and connectors.
    3. NFPA 90A-2012 for installation of air conditioning and ventilating systems.
    4. NFPA 90B-2012 for installation of warm air heating and air conditioning systems.
    5. SMACNA HVAC Duct Construction Standards - Metal and Flexible, 1995.
    6. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Thermal properties.
    2. Friction loss.
    3. Acoustical loss.
    4. Leakage.
    5. Fire rating.

1.4. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

1.5. SAMPLES

1. Submit samples with product data of each different type of flexible duct being used in

accordance with Section 01300 - Submittals.

PART 2– PRODUCTS

2.1. GENERAL

1. Factory fabricated.
2. Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.
3. Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2. METALLIC - UNINSULATED

1. Spiral wound flexible aluminum.
2. Performance:
    1. Minimum working pressure: 2500 Pa (10"WG)
    2. Maximum relative pressure drop coefficient: 3.
3. Acceptable material: Flexmaster triple lock.

2.3. METALLIC - INSULATED

1. Spiral wound flexible aluminum with factory applied flexible glass fibre thermal insulation with vapour barrier and aluminum jacket.
2. Performance:
    1. Minimum working pressure: 2500 Pa (10" WG)
    2. Maximum relative pressure drop coefficient: 3.
3. Acceptable material: Flexmaster

PART 3– EXECUTION

3.1. DUCT INSTALLATION

1. Install where indicated and in accordance with SMACNA.
2. Support in accordance with SMACNA.
3. Maximum length of flexible duct: 1.8 m, 6' for diffuser / grille duct connection.

END OF SECTION 15893

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Flexible connections.
    2. Sealants and tapes.
    3. Duct access doors.
    4. Turning vanes.
    5. Instrument test ports.

1.3. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

PART 2– PRODUCTS

2.1. FLEXIBLE CONNECTIONS

1. Frame: galvanized sheet metal frame 16 GA, 1.6 mm, with fabric clenched by means of double locked seams.
2. Material:
    1. Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40°F to plus 200°F, density of 0.3 lb/sq.ft.
    2. Flame resistant, 0.56 mm thick vinyl coated fabric, 12 kg/m^3 fibreglass insulation for operation of 82°C continuous – connections for insulated duct system, less than 250 mm dia or less than 300 mm – negative pressure duct connection.
        1. Duro-Dyne-Insulflex

3. Silicon rubber coated woven fibreglass fabric to UL 214 for operation up to 260°C – for fume hood exhaust systems.

    1. Duro-Dyne-Thermafab.

2.2. ACCESS DOORS IN DUCTS

1. Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

2. Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

3. Gaskets: neoprene or foam rubber.

4. Hardware:

    1. Up to 250 mm x 250 mm, 12 x 12": 2 sash locks complete with safety chain.

    2. 275 to 460 mm, 13 to 18": 4 sash locks complete with safety chain.

    3. 485 mm to 910 mm, 19 to 36": piano hinge and minimum 2 sash locks.

    4. Doors over 920 mm, 37": piano hinge and 2 handles operable from both sides.

    5. Hold open devices.

    6. 250 mm x 250 mm, 12" x 12": glass viewing panels.

2.3. TURNING VANES

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

2.4. INSTRUMENT TEST PORTS

1. 1.6 mm, 16 GA steel zinc plated after manufacture.

2. Cam lock handles with neoprene expansion plug and handle chain.

3. 1" minimum inside diameter. Length to suit insulation thickness.

4. Neoprene mounting gasket.

PART 3– EXECUTION

3.1. INSTALLATION

1. Flexible connections.
    1. Install in following locations:
        1. Inlets and outlets to supply air units and fans.
        2. Inlets and outlets of exhaust and return air fans.
        3. As indicated.
    2. Length of connection: 6" (150 mm)
    3. Minimum distance between metal parts when system in operation: 3" (75 mm)
    4. Install in accordance with recommendations of SMACNA.
    5. When fan is running:
        1. Ducting on each side of flexible connection to be in alignment.
        2. Ensure slack material in flexible connection.
2. Access doors:
    1. Size: to allow inspection and servicing.
    2. Location:
        1. At fire and smoke dampers.
        2. At control dampers.
        3. At devices requiring maintenance.
        4. At locations required by code.
        5. At reheat coils.
        6. As indicated.
3. Instrument test ports.
    1. General:
        1. Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
    2. Locations.
        1. For traverse readings:
        2. At ducted inlets to roof and wall exhausters.

1. At inlets and outlets of other fan systems.
2. At main and sub-main ducts.
3. And as indicated.

3. For temperature readings:

1. At outside air intakes.
2. In mixed air applications in locations as approved by Consultant.
3. At inlet and outlet of coils.
4. Downstream of junctions of two converging air streams of different temperatures.
5. And as indicated.

4. Turning vanes.

1. Install in accordance with recommendations of SMACNA and as indicated.

END OF SECTION 15911

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do work in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, 1995, except where specified otherwise.

2. LEED Canada for New Construction and Major Renovations 2009.

1.3. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.

PART 2– PRODUCTS

2.1. SPLITTER DAMPERS

1. Of same material as duct but one sheet metal thickness heavier.

2. Single thickness construction.

3. Control rod with locking device.

4. Bend end of rod to prevent end from entering duct.

5. Pivot: piano hinge.

2.2. SINGLE BLADE DAMPERS

1. Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

2. Size and configuration to recommendations of SMACNA, except maximum height 9", 225 mm.

3. Locking quadrant.

4. Inside and outside end bearings.

2.3. MULTI-BLADED DAMPERS

1. Factory manufactured of material compatible with duct.

2. Opposed blade: configuration to recommendations of SMACNA.

3. Maximum blade height: 4", 100 mm.

4. Bearings: pin in bronze bushings.

5. Linkage: shaft extension with locking quadrant.

6. Channel frame of same material as adjacent duct, complete with angle stop.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install at each take off and where indicated.

2. Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

3. For supply, return and exhaust systems, volume dampers are to be located in each branch duct. Each grille, register and diffuser connection to have volume damper located as close as possible to main ducts.

END OF SECTION 15912

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ASTM A525M-87, Specification for General Requirements for Steel and Extruded Aluminum frame.
2. American Society for Testing and Materials International (ASTM)
    1. ASTM A 653/A653M-04a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
3. Health Canada/Workplace Hazardous Materials Information System (WHMIS).
    1. Material Safety Data Sheets (MSDS).
4. LEED Canada for New Construction and Major Renovations 2009.

1.3. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Pressure drop curve.
    2. Free area.

1.4. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency.

PART 2– PRODUCTS

2.1. MULTI-LEAF DAMPERS

1. Use opposed for mixing duty, parallel for tight shut-off.
2. Extruded aluminum, interlocking blades, complete with butyl rubber, extruded vinyl seals or

neoprene on blade edges and frames top and bottom and side seals.

3. Thermally broken frames and blades, frames insulated with extruded polystyrene foam with 12 2.19 or better, blades constructed from aluminum extension with internal hollows insulated with polyurethane or polystyrene foam RSI 0.88.

4. Pressure fit self-lubricated bronze bearings.

5. Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.

6. Operator: 24 V electric actuator with spring return for "fail safe" – supplied by control contractor.

7. Performance: leakage in closed position to be less than 2% of rated air flow at 1200 kPa differential across damper. Pressure drop at full open position to be less than 25 Pa differential across damper at maximum air flow.

8. Acceptable Products for insulated dampers to be Tamco 9000BF, Nailor 2020IBF, Alumavent 3960. Acceptable Products for non-insulated dampers to be Tamco 1000, Nailor 2020IB, Alumavent 3100.

2.2. BACK AND RELIEF DRAFT DAMPERS

1. Automatic gravity operated, multi-single leaf, aluminum construction with nylon bearings, centre pivotted, spring assisted.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install where indicated. Provide insulated dampers on all ducts leading to outside.

2. Install in accordance with recommendations of SMACNA and manufacturer's instructions.

3. Seal multiple damper modules with silicon sealant.

4. Upon system start-up, ensure that dampers operate properly.

END OF SECTION 15913

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. NFPA 90A-2012, Installation of Air Conditioning and Ventilating Systems.
2. CAN/ULC-S112-10, Fire Test of Fire Damper Assemblies.
3. CAN/ULC-S112.2-07, Fire Test of Ceiling Firestop Flap Assemblies.
4. ULC-S505-1974, Fusible Links for Fire Protection Service.
5. LEED Canada for New Construction and Major Renovations 2009.

1.3. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Fire dampers.
    2. Smoke dampers.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.
2. Provide following:
    1. 6 fusible links of each type.

1.5. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

PART 2– PRODUCTS

2.1. FIRE DAMPERS

1. Fire dampers: listed and bear label of ULC and meet requirements of provincial fire authority and NFPA 90A - to be dynamic type.

2. Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

3. Top hinged: interlocking type sized to maintain full duct cross section.

4. Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.

5. 40 x 40 x 3 mm (1 1/2" x 1 1/2" x 1/8") retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

6. Acceptable material: Ruskin, Alumavent, Nailor.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install in accordance with NFPA 90A and in accordance with conditions of ULC listing.

2. Fire damper assemblies to be fire tested in accordance with CAN/ULC-S112.

3. Fire stop flap assemblies to be fire tested in accordance with CAN4-S112.2.

4. Maintain integrity of fire separation.

5. After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

6. Install access door adjacent to each damper. See Section 15911 - Duct Accessories.

7. Coordinate with installer of firestopping.

8. Select interlocking curtain type blade damper frames as follows; (Width is duct dimension parallel to blades. Height is duct dimension perpendicular to blades.)

    1. Type A - folded blades completely within airstream:

        1. for rectangular ducts with both height and width greater than 300 mm, and where duct velocity is less than 7.5 m/s.

    2. Type B - folded blades out of airstream:

        1. for rectangular ducts 200 mm to 350 mm in height and width greater than

200 mm, and where duct velocity is less than 7.5 m/s.

3. Type C – folded blades and damper frame shielded with airstream impingement:

    1. for circular or flat oval ducts

    2. for rectangular duct less than 200 mm in height

    3. for rectangular duct less than 350 mm in height when width is less than 200 mm, and

    4. for rectangular ducts where duct velocity is greater than 7.5 m/s.

END OF SECTION 15914

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SUMMARY

1. Section Includes:
    1. Mechanical louvers; intakes; vents; and reinforcement and bracing for air vents, intakes and gooseneck hoods.

1.3. REFERENCES

1. American National Standards Institute (ANSI)/ National Fire Protection Association (NFPA)
    1. ANSI/NFPA 96-14, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
2. American Society for Testing and Materials International (ASTM)
    1. ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
3. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    1. Material Safety Data Sheets (MSDS).
4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

1.4. SYSTEM DESCRIPTION

1. Performance Requirements:
    1. Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

1.5. SUBMITTALS

1. Product Data:

1. Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01300 - Submittals. Include product characteristics, performance criteria, and limitations.

    1. Submit two (2) copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01300 - Submittals.

2. Indicate following:

    1. Pressure drop.

    2. Face area.

    3. Free area.

    4. Water penetration characteristic.

2. Quality assurance submittals: submit following in accordance with Section 01300 - Submittals.

    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. Engineer will make available 1 copy of systems supplier's installation instructions.

3. Test Reports:

    1. Submit certified data from independent laboratory substantiating acoustic and aerodynamic performance to ASTM E 90.

1.6. QUALITY ASSURANCE

1. Health and Safety Requirements: do construction occupational health and safety in accordance with Division 1.

1.7. DELIVERY, STORAGE, AND HANDLING

1. Packing, shipping, handling and unloading:

    1. Deliver, store and handle in accordance with Division 1.

    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 Division 1.

PART 2- PRODUCTS

2.1. SUSTAINABLE REQUIREMENTS

1. Materials and products in accordance with Division 1.

2.2. GOOSENECK HOODS

1. Thickness: to ASHRAE and SMACNA.

    1. Kitchen: to ANSI/NFPA 96.

    2. Elsewhere: to ASHRAE, SMACNA.

2. Fabrication: to ASHRAE and SMACNA.

    1. Kitchen: to ANSI/NFPA 96.

    2. Elsewhere: to ASHRAE, SMACNA.

3. Joints: to ASHRAE and SMACNA and/or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint considered class A seal.

4. Supports: as indicated.

5. Complete with integral birdscreen of 2.7 mm diameter aluminum wire. Use 12 mm mesh on exhaust 19 mm mesh on intake.

6. Vertical or Horizontal backdraft dampers as indicated.

2.3. FIXED LOUVRES - ALUMINUM

1. Construction: welded with exposed joints ground flush and smooth.

2. Material: extruded aluminum alloy 6063-T5.

3. Blade: stormproof pattern with centre watershed in blade, reinforcing bosses and maximum blade length of 1500 mm.

4. Frame, head, sill and jamb: 150 mm deep one piece extruded aluminum, minimum 3 mm thick with approved caulking slot, integral to unit.

5. Mullions: at 1500 mm maximum centres.

6. Fastenings: stainless steel SAE-194-8F with SAE-194-SFB nuts and resilient neoprene washers between aluminum and head of bolt, or between nut, ss washer and aluminum body.

7. Screen: 12 mm exhaust 19 mm intake mesh, 2 mm diameter wire aluminum birdscreen on inside face of louvres in formed U-frame.

8. Finish: factory applied enamel. Colour: to Engineer’s approval.

9. Accepted Product: Construction Specialties 4110 or Ventex.

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. In accordance with manufacturer's and SMACNA recommendations.

2. Reinforce and brace as indicated.

3. Anchor securely into opening. Seal with caulking to ensure weather tightness.

3.3. FIELD QUALITY CONTROL

1. Verification requirements in accordance with Division 1 Contractor's Verification, include:

    1. Materials and resources.

    2. Storage and collection of recyclables.

    3. Construction waste management.

    4. Resource reuse.

    5. Recycled content.

    6. Local/regional materials.

    7. Low-emitting materials.

3.4. CLEANING

1. Proceed in accordance with Division 1.

2. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION 15941

PART 1– GENERAL

1.1. SHOP DRAWINGS

1. Submit shop drawings and technical information in accordance with Section 01300 - Submittals.

2. Clearly indicate the following: material, gauge, finish, ratings and accessories.

1.2. RELATED WORK

1. Low Pressure Ductwork - Section 15891.

2. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.3. MANUFACTURED ITEMS

1. Grilles, registers and diffusers shall be product of one manufacturer.

1.4. CERTIFICATION OF RATINGS

1. Catalogued or published ratings shall be those obtained from tests carried out by an independent testing agency signifying adherence to applicable codes and standards.

PART 2– PRODUCTS

2.1. GRILLES, REGISTERS AND DIFFUSERS GENERAL

1. Sizes indicated are nominal. Provide correct standard product nearest to nominal for capacity noise level, throat and outlet velocity.

2. Furnish factory prime coated steel frames for setting into fire protecting membrane.

3. Where penetrating fire partitions, provide approved steel sleeve attached to structure and secured in accordance with NFPA 90.

4. Frame:

    1. Steel: Prime coated, cold rolled steel with exposed joints welded and ground flush, mitred corners and completely closed.

    2. Provide full perimeter sponge rubber gaskets.

3. Provide plaster frame or gypsum board.

4. Provide concealed fasteners and operators.

5. Sizes and capacities: as indicated.

6. Standard of Acceptance: E.H. Price, Krueger, Titus, Nailor Industries, Metal Aire.

2.2. SUPPLY GRILLES AND REGISTERS

1. Double deflection with horizontal face and vertical rear bars or as indicated in schedule.

2. Steel or aluminum construction.

2.3. EXHAUST GRILLES AND REGISTERS

1. Single deflection, horizontal adjustable bar type or as indicated in schedule.

2. Steel or aluminum construction.

2.4. AIR DIFFUSERS

1. Square, rectangular or linear with removable, flow straightening core and blank-off quadrants.

2. Steel or aluminum construction.

2.5. LINEAR GRILLES

1. Aluminum bar core type with margin as indicated, pattern adjustment, plaster frames, sealing strips, end caps, mitered corners and alignment key strips for multiple sections.

2.6. FINISHES

1. Primer: to CGSB 1-GP-40M, off white.

2. Enamel: to CGSB 1-GP-88E, off white.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install in accordance with manufacturers instructions.

2. Fit frame with gasket to prevent leakage, and smudging.

3. Install with flat head screws in countersunk holes where fastenings are visible.

4. Diffusers to be installed with concealed fastenings.

END OF SECTION 15942

PART 1 - TAB AGENCY

1. General:

    1. The basic testing and balancing shall be provided by Division 15 and in accordance with this Section.

    2. The independent TAB Agency employed and paid by Division 15 will be providing the final testing and balancing.

    3. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. Quality assurance:

    1. TAB to be performed to standards of ASHRAE.

3. Co-ordination:

    1. Co-ordinate all work specified in this Section.

    2. Provide all facilities required by TAB Agency in order to carry out work of this Section.

4. Adequacy of work for TAB:

    1. TAB Agency to review contract documents before work is started and confirm in writing to Consultant adequacy of provisions for TAB and all other aspects of installation pertinent to TAB.

    2. Division 15 shall provide equipment commissioning and preliminary balancing and confirm the proper operation of all systems.

5. List of TAB Agencies:

    1. ABG Air Balance Group
    (416) 283-0637

    2. Aerodynamics Inspecting Consultants Ltd.
    (905) 625-4388

    3. Design Test Balance
    (905) 886-6513

PART 2- GENERAL

1. TAB: means to test, adjust and balance all systems to perform in accordance with Contract Documents.

2. Follow start-up procedures as recommended by manufacturer unless otherwise specified.

3. Special start-up procedures may be specified elsewhere.

4. Notify Consultant 7 days prior to start of TAB.

5. Operate all systems to permit TAB to be performed.

6. TAB to apply to systems, equipment and related controls specified in Division 15.

7. Reference organization standards:

    1. Do TAB over entire operating range in accordance with most stringent conditions of this specification and standard of following organization.

8. Alternate season testing to be provided by TAB Contractor where applicable.

9. TAB Contractor to inspect site during construction in order to assure that all balancing devices are installed properly and in pre-selected locations.

10. Mechanical contractor to provide the TAB contractor with all related approved shop drawings and change notices.

11. Start TAB only when building is essentially completed, including:

    1. Installation of ceilings, doors, windows and other construction affecting TAB.

    2. Application of sealing, caulking and weatherstripping.

    3. All pressure, leakage and other tests specified elsewhere in Division 15 completed.

    4. All provisions for TAB are installed and operational.

12. Start-up, verification for proper, safe and normal operation of mechanical and associated electrical and control systems affecting TAB including, but not limited to, the following:

    1. Proper thermal overload protection in place for electrical equipment.

    2. Air Systems:

        1. Filters in place and in clean condition.

        2. Duct systems clean of debris.

        3. Air shafts, ceiling plenums are airtight to within specified tolerances.

        4. Correct fan rotation.

        5. Fire and volume dampers in place and open.

        6. Coil fins cleaned and combed.

        7. Access doors closed and duct end caps in place.

8. All outlets installed and connected.

13. Accuracy tolerances:

    1. Do TAB to following tolerances of design values:

        1. HVAC systems: Plus 5%; minus 5%.

        2. As original tolerances.

        3. Measurements to be accurate to within plus or minus 2% of actual values.

    2. Instrument calibration: to be in accordance with TAB referenced organization standard, but within 3 months of commencement of TAB.

14. Submittals prior to commencement of TAB:

    1. Proposed methodology and procedures for performing TAB.

    2. Proposed check lists and report forms.

    3. List of instrumentation, including details and certificates of calibration.

15. Report:

    1. Format to be in accordance with TAB referenced organization standard, but using SI units.

    2. Report to include as built full system schematics showing results of TAB.

    3. Submit, prior to formal submission of TAB reports, for checking and approval by Consultant, sample of rough TAB sheets. Include:

        1. Details of instruments used.

        2. Details of TAB procedures employed.

        3. Calculations procedures.

        4. Summaries.

    4. Submit 3 copies of TAB reports, each in "D" ring binders, complete with index tabs for verification and approval of Consultant.

16. Verification:

    1. Reported measurements shall be subject to verification by Consultant. Provide instrumentation and manpower to verify results of up to 30% of all reported measurements. Number and location of verified measurements to be at discretion of Consultant.

    2. Bear costs to repeat TAB, as required, to satisfaction of Consultant.

1. Settings: lock and permanently mark settings as required by reference standard.

2. Completion: TAB to be considered complete only when final reports are approved by Consultant.

PART 3- AIR MOVING SYSTEMS

1. General: measurements as required by referenced organization standards, including, but not limited to, following:

    1. Measurements:

        1. Air velocity.

        2. Static pressure.

        3. Velocity pressure.

        4. Temperature:

            1. Dry bulb.

        5. Cross sectional area.

        6. RPM.

        7. Electrical power:

            1. Voltage
            2. Current draw.

2. Location of equipment measurements:

    1. Inlet and outlet of each:

        1. Fan.

        2. Coil.

        3. Filter.

        4. Damper.

        5. Humidifiers.

        6. Terminal Units.

        7. Other auxiliary equipment.

3. Location of system measurements at:

1. Main ducts.
2. Main branch ducts.
3. Sub-branch ducts.
4. Each supply, exhaust and return air inlet and outlet.
5. Other auxiliary equipment.
6. All areas served by system.
7. Each thermostatically controlled zone.

PART 4- BUILDING GENERALLY

1. Measure DBT, WBT, %RH, air velocity, air flow patterns, and noise data in occupied zone of all occupied areas.

END OF SECTION 15990

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. This Section covers items common to Sections of Division 16. This Section supplements requirements of Division 1.

3. Coordinate all requirements with general contractor.

1.2. CODES AND STANDARDS

1. In this document, all references to Code numbers shall mean “Latest Edition”.

2. Do complete installation in accordance with Ontario Electrical Safety Code.

3. Do complete installation in accordance with CSA C22.1-12 except where specified otherwise.

4. Comply with all CSA and inspection Authority Bulletins in force at time of Tender.

5. Do overhead and underground systems in accordance with CSA C22.3 No.1-10 except where specified otherwise.

6. Abbreviations for electrical terms: to CSA Z85-1983.

7. Where requirements of this specification exceed those of above-mentioned standards, this specification shall govern.

1.3. DEFINITIONS

1. “Provide” means supply and install.

2. “Approved” means approved in writing by Consultant.

3. “Inspection Authority” means Electrical Safety Authority.

4. “Supply Authority” means ***Hearst Power.***

5. “Consultant” means designated qualified professional engineer acting as representative of Owner for monitoring of work.

6. “Manual” means Operations and Maintenance manual.

7. “OESC” means latest edition of Ontario Electrical Safety Code

1.4. CARE, OPERATION, START-UP AND INSTRUCTION TO OWNERS

1. Provide certified personnel to instruct Owner of operation of electrical equipment. Provide maintenance specialist personnel to instruct on maintenance and adjustment of electrical equipment and any changes or modification of equipment must be under terms of guarantee.

2. Provide instruction during regular work hours prior to acceptance and turn over to Owner's staff for regular operation.

3. Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

4. Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn three manuals over to the Owner.

5. Operation and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

1.5. AS-BUILT DRAWINGS

1. Site records:

    1. One set to be kept on site and all changes to be recorded on daily basis. At the completion of the project, all changes shall be transferred to clean set, signed and passed to the Consultant.

    2. Make these drawings available for reference purposes and to inspection at all times.

2. As-built drawings must be delivered before system acceptance.

1.6. VOLTAGE RATINGS

1. Operating voltages: to CAN3-C235-83 (R2006).

2. Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.7. PERMITS, FEES AND INSPECTION

1. Submit to Inspection Authority and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

2. Consultant will provide drawings and specifications required by Inspection Authority and Supply Authority at no cost.

3. Submit to the Building Department the necessary number of drawings and specifications for examination prior to commencement of work to obtain a building permit. The Contractor shall obtain and pay for the building permit. Include all costs in the tender price.

4. Submit Notice of Project to Ministry of Labour.

5. Pay associated fees and obtain all permits required for the performance of the work.

6. Notify Consultant of changes required by Inspection Authority or Building Department prior to making changes.

7. Furnish Certificates of Acceptance from Inspection Authority on completion of work to Consultant.

1.8. MATERIALS AND EQUIPMENT

1. Provide materials and equipment in accordance with Division 1.

2. Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Inspection Authority.

3. Factory assemble control panels and component assemblies.

1.9. ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

1. Verify installation and co-ordination responsibilities related to motors, equipment and controls with other trades and as indicated.

2. Mechanical contractor shall supply and install all motors, controls and control wiring. Mechanical contractor shall supply all disconnect switches, starters, motor rated switches and relays, for all motor driven equipment under mechanical contract. All disconnect switches, starters, motor rated switches and relays shall be handed over to electrical contractor for installation and wiring. Both mechanical and electrical contractors to coordinate to ensure proper protection and equipment is provided and included in contract.

3. Control wiring and conduit to be installed in accordance with Section 16111 and 16122, except for connections below 50V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

4. Electrical equipment not supplied by mechanical contractor is listed on the drawings or elsewhere in the specifications. Electrical contractor to coordinate with mechanical contractor to ensure proper protection and equipment is provided for all equipment and is included in Contract.

1.10. EQUIPMENT IDENTIFICATION

1. Identify electrical equipment with nameplates and labels as follows:

2. Nameplates:

    1. Lamacoid 3 mm (1/8") thick plastic engraving sheet, white face, black core, mechanically attached with self tapping screws. For emergency power circuits, use a red face and black core.

NAMEPLATE SIZES

Size 1	10 x 50 mm (3/8 x 2")	1 line	3 mm (1/8") high letters
Size 2	12 x 70 mm (1/2 x 3")	1 line	5 mm (1/4") high letters
Size 3	12 x 70 mm (1/2 x 3")	2 lines	3 mm (1/8") high letters
Size 4	20 x 90 mm (3/4 x 4")	1 line	8 mm (3/8") high letters
Size 5	20 x 90 mm (3/4 x 4")	2 lines	5 mm (1/4") high letters
Size 6	25 x 100 mm (1" x 4")	1 line	12 mm (1/2") high letters
Size 7	25 x 100 mm (1" x 4")	2 lines	6 mm (1/4") high letters

3. Labels:

    1. Embossed plastic labels with 6 mm (1/4") high letters unless specified otherwise.

4. Wording on nameplates and labels to be approved by Consultant prior to manufacture.

5. Allow for average of twenty-five (25) letters per nameplate and label.

6. Identification to be English.

7. Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

8. Disconnects, starters and contactors: indicate equipment being controlled and voltage.

9. Terminal cabinets and pull boxes: indicate system and voltage.

10. Transformers: indicate capacity, primary and secondary voltages.

11. Coordinate names of equipment and systems with Division 15 to ensure that identical names are used.

1.11. WIRING IDENTIFICATION

1. Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

2. Maintain phase sequence and colour coding throughout.

3. Colour code: to CSA C22.1.

4. Use colour coded wires in communication cables, matched throughout system.

1.12. CONDUIT AND CABLE IDENTIFICATION

1. Colour code conduits, boxes and metallic sheathed cables.

2. Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

3. Colours: 25 mm (1") wide prime colour and 20 mm (3/4") wide auxiliary colour.

	PRIME	AUXILIARY
up to 250 V	yellow	
up to 600 V	yellow	green
up to 5 kV	yellow	blue
up to 15 kV	yellow	red
Telephone	green	
Other communication systems	green	blue
Fire alarm	red	
Emergency Voice	red	blue
Other security systems	red	yellow

1.13. WIRING TERMINATIONS

1. Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.14. MANUFACTURERS AND CSA LABELS

1. Ensure that manufacturer's registration plates are properly affixed to all apparatus showing the size, name of equipment, serial number, and all information usually provided, including voltage, cycle, phase and the name and address of the manufacturer.

2. Do not paint over registration plates or approved labels. Leave openings through insulation for viewing the plates. Contractors or sub-contractors nameplate not acceptable.

1.15. WARNING SIGNS

1. As specified and to meet requirements of Inspection Authority and Consultant.

1.16. SINGLE LINE ELECTRICAL DIAGRAMS

1. Provide single line electrical diagrams under plexiglass in glazed frames as follows:

    1. Electrical distribution system: locate in main electrical room.

2. Drawings: 600 x 600 mm (24" x 24") minimum size.

1.17. LOCATION OF OUTLETS

1. Locate outlets as shown on drawings.

2. Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.

3. Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10 ft) and information is given before installation.

4. Locate light switches on latch side of doors. Locate disconnect devices in mechanical rooms on latch side of door.

1.18. MOUNTING HEIGHTS

1. Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

2. If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3. Install electrical equipment at following heights unless indicated otherwise.

    1. Local switches: 1100 mm (43")

    2. Wall receptacles:

        1. General: 400 mm (16")

        2. Above top of continuous baseboard heater: 200 mm (8")

        3. Above top of counters or counter splash backs: 175 mm (7")

        4. Behind clothes washing machine: 914mm (36”)

        5. In mechanical rooms: 1400 mm (55")

    3. Panelboards to top of trim: 1800 mm (72”)

    4. Telephone outlets: 400 mm (16")

    5. Wall mounted telephone outlets: 1200 mm (47")

    6. Emergency lighting heads: 2300 mm (90")

    7. Emergency Call Button:

        1. With centre located not less than 1000 mm and not more than 1100 mm from the floor or ground.

        2. Emergency Sign to be located directly above button

    8. Barrier-free Door Operators:

        1. Provide 100 mm x 100 mm junction;

        2. With centre located not less than 1000 mm and not more than 1100 mm from the floor or ground; and

        3. Be located not less than 600 mm beyond the door swing where the door opens towards the control.

1.19. LOAD BALANCE

1. Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

2. Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

3. Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.20. SLEEVES

1. Provide pipe sleeves at points where conduits (53 mm and larger) pass through masonry or concrete.

2. Provide sleeves of minimum 1.0 mm (20 GA) galvanized sheet steel with lock seam joints.

3. Use cast iron or steel pipe sleeves with annular fin continuously welded at mid-point.

    1. Through foundation walls.

    2. Where sleeve penetrates fire rated wall or floor ceiling assembly.

4. Sizes:

    1. Provide 5 mm (1/4") clearance all around, between sleeves and conduits.

    2. Where piping passes below footings, provide min clearance of 50 mm (2") between sleeve and conduit. Fill void with elastic, water proof material. Backfill up to underside of footing with concrete of same strength as footing.

5. Fill voids around pipes. Remove plastic sleeves.

    1. Caulk between sleeve & conduit in foundation walls and below grade floors with oakum that lead between sleeve and pipe.

    2. Where sleeves pass through walls or floors, caulk space between conduit and sleeve with waterproof fire retardant non-hardening mastic.

    3. Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint.

6. Where pipes pass through fire rated walls, floors and partitions, maintain fire rating integrity assembly in compliance with OBC. Submit shop drawings and details on all products prior to commencing work.

7. Temporarily plug all openings during construction.

1.21. CONDUIT AND CABLE INSTALLATION

1. Install conduit and sleeve prior to pouring of concrete.

2. Install cables, conduits and fittings to be embedded or plasters over, neatly and close to building structure so furring can be kept to minimum.

3. Protect alarm and emergency system wiring from fire for the required length of time.

1.22. FIELD QUALITY CONTROL

1. All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks – the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

2. The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province that the work is being constructed.

3. Conduct and pay for following tests:

    1. Power distribution system including phasing, voltage, grounding and load balancing.

    2. Circuits originating from branch distribution panels.

    3. Lighting and its control. Contractor shall provide completed Lighting Controls Commissioning Checklist. Refer to Specification 16141.

    4. Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

4. Furnish manufacturer’s certificate or letter confirming the entire installation as it pertains to each system has been installed to manufacturer’s instructions.

5. Insulation resistance testing.

    1. Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

    2. Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

    3. Check resistance to ground before energizing.

6. Carry out tests in presence of Consultant.

7. Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

8. Submit test results for Consultant's review.

1.23. CONCRETE WORK

1. Provide 100mm concrete housekeeping pads for all floor mounted equipment, including:

transformers, automatic transfer switches, switchboard, MCCs and panels.

1.24. EXCAVATION AND BACKFILLING

1. This Division shall be responsible for coordination for bedding of lines or equipment and for backfilling and compaction to 98% Standard Proctor Density.

1.25. CO-ORDINATION WITH POWER SUPPLY UTILITY

1. Make arrangements with power supply utility for power line extension, transformers and connections. Pay all costs.

1.26. DEMOLITION

1. Disconnect and make safe electrical equipment and services as required on site.

2. Be responsible for demolition and removal of electrical equipment and services designated on drawings for removal and as required by work unless specified otherwise under other divisions.

3. Electrical work being removed by other division shall be carried out under direction of this division. Do all disconnecting prior to authorizing removal.

1.27. FIREPROOFING

1. Where cables or conduits pass through floors and fire rated walls, pack space between wiring and sleeve full with firestopping system to CAN 4-S115.

1.28. COORDINATION WITH EXISTING UTILITIES

1. Before commencing any Work, the Contractor shall determine the locations of all underground utilities and structures indicated in or inferable from the Contract Documents, or that are inferable from an inspection of the Place of the Work.

2. All existing utilities are to be maintained and protected for the length of construction.

3. Contractor to notify consultant if any conflicts arise and allow for minimum 48 hours for consultants review.

END OF SECTION 16010

PART 1- GENERAL

1.1. RELATED SECTIONS

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. Section 16010 – Electrical General Requirements.

PART 2- PRODUCTS

2.1. PVC DUCTS

1. PVC ducts, type DB2**.**
2. Rigid PVC when traversing beneath vehicular areas.

2.2. PVC DUCT FITTINGS

1. Rigid PVC opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors as required to make complete installation.
2. Expansion joints.
3. Rigid PVC 5 angle couplings.

PART 3- EXECUTION

3.1. DUCT INSTALLATION

1. Install underground duct banks.
2. Build duct bank on undisturbed soil or on well compacted granular fill not less than 150mm (6”) thick, compacted to 95% of maximum proctor dry density.
3. Open trench completely between manholes to be connected before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.
4. Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.
5. Install base spacers at maximum intervals of 1.5 m (5’) levelled to grades indicated for bottom layer of ducts.
6. Lay PVC ducts with configuration as indicated with preformed interlocking, rigid plastic

intermediate spacers to maintain spacing between ducts at not less than 75mm (3") horizontally and vertically. Stagger joints in adjacent layers at least 150mm (6") and make joints watertight.

7. Make transpositions, offsets and change in direction using 5° bend sections, do not exceed a total of 20° with duct offset.

8. Use bell ends at duct terminations in manholes or buildings.

9. Use conduit to duct adapters when connecting to conduits.

10. Terminate duct runs with duct coupling set flush with the end of concrete envelope when dead ending duct bank for future extension.

11. Cut, ream and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.

12. Clean ducts before laying. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

13. After installation of ducts, pull through each duct a wooden mandrel not less than 300mm (12") long and of a diameter of 6mm (1/4") less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

14. In each duct install pull rope continuous throughout each duct run with 3m (10') spare rope at each end.

3.2. CABLE INSTALLATION IN DUCTS

1. Installation of service entrance power cables, conduits, etc. will be by electrical contractor, unless otherwise noted.

2. Primary duct banks and manholes are existing to remain.

3. Install cables as indicated in ducts.

4. Do not pull spliced cables inside ducts.

5. Install multiple cables in duct simultaneously.

6. Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

7. To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.

8. Before pulling cable into ducts and until cables properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

9. After installation of cables, seal duct ends with duct sealing compound to prevent entrance of

moisture or gases.

10. Service entrance raceway shall contain no other than the service entrance conductors.

3.3. MARKERS

1. Mark ducts every 50’ along straight runs and changes in direction.

2. Provide drawings showing locations of markers.

3.4. AS-BUILTS

1. Provide As-Built drawings, indicating location of all underground conductor, cable or raceway installations including depth of burial and type of installation.

3.5. FIELD QUALITY CONTROL

1. Perform tests in accordance with Section 16010 - Electrical General Requirements.

2. Perform tests using qualified personnel. Provide necessary instruments and equipment.

3. Check phase rotation and identify each phase conductor of each feeder.

4. Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

5. Pre-Acceptance Tests:

    1. After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

    2. Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

6. Acceptance Tests:

    1. Ensure that terminations and accessory equipment are disconnected.

    2. Ground shields, ground wires, metallic armour and conductors not under test.

    3. Leakage Current Testing:

        1. Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.

        2. Hold maximum voltage for time period specified by manufacturer.

        3. Record leakage current at each step.

4. High Potential (Hipot) Testing shall be completed in the factory.

    1. Conduct Hipot Testing in accordance with IPCEA recommendations.

7. Provide Engineer with list of test results showing location at which each test was made, circuit tested and result of each test.

8. Remove and replace entire length of cable if cable fails to meet any of the test criteria.

END OF SECTION 16106

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. LOCATION OF CONDUIT

1. Drawings do not indicate conduit runs.

2. All conduits under floor slab shall be zoned in groups and run in as straight a line as possible.

1.3. REFERENCES

1. Canadian Standards Association (CSA)

    1. CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.

    2. CSA C22.2 No. 56-04 (R2009), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

    3. CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.

    4. CSA C22.2 No. 211.2-06 (R2011), Rigid PVC (Unplasticized) Conduit.

    5. CSA C22.2 No. 227.3-05 (R2010), Flexible Non-metallic Tubing.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1.

2. Place materials defined as hazardous or toxic waste in designated containers.

3. Ensure emptied containers are sealed and stored safely for disposal away from children.

4. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Division 1.

PART 2- PRODUCTS

2.1. CONDUITS

1. Electrical metallic tubing (EMT): with steel couplings, sized as indicated.

2. Rigid PVC conduit, sized as indicated.

3. Epoxy coated conduit: with zinc coating and corrosion resistant epoxy finish inside and outside.

4. Flexible metal conduit and liquid-tight flexible metal conduit, sized as indicated.

5. Flexible PVC conduit, sized as indicated.

2.2. CONDUIT FASTENINGS

1. One hole steel straps to secure surface conduits 50 mm (2") and smaller. Two hole steel straps for conduits larger than 50 mm (2").

2. Beam clamps to secure conduits to exposed steel work.

3. Channel type supports for two or more conduits at 3 m (9') o/c.

4. 6 mm dia threaded rods to support suspended channels.

2.3. CONDUIT FITTINGS

1. Fittings: manufactured for use with conduit specified. Coating: same as conduit.

2. Fittings to be suitable sized for conduit used.

3. Fittings used for EMT to be steel, not cast.

4. Factory "ells" where 90° bends are required for 25 mm (1") and larger conduits.

2.4. EXPANSION FITTINGS FOR RIGID CONDUIT

1. Weatherproof expansion fittings with internal bonding assembly suitable for 100 or 200 mm linear expansion.

2. Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.

3. Weatherproof expansion fittings for linear expansion at entry to panel.

2.5. FISH CORD

1. Polypropylene.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

2. Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

3. Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.

4. Use rigid PVC conduit for installation underground and in slabs.

5. Use flexible metal conduit for final connection to devices in ceiling space max. length 3 m.

6. Use liquid tight flexible metal conduit for final connection to a vibrating piece of equipment.

7. Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

8. Mechanically bend steel conduit over 21 mm diameter.

9. All unterminated conduit ends to be reamed and protected by insulating bushings.

10. Install fish cord in empty conduits and all conduits 53 mm and greater.

11. Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

12. Dry conduits out before installing wire.

13. Use water tight fittings at connections to taps or sides of sprinkler proof equipment or seal with approved sealant.

3.2. SURFACE CONDUITS

1. Run parallel or perpendicular to building lines.

2. Locate conduits behind infrared or gas fired heaters with 1500 mm clearance.

3. Run conduits in flanged portion of structural steel.

4. Group conduits wherever possible on suspended channels.

5. Do not pass conduits through structural members except as indicated.

6. Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.

7. All exposed conduits in areas other than service spaces are to be painted to match existing finishes.

3.3. CONCEALED CONDUITS

1. Run parallel or perpendicular to building lines.

2. Do not install horizontal runs in masonry walls.

3. Do not install conduits in terrazzo or concrete toppings.

3.4. CONDUITS IN CAST-IN-PLACE CONCRETE

1. Locate to suit reinforcing steel. Install in centre one third of slab.

2. Protect conduits from damage where they stub out of concrete.

3. Install sleeves where conduits pass through slab or wall.

4. Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.

5. Do not place conduits is slabs in which slab thickness is less than 4 times conduit diameter.

6. Encase conduits completely in concrete with minimum 25 mm concrete cover.

7. Organize conduits in slab to minimize cross-overs. Do not install horizontal runs in masonry walls.

3.5. CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

1. Run conduits 25 mm (1") and larger below slab and encased in 75 mm (3") concrete envelope. Provide 50 mm (2") of sand over concrete envelope below floor slab.

3.6. CONDUITS UNDERGROUND

1. Slope conduits to provide drainage and prevent moisture or gases from entering the building.

2. Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

END OF SECTION 16111

PART 1- GENERAL

1.1. RELATED SECTIONS

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. Section 16151 – Wire and Box Connections – 0 – 1000V.

1.2. REFERENCES

1. CSA C22.2 No. 0.3-09, Test Methods for Electrical Wires and Cables.

1.3. PRODUCT DATA

1. Submit product data in accordance with Division 1.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1.
2. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Division 1.
3. Fold up metal banding, flatten and place in designated area for recycling.

PART 2- PRODUCTS

2.1. GENERAL

1. All conductors to be copper, unless otherwise noted.

2.2. BUILDING WIRES

1. All conductors to be copper, unless otherwise noted.
2. Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG for power and # 16 AWG for controls and fire alarm.
3. Copper conductors: size as indicated, with insulation of chemically cross-linked thermosetting polyethylene material type RW90, or with thermoplastic insulation and nylon jacket, type T-90 nylon.
4. 600V rating for nominal 208V system voltage; 1000V rating for nominal 600V system

voltage.

5. All outdoor circuit conductors, including service entrance conductors to be type RWU90 or USEI-90, unless otherwise noted.

6. Wire and conduit sizes shown are based on RW75 XLPE and are minimum sizes. Contractor is responsible for wire and conduit sized for other approved wires.

7. Conductors shall be colour coded. Conductors size 10 AWG and smaller shall have colour impregnated into insulation at time of manufacture.

    1. Colour code wiring for 120 / 208 Volt equipment as follows

        1. Phase conductors: Red, Black, Blue

        2. Neutral conductors: White

        3. Bonding to ground: Green

    2. Colour code wiring for 347 / 600 Volt equipment as follows

        1. Phase conductors: Red, Black, Blue

        2. Neutral conductors: White

        3. Bonding to ground: Green

2.3. ARMOURED CABLES

1. Conductors insulated copper sizes as indicated, minimum wire size #12 AWG.

2. Type: AC90.

3. Armour: interlocking type fabricated from aluminum strip.

4. Connectors: to suit.

5. Fastenings:

    1. One hole steel straps to secure surface cables 25 mm and smaller. Two hole steel straps for cables larger than 25 mm.

    2. Channel type supports for two or more cables at 1500 mm centres.

    3. Threaded rods: 6 mm dia. To support suspended channels.

6. Approved compression type lugs accurately sized to allow bolted connections at each cable end.

7. All wiring shall be concealed in floor slabs, walls, ceiling and furred spaces. AC90 armoured cable may be used only for drops to fixtures, maximum length 3 m in concealed ceiling

spaces, or drops to receptacles in GWB partitions, maximum length 4.5 m. Otherwise cables shall be in EMT conduit.

2.4. CONTROL CABLES

1. Type LVT: 2 soft annealed copper conductors sized as indicated with thermoplastic insulation and outer covering thermoplastic jacket.

2. Plenum rated cable (FT-6) required in ceiling space where not in conduit.

PART 3- EXECUTION

3.1. INSTALLATION OF BUILDING WIRES

1. Install wiring in conduit in accordance with Section 16111, unless otherwise noted.

2. Use type RW90 where required by Ontario Electrical Safety Code, for all panelboard feeders and for all conductors sized 250 MCM and larger.

3. Use type RW90 or T-90 for branch circuit wiring unless otherwise indicated.

4. Minimum wire size shall be No. 12 AWG. For 15A, 120V branch circuit home runs which exceed 23 m length shall be minimum No. 10 AWG, and minimum No. 8 AWG for runs which exceed 36 m. For 20A, 120V branch circuit home runs which exceed 17 m in length shall be minimum No. 10 AWG, and minimum No. 8 AWG for runs which exceed 27 m. Where existing wiring is re-used, minimum wire sizes shall apply and wiring shall be replaced when it does not meet the minimum size.

5. Existing wiring may only be re-used if permitted by Engineer.

3.2. INSTALLATION OF ARMOURED CABLES

1. Use only for drops to fixtures maximum length 3 m in concealed ceiling spaces, or drops to receptacles in GWB partitions maximum length 4.5 m.

2. Terminate cables in accordance with Section 16151.

3. Installation of all single conductor armoured cable shall be in such a way as to prevent the flow of sheath currents (current flow in the sheath caused by induced voltage on the sheath), as per Ontario Electrical Safety Code Rule 4-008. To prevent the flow of sheath currents, it is necessary to make sure that all paths (at terminations and supports) in which they may circulate are eliminated. Cable sheaths shall be grounded at the supply end termination only and isolated from ground and each other at the load end termination by a minimum of a 6 mm thick insulated material plate. Provide a lamacoid at the supply end of the conductors indicating “ENSURE CABLES ARE INSTALLED TO PREVENT SHEATH CURRENTS”.

3.3. INSTALLATION OF CONTROL CABLES

1. Install control cables in conduit in accordance with Section 16111.

2. Ground control cable shield.

END OF SECTION 16122

PART 1 – GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SCOPE OF WORK

1. Category 6 100 OHM balanced unshielded twisted pair (UTP) plenum horizontal cable is deployed through plenum pathways from the Telecommunications Room (TR) to the wall or furniture outlets. Plenum cable is rated for air handling spaces. Horizontal UTP cable is terminated into a modular jack in the wall outlet, and is punched into a cross-connect panel in the TR. This portion of horizontal cabling, including terminations, is defined as the permanent link. Standards permit one consolidation point inter-connection in the permanent link for zone cable distribution. Several codes and standards apply to installation and termination of 100 OHM balanced UTP cable. It is the responsibility of the cable installer to follow industry standards to assure proper cable performance and long-term reliability.

2. The Telecommunications Room (TR) is Mech Rm 104.

3. This section includes minimum requirements for the following:

    1. Category 6 100 OHM Balanced UTP Cable.

1.3. VOICE AND DATA CABLING

1. Equipment price breakdown

    1. The Contractor shall provide a complete Category 6 voice/data/VOIP cabling system including terminations, patch panels and single manufacturer certification as specified below.

    2. This specification defines the cabling infrastructure required to provide Voice and Data service.

    3. The need to amend or modify the installation specification may arise. All changes, modifications or amendments must be approved by the consultant prior to commencement of the installation.

1.4. QUALITY ASSURANCE

1. Installation of Category 6 cable shall adhere to manufacturer’s guidelines.

2. Category 6 cable shall be installed according to recognized Category 6 installation practices, and applicable codes and standards.

3. Installed Category 6 cable shall be manufactured by an ISO 9001-2000 Certified facility.

4. Installed Category 6 cable shall be free from defects in material or workmanship from the manufacturer, and shall be of the quality indicated.

5. Specified cable is based on acceptable manufacturers listed in this specification.

6. All methods of construction that are not specified in the contract documents shall be subject to control and approval by the Technical Authority.

7. Installed cable shall be lot-traceable by lot number and date of manufacture printed on the outer cable jacket.

8. All critical internal manufacturing operations for Category 6 cable shall have documented in-process inspection and testing according to ISO9001-2000.

9. Where “approved equal” is stated, any substitute product shall be equivalent to all requirements specified, and is subject to approval.

10. Materials and work specified in this document shall comply with, and are not limited to the standards, codes, and publications listed below:

    1. ANSI/TIA/EIA-568-B.1, Commercial Building Telecommunications Cabling Standard (and all published addenda), Part 1: General Requirements, 2001.

    2. ANSI/TIA/EIA-568-B.2, Commercial Building Telecommunications Cabling Standard (and all published addenda), Part 2: Balanced Twisted Pair Cabling Components, 2001.

    3. ANSI/TIA/EIA-568-B.2-1, Commercial Building Telecommunications Cabling Standard (and all published addenda), Part 2: Balanced Twisted Pair Cabling Components, Addendum 1: Transmission Performance Specifications for 4-Pair 100-Ohm Category 6 Cabling 2002.

    4. National Fire Protection Association, Inc., NFPA 70: National Electric Code(NEC), 2002.

        1. NEC Article 250: Grounding

        2. NEC Article 800: Communications Circuits

    5. ANSI J-STD-607A, Commercial Building Grounding and Bonding Requirements for Telecommunications, 2002.

    6. ISO/IEC 11801, Ed. 2:2002, Information Technology – Generic Cabling for Customer Premises, 2002.

    7. ANSI.TIA/EIA-569-B, Commercial Building Standards for Telecommunications Pathways and Spaces, 2003.

    8. ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure, 2002.

9. IEEE 802.3af, Data Terminal Equipment (DTE) Power Over Media Dependent Interface (MDI).

10. IEEE 802.3ab, Specification for 1000 Mb/s (Gigabit Ethernet) Operation over Category 5 or higher 4-Pair Balanced Twisted Pair Cabling.

11. IEEE 802.3an, Specification for 10 Gb/s (10 Gigabit Ethernet) Operation over Category 6 or higher 4-Pair Balanced Twisted Pair Cabling.

12. TIA/TSB-155, Telecommunications System Bulletin: Characterizing Existing Category 6 cabling for 10 Gb/s Ethernet Operation over 55 Meters Channel Length.

13. Underwriter's Laboratory, Inc., UL1863: Standard for Safety – Communications Circuit Accessories, 4th Ed, 2004.

14. Telecommunications Distribution Methods Manual, 10th Ed., Building Industry Consulting Services International (BICSI), 2003.

15. Information Transport Systems Installation Manual, 4th Ed., Building Industry Consulting Services International (BICSI), 2004.

11. Installations shall, as minimum, comply with the latest issues of the following Building Codes: All municipal By-laws, Provincial Codes, the National Building Code, Canadian Labour Code, and the National Fire Code. In the case of conflict or discrepancy, the more stringent code shall apply.

1.5. DEFINITIONS

1. The Technical Authority, Piotrowski Consultants Ltd. is defined as the consultant.

2. The "Contractor" is defined as the supplier of the scope of work defined in this specification.

1.6. SHOP DRAWINGS

1. Shop drawings shall be submitted to the Consultant and shall include:

    1. Specification sheets on all items, including cable types and manufacturer's cabling system specification numbers.

    2. An outline drawing of the cabling system for the Communications Rooms, showing floor plan and wall layouts for termination blocks, typical connections and major components must be included. Verification that all equipment will be supplied by manufacturer authorised Canadian Distributors.

    3. Verification that the installers are trained and authorised by the Cabling Application warranty approved manufacturer.

1.7. ACCEPTABLE BIDDERS AND BID PROCEDURES

1. Communications Contractor shall be system certified with minimum five (5) years experience. References to be available upon request.

2. Supplier shall have an in-place support facility within 450 kilometers of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

PART 2 - PRODUCTS

2.1. DESCRIPTION OF EQUIPMENT

1. Supply and install all cabling, jacks, patch panels and terminations, to provide a complete and operating Voice/Data Cabling system to support future computer network systems in the building. (Network hub equipment and accessories are NOT included in the scope of work unless otherwise noted).

2. The system shall comprise of horizontal UTP (Unshielded Twisted Pair) wiring from the patch panels to each Data outlet jack. Voice Backbone cable to be terminated at **Voice Backboard.**

3. When voice or data outlets are identified with multiple cables, provide one outlet box complete with 27 mm conduit. Refer to Legend for Wiring Details and Number of Cables per Drop.

4. The cabling system must meet or exceed Category 6 Channel performance as defined in TSB 568-B and provide a Single Manufacturer 25 year system performance certification.

2.2. HORIZONTAL CABLE

1. The Voice Cable shall be be Four Pair, Twisted 24 AWG solid copper, unshielded twisted cable meeting TIA/EIA-568-B Category 6. The maximum cable length for each run shall be limited to 90 meters. Cable to have white sheath.

2. The Data Cable shall be Four Pair, Twisted 24 AWG solid copper, unshielded twisted cable meeting TIA/EIA-568-B Category 6. The maximum cable length for each run shall be limited to 90 meters. Cable to have blue sheath.

3. All cables shall be permanently identified with indelible marker, or permanent labels. The label shall be located within .05 meters of both ends of the installed cable. The labelling shall conform to the requirements as defined in CAN/CSA-T528-93 Section 6 (Wiring System Administration).

2.3. DATA JACKS

1. Data cable workstation data jacks shall be T568A Wire Map configuration, 8 pin modular jacks (RJ45) approved to TIA/EIA-568-B, Category 6 standard.

2. The jack modules must accept RJ45 computer plugs without causing any damage or degradation to the connectors.

2.4. WORK AREA WIRING

1. All cables shall be terminated in an eight position 8-MOD. T568A MDVO module at the Voice/Data outlet. This shall be wired in a T568A configuration.

2. Each workstation module shall be a separate colour to identify its function Voice or Data. Colour of jacks to be coordinated with the Technical Authority.

3. Where the Voice/Data outlet is located within a private office, the contractor will supply a minimum of one wall mounted 4-port outlet faceplate/box' unless otherwise specified by the Technical Authority.

4. Contractor shall supply one(1)7ft, and one(1)4ft Cat 6 Modular Patch Cords, for each Data circuit terminating at each Patch Panel / Voice/Data Outlet.

5. These patch cords will be used to patch network hardware to the Patch Panels in TC and Voice/Data outlet box to the customer supplied workstation equipment.

6. Contractor shall install wiring to modular workstation in such a manner to ensure the EMI/RFI separation distances are maintained.

7. Surface mounted electrical raceways and connectivity products must match where required.

2.5. COMMUNICATIONS ROOM WIRING

1. Contractor shall supply and install a 20U, wall mounted communications cabinet with an adequate number of 24-port patch panels, in conjunction with the scope of work, to terminate all horizontal Data designated cables from the respective Voice/Data outlets. All 24-port patch panels must have an integrated rear cable management bar and front labeling space to facilitate port identification. All patch panels must be installed with an accompanying 2U wire management channel, for all Data patch cables. All connectors shall be wired in a T568A configuration.

2. Contractor will supply and install an adequate number of termination mounts and connectors, in a cross connect configuration, to terminate all horizontal Voice designated cables from the respective Voice/Data outlets.

2.6. STANDARD OF ACCEPTANCE

1. Belden

2. Hubbell

3. Panduit

PART 3 - EXECUTION

3.1. PREPARATION

1. Horizontal pathways (conduit, cable tray, raceway, etc.) shall be fully deployed from the main telecommunication room to each voice/data outlet location according to applicable codes and standards.

2. Metallic horizontal cable pathways shall be bonded to an approved ground according to ANSI-J-STD-607.

3.2. INSTALLATION

1. Pull cable into conduits, or place into raceway or cable tray as specified. Do not exceed 25 Lb pull force per cable. Use appropriate lubricants as required to reduce pulling friction.

2. All exposed wiring shall be installed in surface raceway.

3. All wiring above ceilings or below access floors shall be installed in cable tray or open-top cable hangers. Where cable tray is not provided, J Hook supporting system is to be provided.

4. Cable slack and service loops shall be stored properly above the ceiling or under the access floor. A “figure-eight” service loop is recommended for Category 6 cabling to reduce EMI coupling.

5. Pathway fill ratio in conduit, tray, raceway, etc. shall not exceed 40% of pathway cross-sectional area.

6. Installed cable bend radius shall be greater than 4X cable diameter. Avoid kinking or twisting the cable during installation.

7. Do not over-tighten cable ties, and do not use staples or clamps to anchor cables. Velcro straps to be used for large bundles.

8. Spacing of cable supports above the ceiling shall be maximum 48”.

9. Maintain the following clearances from EMI sources:

    1. Power cable: 6 in.

    2. Transformers and electrical service enclosures: 36 in.

10. Communications cabling that must cross power cables or conduit shall cross at a 90-degree angle and shall not make physical contact.

11. Length of each horizontal cable run from the main telecommunication room to the wall outlet shall not exceed 90 meters.

12. Leave sufficient slack for 90 degree sweeps at all vertical drops.

13. Do not install cable in wet areas, or in proximity to hot water pipes or boilers.

14. Cable ends for termination shall be clean and free from crush marks, cuts, or kinks left from pulling operations.

15. Installed cable jackets shall have no abrasions with exposed conductor insulation or bare copper 'shiners". The installer is responsible to replace damaged cables.

16. Horizontal cables extending from mounted jacks or panels shall maintain a minimum bend radius of at least 4 times the cable diameter.

17. Firestop all cable penetrations through fire-rated barriers per local codes.

3.3. WORK SCHEDULE

1. Prior to work commencing, a schedule will be provided by Contractor to Technical Authority. Schedule will show anticipated progress stages and final completion of work. Interim reviews of work progress based on schedule will be conducted as decided by the Technical Authority. The schedule may be updated by Contractor in conjunction with and with the approval of the Technical Authority.

3.4. WORK AREA LABELLING

1. Contractor will clearly label all outlet boxes for both. The labels shall be machine printed adhesive labels. Hand labeling is not permitted.

2. The labeling will conform to CAN/CSA-T528-93, "Design Guideline for Administration of Telecommunications Infrastructure in Commercial Buildings".

3. Workstation labeling will identify unique No. (001-999), and use (V=VOIP, D=Data, P=Phone).

3.5. COMMUNICATIONS ROOM LABELLING

1. Contractor will clearly label all wiring blocks at the IT Cabinets. The labels shall be machine printed adhesive labels. Hand labeling is not permitted / only mechanical printed labels will be accepted.

2. IT cabinets labelling will identify unique No. (001-999), and use (V=VOIP, D=Data, P=Phone).

3. Supply "As Built Drawings" for completed project.

3.6. CABLE AUDIT

1. A random visual inspection by the Technical Authority, prior to the commencement of Installer with Channel Performance and Functional testing will be required. The

installation will be validated for compliance with the industry standards with particular attention given to the following criteria:

1. Cable jacket removal and connector termination

2. Routing and pathway supports

3. Cable bend radius and cable tie slack

4. Neatness, clamping, and harnessing of cabling and wiring.

5. Wire and cable identification and labelling.

6. Nameplates, identification, plates, and markings

3.7. TESTING

1. After all terminations are complete, the Contractor shall be responsible to test each UTP cable installed. All testing shall be in accordance with the ANSI/TIA/EIA 568.2-D standards (including most recent additions and addendum), and the testing Specifications herein. The horizontal UTP cable shall be tested as described below.

2. All test equipment must meet current industry standardsincluding most recent additions and addendums. Test equipment must meet ANSI/TIA-1152-A Level III or above for Category 6, Level IIIe for Category 6a and Level IV for Category 7. All testing shall be performed using a Level III or above tester.

3. For any given project, the Contractor must use the same test equipment manufacturer and model for all UTP cable tests. Mixing of different manufacturer's test equipment is not permitted.

4. The Contractor shall provide documentation verifying the test equipment's last calibration. (Calibration date must be within Twelve months of the date the tests are to be performed. If calibration is required, it shall be at the Contractors expense.)

5. At the time testing begins, all test equipment must be operating under the latest version of software as provided by the respective manufacturer. All costs associated with test equipment software upgrades are the responsibility of the Contractor.

6. Prior to testing, the Contractor shall perform the following test equipment setup procedures.

    1. The Contractor shall ensure that all relevant project data (e.g., Technician/Operator Name, Date of Test, Project Name, Building, Floor, TO/Jack position number, etc.,) is entered into the test equipment.

    2. The Contractor shall ensure that the appropriate cable manufacturer, manufacturer's model number and electrical parameters (e.g., NVP - Nominal Velocity of Propagation, FEXT, NEXT, etc.) are loaded into the test equipment.

    3. The Contractor shall ensure that the scanner is properly calibrated to the injector.

7. All UTP cable tests shall be performed by connecting an injector to the respective jack and the scanner to the respective Bix /110-wiring block or patch panel. The Contractor shall ensure that the appropriate TO number is loaded into the test equipment. A Permanent Link test, as described in the ANSI/TIA/EIA 568-B standards (including most recent additions and addendum) is required for all UTP testing. At a minimum, each UTP cable must be tested for the following parameters, but not limited to:

    1. Pair-to-Pair NEXT (Near End Cross Talk)

    2. Power Sum NEXT

    3. Pair-to-Pair ELFEXT (Equal Level Far End Cross Talk)

    4. Power Sum ELFEXT

    5. Attenuation (Insertion Loss)

    6. Return Loss

    7. Propagation/Delay Skew

    8. Cable length

    9. Wire map

8. As part of the test procedure, the Contractor shall verify that the TO number matches the number on the patch panel.

9. The Contractor shall test each cable installed by the Contractor under this procurement.

10. The Contractor shall troubleshoot and correct, repair or replace each cable that does not meet specification.

11. A test result marked with an "*" (or Marginal Result) will not be accepted.

12. A test summary and each individual UTP cable test shall be included as part of the Contractor's as-built documentation submittal. Only the Test Summary Sheet shall be printed, and submitted in hardcopy format. The individual UTP cable tests shall be submitted in electronic format only. The Test Summary Sheet for each Telecommunications Room shall be signed and dated by the Contractor's Project Manager. The Contractor shall submit the original signed Test Summary Sheets as part of the final as-built submittal. In addition, the Contractor shall submit all cable test results in electronic form via electronic media. The electronic test results must be submitted in the original software format of the respective test equipment manufacturer. Text files or files that have been imported into a word processor will not be accepted.

3.8. CABLING SYSTEM CHANNEL APPLICATION WARRANTY

1. All cabling products and workmanship must include coverage as follows:

    1. All Data channel cabling components in the scope of work of this document must be included in the 25 year parts & labour warranty document.

2. Product is warranted free of defects in material or workmanship.

3. Product is warranted to perform the intended function within design limits.

3.9. APPROVED CONTRACTORS

1. TC-Tel

   Adam Chretien
   Telephone: (705) 499-5529

2. Northern Voice & Data Cabling Services Inc.

   Dave Lammi
   Telephone: (705) 673-6207

3. Helix IT

   Rob Loxton
   Telephone: (705) 345-5956

END OF SECTION 16124

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. CSA C22.1-12 Canadian Electrical Code, Part 1.

1.3. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1, and with the Waste Reduction Workplan.

2. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Division 1.

PART 2- PRODUCTS

2.1. OUTLET AND CONDUIT BOXES - GENERAL

1. Size boxes in accordance with CSA C22.1.

2. 102 mm (4") square or larger outlet boxes as required for special devices.

3. Gang boxes where wiring devices are grouped.

4. Blank cover plates for boxes without wiring devices.

5. 347V outlet boxes for 347V switching devices.

6. Combination boxes with barriers where outlets for more than one system are grouped.

2.2. SHEET STEEL OUTLET BOXES

1. Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

2. Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm

3. 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.

4. 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished tile walls.

2.3. MASONRY BOXES

1. Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4. CONCRETE BOXES

1. Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5. CONDUIT BOXES

1. Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle.

2. Electro-galvanized utility tape for indoor surface wiring.

2.6. FITTINGS - GENERAL

1. Bushing and connectors with nylon insulated throats.

2. Knock-out fillers to prevent entry of debris.

3. Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

4. Double locknuts and insulated bushings on sheet metal boxes.

PART 3- EXECUTION

3.1. INSTALLATION

1. Support boxes independently of connecting conduits.

2. Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

3. For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

4. Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

5. Provide a suitable outlet box for each light, switch, receptacle or other outlet, approved for the particular area in which it is to be installed.

6. Locate outlet boxes, mounted in hung ceiling space, so they do not obstruct or interfere with the removal of lay-in ceiling tiles.

7. Offset outlet boxes, shown back to back in partitions, horizontally to minimize noise transmission between adjacent rooms.

8. Seal electrical switch and outlet boxes that penetrate vapour barrier with moulded box vapour barrier wrap boxes with film sheet providing minimum 300 mm perimeter lap flange.

END OF SECTION 16132

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Division 1.
2. Occupancy Sensor shop drawings to be complete with a floor plan layout drawing from the manufacturer indicated proper layout requirements, as well as all wiring details and diagrams to provide lighting control as indicated on drawings.
3. Identify the sensor type on the top of the page of the shop drawing. (For Example: Type 23)

PART 2 - PRODUCTS

2.1. SWITCHES

1. 20A, 120V single pole, three-way, or four-way specification grade, as indicated.
2. Manually-operated general purpose ac switches with following features:
    1. Terminal holes approved for No. 10 AWG wire.
    2. Silver alloy contacts.
    3. Urea or melamine moulding for parts subject to carbon tracking.
    4. Suitable for back and side wiring.
    5. White toggle.
3. Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
4. Provide motor rated switches, where indicated. To be complete with pilot light.
5. Switches of one manufacturer throughout project.
6. Acceptable materials: Hubbell, Bryant, Leviton, Pass & Seymour.

2.2. WIRED DIMMERS

1. Wall box dimmer, Cat5 connected, white in colour to match switches and outlets.

2. Manually operated wallpod.

3. Solid-state, 0-10V control to match connected fixtures.

4. Mechanical air-gap switch to disconnect load power.

5. Power failure memory.

6. RFI suppression.

7. Electrostatic discharge tested.

8. Dimmers controlling LED fixtures to be rated for such loads and shall meet all light fixture and lamp manufacturer's requirements.

9. Acceptable materials: nLight nPODMA series or equivalent WaveLinx Wired by Cooper.

2.3. RECEPTACLES

1. Duplex receptacles, CSA NEMA configuration 5-15R, 125V, 15A, U ground, with following features:

    1. White urea moulded housing.

    2. Suitable for No. 10 AWG for back and side wiring.

    3. Break-off links for use as split receptacles.

    4. Eight back wired entrances, four side wiring screws.

    5. Triple wipe contacts and riveted grounding contacts.

2. Housekeeping receptacles duplex CSA NEMA configuration 5-20R, 125V, 20A, U ground with following features:

    1. White urea moulded housing.

    2. External nickel-plated brass back wire clamps with #10 brass terminal screws.

    3. Ground terminal back wire clamp.

    4. 0.04" thick nickel-plated brass, triple-wiped power contacts.

    5. Nickel-plated one-piece mounting strap with integral ground and two screw anchor strap to back body.

3. 20A Specification Grade Dead Front Self-Test GFCI Duplex Receptacle CSA NEMA configuration 5-20R, 125V, 20A, U ground with following features:

    1. White urea moulded housing.

2. External nickel-plated brass back wire clamps with #10 brass terminal screws.

3. Ground terminal back wire clamp.

4. 0.04” thick nickel-plated brass, triple-wiped power contacts.

5. Nickel-plated one-piece mounting strap with integral ground and two screw anchor strap to back body.

6. Test/Reset push buttons.

7. Performs an automatic test every three seconds to insure that ground fault protection is active.

8. Indicator lights.

9. Rated as a 1-1/2 HP motor control switch.

4. Other receptacles with ampacity, voltage and NEMA configuration as indicated.

5. All receptacles of CSA NEMA configuration 5-15R & 5-20R within a dwelling unit are to be tamper-resistant type, with the exception of receptacles for microwaves, refrigerators, freezers and kitchen counters. Provide shop drawings for review.

6. Receptacles of one manufacturer throughout project. Minimum of specification grade.

7. Acceptable materials: Hubbell, Bryant, Leviton, Legrand, Pass & Seymour.

2.4. OCCUPANCY SENSORS

1. Wall Mount, Line Voltage

Type 10

Wall mounted, line-voltage occupancy sensor to be passive infrared detection, c/w separate ON/OFF button. Detects small motion (hand movements) up to 20' radial coverage and large motion (walking) up to 36' radial coverage. Equal to the Sensorswitch WSX, c/w accessories to control loads as indicated on drawings.

Type 14

Wall mounted, line voltage occupancy sensor to be passive infrared detection, c/w 2-pole relay for independent lighting and fan control. Detects small motion (hand movements) up to 20' radial coverage and large motion (walking) up to 36' radial coverage. Equal to the Sensorswitch WSX 2P, c/w accessories to control loads as indicated on drawings.

2. Sensorswitch shall be standard of acceptance. Wavelinx Wired sensors by Cooper shall also be accepted.

3. Pre-terminated Cat5e cables required for all controls where applicable.

2.5. SPECIAL WIRING DEVICES

1. Feed through ground fault interrupters, Class A, trip level 4 to 6 milliamps. All receptacles within 1.5 meters of a sink, tub or shower to be GFI type.

2.6. COVER PLATES

1. Cover plates for wiring devices, complete with clear adhesive label with black lettering indicating source panel and circuit number.

2. Cover plates from one manufacturer throughout project.

3. Stainless steel, vertically brushed, 1 mm (1/16") thick cover plates for all wiring devices mounted in flush-mounted outlet box (including voice / data outlets).

4. Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes, or utility boxes.

5. Weatherproof gasketted, lockable decorative rain-tight while-in-use cover, expandable, suitable for GFCI outlet, shall be Hubbell TayMac ML500 series or Hubbell TayMac MX4280 series. Colour By Architect. Submit in shop drawing package for Engineers Approval.

PART 3- EXECUTION

3.1. INSTALLATION

1. Switches:

    1. Install single throw switches with handle in "UP" position when switch closed.

    2. Install switches in gang type outlet box when more than one switch is required in one location.

    3. Mount toggle switches at height specified in Section 16010 - Electrical General Requirements or as indicated.

    4. Where lighting controls are grouped, each control shall be labelled to indicate the area controlled.

2. Dimmers:

    1. Provide separate box for each dimmer, spaced to maintain full rating.

    2. Avoid locations below thermostats

3. Receptacles:

    1. Install receptacles in gang type outlet box when more than one receptacle is

required in one location.

2. Mount receptacles at height specified in Section 16010 - Electrical General Requirements or as indicated.

3. Where split receptacle has one portion switched, mount vertically and switch upper portion.

4. Cover plates:

1. Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

2. Install suitable common cover plates where wiring devices are grouped.

3. Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

5. Occupancy Sensors:

1. Install sensors and ancillary devices at location(s) shown on drawings, following sensor manufacturer's recommended installation methods.

2. Perform necessary field adjustments and settings of sensors as required for proper operation.

3. Time delay for all sensors to be set as per control schedule.

4. Passive infrared setting to be set at minimum.

5. Some occupancy sensors require the use of a neutral. Ensure a neutral is present for each lighting circuit being controlled by a sensor. Run additional wiring as required, coordinate all requirements on site.

6. Where one or more occupancy sensors control one or more switching circuits within a room, activation of any sensor within that room to turn on all lights. Provide power packs and slave packs as required. All wiring to be as per manufacturer's recommendation.

6. Occupancy Sensor Commissioning:

1. Manufacturer's representative to provide on-site commissioning and set-up of system and provide letter confirming:

1. Installation is as per manufacturer's recommendations.

2. Settings and time delay are as per specification.

3. Confirm devices are operating properly for installation and provide minor field modifications as required.

4. Identify which devices were adjusted in the field.

5. Provide completed Lighting Controls Commissioning Checklist appended to this

specification.

7. Grounding:

   1. Ground all wiring devices and respective outlet boxes in accordance with applicable sections of Ontario Electrical Safety Code. Ensure proper ground connections of isolated ground receptacle.

END OF SECTION 16141

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. CSA C22.2 No. 65-13 Wire Connectors.
2. EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

PART 2 - PRODUCTS

2.1. MATERIALS

1. Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as required.
2. Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
3. Bushing stud connectors: to EEMAC 1Y-2 to consist of:
    1. Connector body and stud clamp for stranded copper conductors.
    2. Clamp for stranded copper conductors
    3. Stud clamp bolts.
    4. Bolts for copper conductors
    5. Sized for conductors as indicated.
4. Clamps or connectors for armoured cable, flexible conduit, as required.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Remove insulation carefully from ends of conductors and:
    1. Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

2. Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

3. Install fixture type connectors and tighten. Replace insulating cap.

4. Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION 16151

PART 1 - GENERAL

1.1. RELATED WORK

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. Fastenings and supports: Section 01600 Material and Equipment.

PART 2 - PRODUCTS

2.1. SUPPORT CHANNELS

1. U shape, size 41 x 41 x 2.5 mm thick, surface mounted or suspended.

2. Smaller sections subject to Consultant's approval.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Secure equipment to tile and plaster surfaces with nylon anchors, with independent grip protrusions.

2. Secure equipment to poured concrete with expandable inserts.

3. Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

4. Secure equipment to Siporex ceiling with Aircrete anchors equal to Fischer p/n:GB14.

5. Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

6. Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

7. Fasten exposed conduit or cables to building construction or support system using straps.

    1. One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

    2. Two-hole steel straps for conduits and cables larger than 50 mm.

    3. Beam clamps to secure conduit to exposed steel work.

8. Suspended support systems.

    1. Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

    2. Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

9. For surface mounting of two or more conduits use channels at 3 m oc spacing.

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

11. Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

12. Do not use wire lashing or perforated strap to support or secure raceways or cables.

13. Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

14. Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

15. Provide minimum 2400 mm support channel on each suspended fixture in open areas, with rigid stem supports from structure to channel, and fixture secured to channel.

16. All fastenings and supports to be hot dipped galvanized. All cut ends exposing base material to be completely sealed with field applied coating to give equivalent protection prior to installation. Following complete installation, all damage to protective layer to be carefully and completely touched up with same field applied coating.

END OF SECTION 16191

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1.

PART 2- PRODUCTS

2.1. DISCONNECT SWITCHES

1. Enclosed manual air break switches in non-hazardous locations to CSA C22.2 No. 4-04 (2009).
2. Fuse holder assemblies to CSA C22.2 No. 39-13.
3. Fusible and non-fusible disconnect switch in CSA Enclosure size as indicated.
4. Provision for padlocking in on-off switch position by three locks.
5. Mechanically interlocked door to prevent opening when handle in ON position.
6. Fuses: size as indicated, to Section 16478 - Fuses - Low Voltage.
7. Fuse holders: suitable without adaptors, for type and size of fuse indicated.
8. Quick-make, quick-break action.
9. ON-OFF switch position indication on switch enclosure cover.
10. Main disconnect switch to be service entrance rated.

2.2. EQUIPMENT IDENTIFICATION

1. Provide equipment identification in accordance with Section 16010 - Electrical General Requirements.
2. Indicate name of load controlled on size 4 nameplate.

2.3. ACCEPTABLE MATERIALS

1. Square D

2. Cutler-Hammer

PART 3- EXECUTION

3.1. INSTALLATION

1. Install disconnect switches complete with fuses, if applicable.

2. For all disconnects where fuse and wire sizes have a lower rating then the disconnect, a lamacoid label is to be applied indicating “MAX FUSE SIZE TO BE ____ AMPS”. To be filled in with the value of the specific fuse size.

END OF SECTION 16440

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. OESC Section 10, Bonding and Grounding.

PART 2 - PRODUCTS

2.1. EQUIPMENT

1. Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.

2. Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, soft annealed, size as indicated.

3. Rod electrodes: copper clad steel 19 mm dia by 3 m long.

4. Plate electrodes: copper, minimum surface area 0.2 m^2 and 6 mm thick.

5. Grounding conductors: bare stranded copper, soft annealed, size as indicated.

6. Insulated grounding conductors: green, type TWH.

7. Ground bus: copper, 50 mm x 6 mm x 600 mm long, complete with insulated supports, fastenings, connectors.

8. Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

    1. Grounding and bonding bushings.

    2. Protective type clamps.

    3. Bolted type conductor connectors.

    4. Thermit welded type conductor connectors.

    5. Bonding jumpers, straps.

    6. Pressure wire connectors.

PART 3- EXECUTION

3.1. INSTALLATION GENERAL

1. Install complete permanent, continuous grounding system including electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Consultant, and Inspection Authority. Where EMT is used, run ground wire in conduit.

2. Install connectors in accordance with manufacturer's instructions.

3. Protect exposed grounding conductors from mechanical injury.

4. Make buried connections using Burndy compression connectors.

5. Use mechanical connectors for grounding connections to equipment provided with lugs, and to conductive water main using approved grounding device.

6. Soldered joints not permitted.

7. Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

8. Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

9. Install separate ground conductor to outdoor lighting standards.

10. Connect building structural steel and metal siding to ground by welding copper to steel.

11. Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

12. Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.

13. Install separate insulated ground conductor in all branch circuit conduit runs for receptacles. Conduit not to be used as a grounding system.

14. Ground secondary service pedestals.

3.2. ELECTRODES

1. Make ground connections to continuously conductive underground water pipe on street side of water meter.

2. Install water meter shunt.

3. Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.

4. Install grounding electrodes and make grounding connections.

5. Plate electrodes to be located a minimum 600mm below finished grade level.

6. Where ground rods are used, provide at least two ground rods, located at least 3 meters apart and buried to a minimum depth of 3 meters.

7. Bond separate, multiple electrodes together.

8. Use size #2/0 AWG copper conductors for connections to electrodes.

9. Make special provision for installing electrodes that will give [acceptable] resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3. SYSTEM AND CIRCUIT GROUNDING

1. Install system and circuit grounding connections to neutral of primary 600V system or secondary 208V system.

3.4. EQUIPMENT GROUNDING

1. Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels and outdoor lighting.

3.5. FIELD QUALITY CONTROL

1. Perform tests in accordance with Section 16010 - Electrical General Requirements.

2. Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Consultant and Inspection Authority.

    1. Ground continuity: Ensure, through ground loop resistance measurement, that the grounding for the new equipment is tied in satisfactorily to the existing ground grid. Continuity measurements should be made between new equipment and system grounds of existing 600V services.

    2. Perform tests before energizing electrical system.

3. Coordinate scheduling of tests with testing agency. Provide all test results to consultant.

END OF SECTION 16450

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. This section defines dry-type transformers designed to meet the following regulations:
    1. NRCan (Natural Resources Canada), Energy Efficiency Act SOR/2016 - 311, amendment 14.
    2. Ontario Green Energy Act, revised by ON Reg.404-12 effective January 1st, 2018.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1.

PART 2- PRODUCTS

2.1. TRANSFORMERS

1. Use transformers of one manufacturer throughout project.
2. Energy Efficiency Levels to NRCan 2018/19 and ON Reg.404-12 – effective as of Jan. 1, 2018 (in Ontario).
3. Type 1: General Purpose
    1. Design
        1. Type: ANN, aluminum winding.
        2. Single or 3 phase, 60 Hz, size primary voltage, secondary voltage and kVA as indicated.
        3. Voltage taps on primary to be full capacity, two 2.5% above and two 2.5% below normal.
        4. Insulation: Class 220°C, 150°C temperature rise.
        5. Basic Impulse Level: 10kV
        6. Hipot: standard
        7. Average sound level: standard
        8. Impedance at 170°C: standard

9. Enclosure: ventilated NEMA 3R, front accessible.

10. Mounting: floor, unless indicated otherwise.

11. Finish: in accordance with Section 16010 - Electrical General Requirements.

12. Sprinkler Drip Shields

2.2. EQUIPMENT IDENTIFICATION

1. Provide equipment identification in accordance with Section 16010 - Electrical General Requirements.

2. Label size: 7

2.3. ACCEPTABLE MANUFACTURERS

1. Eaton, Hammond, Schneider, Rex Power Magnetics, Delta

PART 3- EXECUTION

3.1. INSTALLATION

1. Mount dry type transformers up to and including 75 kVA as indicated.

2. Mount dry type transformers above 75 kVA on floor.

3. Provide 100mm concrete housekeeping pad under equipment.

4. Ensure adequate clearance around transformer for ventilation and to meet Code requirements.

5. Install transformers in level upright position.

6. Remove shipping supports only after transformer is installed and just before putting into service.

7. For transformers installed on the floor slab, provide vibration isolation pads.

8. For transformers installed on brackets attached to the wall, provide spring vibration isolators, minimum static deflection of 6 mm.

9. Loosen isolation pad bolts until no compression is visible or as per manufacturer’s recommendations.

10. Make primary and secondary connections in accordance with wiring diagram.

11. Energize transformers immediately after installation is complete, where practical.

12. Provide ground wire from main service ground to neutral point of secondary windings, sized to Code. Run in primary feeder conduit, and bond to transformer case to satisfaction of Inspection Authority.

13. Provide flexible conduit connections for last one (1) meter in each conduit.

END OF SECTION 16461

PART 1 - GENERAL

1.1. RELATED REQUIREMENTS

1. Section 01300 - Submittals.

1.2. REFERENCES

1. American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
    1. ANSI/IEEE C62.41, Practice on Surge Voltages in Low-Voltage AC Power Circuits.
2. Underwriters' Laboratories of Canada (ULC)
    1. UL 1449 Latest Edition, Standard for Surge Protective Devices.

1.3. ACTION AND INFORMATIONAL SUBMITTALS

1. Submit in accordance with Section 01300 - Submittals.
2. Product Data:
    1. Submit manufacturer's instructions, printed product literature and data sheets for secondary lighting arresters and include product characteristics, performance criteria, physical size, finish and limitations.
3. Shop Drawings:
    1. Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
        1. Indicate on drawings:
            1. Per phase kA protection
            2. MCOV
            3. Protection Modes
            4. VPR
            5. Nominal Discharge Current (20kA minimum)
            6. Monitoring Diagnostics

1.4. CLOSEOUT SUBMITTALS

1. Submit in accordance with Section 01300 - Submittals.
2. Operation and Maintenance Data: submit operation and maintenance data for secondary lighting arresters for incorporation into manual.

1.5. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with manufacturer's written instructions.
2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

3. Storage and Handling Requirements:
    1. Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    2. Store and protect surge protective devices from nicks, scratches, and blemishes.
    3. Replace defective or damaged materials with new.

PART 2- PRODUCTS

2.1. EQUIPMENT

1. Arrester component parts: to ANSI/IEEE C62.41 and UL 1449 3rd.
2. Arrester characteristics:
    1. System voltage: 347/600V
    2. Rated voltage of arrester: suitable for panel board is it to be installed in.
    3. Integrated into panel board, mounted directly to bus bars.
    4. Indicated kA rating denotes the required per phase rating.
3. Manufacturers:
    1. Service Track ST200
    2. Alternates must be pre-approved by consultant prior to tender close.
4. Electrical Requirements
    1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.
    2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.
    3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
    4. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

	Protection Modes			
Configuration	L-N	L-G	L-L	N-G
Wye	•	•	•	•
Delta	N/A	•	•	N/A
Single Split Phase	•	•	•	•
High Leg Delta	•	•	•	•

5. Nominal Discharge Current (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.

6. ANSI/UL 1449 3rd Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

MODES	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	700	1200	1500
L-L	1200	2000	3000

5. SPD Design

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

2. Fully Integrated Component Design – All of the SPD's components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.

3. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.

4. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.

5. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

6. Monitoring Diagnostics:

1. Each SPD shall provide the following integral monitoring options:

1. Protection Status Indicators - Each unit shall have dual coloured solid-state indicator light that reports the status of the protection on each phase.
2. For wye configured units, the indicator lights must report the status of all protection elements and circuitry including the L-N, N-G and L-G modes. Wye configured units shall also contain an additional dual coloured solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes

shall not be accepted.

3. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
4. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
5. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.

7. Surge Counter:

1. The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location. The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of 50 ± 20A occurs. A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. In order to prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge count total.
2. The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge counter's display prior to the interruption shall be stored in non-volatile memory and displayed after power is restored. The surge counter's memory shall not require a backup battery in order to achieve this functionality.

8. Overcurrent Protection

1. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.

9. Safety Requirements

1. The SPD shall minimize potential arc flash hazards by containing no user serviceable / replaceable parts and shall be maintenance free. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

PART 3- EXECUTION

3.1. EXAMINATION

1. Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for secondary lighting arresters installation in accordance with manufacturer's written instructions.
    1. Visually inspect substrate.
    2. Inform Consultant of unacceptable conditions immediately upon discovery.
    3. Proceed with installation only after unacceptable conditions have been remedied.

3.2. CLEANING

1. Progress Cleaning: Leave Work area clean at end of each day.
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. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SHOP DRAWINGS

1. Submit shop drawings in accordance with Division 1.

2. Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.3. PLANT ASSEMBLY

1. Install circuit breakers in panelboards before shipment.

2. In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

PART 2- PRODUCTS

2.1. PANELBOARDS

1. Panelboards: product of one manufacturer.

2. Bus and breaker rated for the following symmetrical interrupting capacity, unless otherwise indicated.

    1. 120 / 208 V Panelboards – 10 kA I.C.

    2. 277 / 480 V Panelboards – 10 kA I.C.

    3. 347 / 600 V Panelboards – 25 kA I.C.

    Refer to singleline diagram for other values.

3. Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

4. Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

5. Each panelboard to be equipped with integral lock and be complete with two keys. All

panelboards to be keyed alike.

6. Aluminum bus with neutral of same ampere rating as mains.

7. Mains: suitable for bolt-on breakers.

8. Trim and door finish: baked grey enamel

9. Panelboards on emergency power to be labeled in RED.

10. Panelboards to be equipped with sprinkler shields.

11. Provide 15% space for future breakers in all 120/208V panels and 25% space in all 600V panels, unless otherwise noted.

12. NEMA 1 enclosure.

2.2. BREAKERS

1. Breakers: to Section 16477 - Moulded Case Circuit Breakers.

2. Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

3. Main breaker: separately mounted on top or bottom to suit cable entry. When mounted vertically, down position should open breaker.

4. Lock-on devices for emergency and exit light circuits.

2.3. SURGE PROTECTIVE DEVICES (SPD)

1. Main 600V panelboard to have SPD

2. All surge protective devices to Section 16462 - Surge Protective Devices.

2.4. EQUIPMENT IDENTIFICATION

1. Provide equipment identification in accordance with Section 16010 - Electrical General Requirements.

2. Nameplate for each panelboard size 4 engraved, as indicated

3. Nameplate for each circuit in distribution panelboards size 2 engraved, as indicated.

4. Complete circuit directory with typewritten legend showing location and load of each circuit.

2.5. ACCEPTABLE MATERIALS

1. Eaton / Cutler-Hammer

2. Schneider

PART 3- EXECUTION

3.1. INSTALLATION

1. Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

2. Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

3. Plywood backboard to be painted with fire-retardant paint.

4. Plywood backboards installed in damp locations to be pressure treated type.

5. In non-combustible construction, provide one layer of 16 mm (5/8”) gypsum wall board behind each panel, full size of panel.

6. Mount panelboards to height specified in Section 16010 - Electrical General Requirements or as indicated.

7. Provide 100mm concrete housekeeping pad under floor mounted equipment.

8. Connect loads to circuits.

9. Connect neutral conductors to common neutral bus with respective neutral identified.

3.2. PANELBOARD LAYOUTS

1. Follow panelboard details attached or on drawings, for layout of circuit and breaker sizes wherever possible.

2. Record all changes to panelboard details and submit as part of As-Built drawing set for review at completion of the project. Insert copies in each maintenance manual.

END OF SECTION 16471

PANELBOARD SCHEDULE -- BP201

WIRE & COND	SERVICE	BRKR	Load kW	CCT. No.		CCT. No.	Load kW	BRKR	SERVICE	WIRE & COND
2#12-16mmC	OFFICE 102 REC.	15A	1.2	1		2	0.1	15A	EMERGENCY LIGHTING	2#12-16mmC
2#12-16mmC	LUNCH ROOM REC.	15A	1.2	3		4	1.5	20A	I.T. / TELECOM BACKBOARD REC.	2#12-16mmC
2#12-16mmC	LUNCH ROOM COUNTER REC.	20A	1.5	5		6	1.5	20A	HOUSE KEEPING REC	2#12-16mmC
2#12-16mmC	LUNCH ROOM COUNTER REC.	20A	1.5	7		8	1.2	15A	WASHROOM 105/106 REC.	2#12-16mmC
2#12-16mmC	OFFICE / LUNCHROOM HEATER	15A	2.0	9		10	0.3	20A	OFFICE, LUNCH RM, W/R'S, H/W, REST AREA LIGHTS	2#12-16mmC
				11		12	3.0	20A	W/R HEATERS	2#12-16mmC
2#12-16mmC	REST AREA HEATER	15A	1.3	13		14				
				15		16	1.0	15A	MECHANICAL ROOM HEATER	2#121-16mmC
2#12-16mmC	REST AREA REC.	15A	1.2	17		18				
2#12-16+mmC	OVERFLOW HEAT TRACE	15 A	0.3	19		20	---	20A	SPARE	---
2#12-16mmC	HALLWAY HEATER	20A	3.0	21		22	---	20A	SPARE	---
				23		24	---	20A	SPARE	---
---	SPARE	15 A		25		26	---	20A	space	---
---	SPARE	15 A	---	27		28	---	20A	space	---
---	SPARE	15 A	---	29		30				
---	SPARE	15 A	---	31		32				
---	SPARE	15 A	---	33		34				
				35		36				
				37		38				
				39		40				
				41		42				

****C/W Main Breaker As Per Diagram 1/E101**

NOTE: 120V Wire & Conduit sizes noted in this panel schedule are for branch circuit reference information only. Group wiring and derate wiring depending on wire length as per specification sections 16111 and 16122.

CONNECTED LOAD: 21.8 kW

MAX. CURRENT: 60.4 Amps

PANEL DESCRIPTION: Panel BP201

PANEL RATING: 100A, 120/208V, 3P 4W - 42 CCT

PANELBOARD SCHEDULE -- BP202

WIRE & COND	SERVICE	BRKR	Load kW	CCT. No.		CCT. No.	Load kW	BRKR	SERVICE	WIRE & COND
2#12-16mmC	EXTERIOR RECS	20A	1.9	1		2	0.1	15A	EMERGENCY LIGHTING	2#12-16mmC
2#12-16mmC	SHOP RECS NORTH WALL	20A	1.9	3		4	1.9	20A	SHOP STORAGE RECS	2#12-16mmC
2#12-16mmC	SHOP RECS SOUTH WALL	20A	1.9	5		6	1.9	20A	WASHING MACHINE	2#12-16mmC
2#12-16mmC	SHOP RECS BENCH NORTH	20A	1.9	7		8	8.6	30A	DRYER	3#10-16mmC
2#12-16mmC	OFFICE / LUNCHROOM HEATER	15A	2.0	9		10				
2#12-16mmC	SHOP RECS BENCH SOUTH	20A	1.9	11		12	1.5	15A	CO/NO2 CONTROLLER	2#12-16mmC
2#12-16mmC	EF#4	15A	1.3	13		14	0.8	15A	SHOP LIGHTS	2#12-16mmC
2#12-16mmC	UH#1	15A	0.1	15		16	1.0	20A	EXTERIOR LIGHTS	2#12-16mmC
2#12-16mmC	HRV#1	15A	0.3	17		18	0.1	15A	AC#1 / 2 / 3 / 4	2#12-16mmC
2#12-16mmC	EF#1 / 2 / 3	15A	0.2	19		20				
2#12-16mmC	HALLWAY HEATER	20A	3.0	21		22	15.2	60A	CU#1	2#6-21mmC
2#12-16mmC	SHOP RECS BENCH SOUTH	20A	1.9	23		24				
2#12-16mmC	JIB CRANE	20A	1.5	25		26			space	
2#12-16mmC	EF#5	15A	0.5	27		28			space	
2#12-16mmC	EF#5	15A	0.5	29		30			FUTURE EV CHARGER	
4#6-27mmC	OUTBUILDING PANEL	60A	21.6	31		32				
				33		34	6.0	30A	COMPRESSOR	3#12-16mmC
				35		36				
2#12-16mmC	IN-DUCT HEATER	15A	2.5	37		38				
				39		40	10.0	40A	FUEL STORAGE HEATER	3#8AWG TECK 90
2#12-16mmC	SHOPSTORAGE HEATER	15 A	1.0	41		42				
				43		44				
---	SPARE	15 A	---	45		46	---	20A	SPARE	---
---	SPARE	15 A	---	47		48	---	20A	SPARE	---
---	SPARE	15 A	---	49		50	---	20A	SPARE	---
---	SPARE	15 A	---	51		52	---	20A	SPARE	---
---	SPARE	15 A	---	53		54	---	20A	SPARE	---
---	SPARE	15 A	---	55		56	---	15 A	SPARE	---
				57		58				
	space			59		60			space	

****C/W Main Breaker As Per Diagram 1/E101**

NOTE: 120V Wire & Conduit sizes noted in this panel schedule are for branch circuit reference information only. Group wiring and derate wiring depending on wire length as per specification sections 16111 and 16122.

CONNECTED LOAD: 92.9 kW

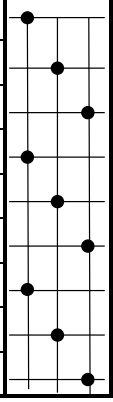
MAX. CURRENT: 258.1 Amps

PANEL DESCRIPTION: Panel BP202

PANEL RATING: 400A, 120/208V, 3P 4W - 60 CCT

PANELBOARD SCHEDULE -- BP401

WIRE & COND	SERVICE	BRKR	Load kW	CCT. No.		CCT. No.	Load kW	BRKR	SERVICE	WIRE & COND
3#3-27mmC	WELDER	90A	72.2	1		2	---		space	---
				3		4	---		space	---
				5		6	---		space	---
---	SPARE	15 A	---	7		8	---		space	---
				9		10	---		space	---
				11		12	---		space	---
---	SPARE	15 A	---	13		14	---		space	---
				15		16	---		space	---
				17		18	---		space	---



****C/W Main Breaker As Per Diagram 1/E101**

CONNECTED LOAD: 72.2 kW

MAX. CURRENT: 86.9 Amps

PANEL DESCRIPTION: Panel BP401

PANEL RATING: 225A, 277/480 V, 3P 4W - 18 CCT

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1.

2. Include time-current characteristic curves for breakers with ampacity of 400A and over or with interrupting capacity of 22,000A symmetrical (rms) and over at system voltage.

PART 2- PRODUCTS

2.1. BREAKERS - GENERAL

1. Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

2. Common-trip breakers: with single handle for multi-pole applications.

3. Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-10 times current rating.

2.2. THERMAL MAGNETIC BREAKERS

1. Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install circuit breakers as indicated.

END OF SECTION 16477

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. Canadian Standards Association (CSA)

    1. CSA C22.2 No. 248.12-11, Low Voltage Fuses Part 12: Class R (Tri-National Standard with, UL 248-12 and NMX-J-009/248/12-ANCE).

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Division 1.

2. Submit fuse performance data characteristics for each fuse type and size above 200A. Performance data to include: average melting time-current characteristics, I2t (for fuse coordination), and peak let-through current.

1.4. MAINTENANCE MATERIALS

1. Three spare fuses of each type and size installed above 400 A.

2. Six spare fuses of each type and size installed up to and including 400 A.

3. A list of the spare parts, including fuse size, manufacturer’s part numbers and quantity to be included in operations and maintenance manuals.

1.5. DELIVERY AND STORAGE

1. Ship fuses in original containers.

2. Do not ship fuses installed in switchboard.

3. Store fuses in original containers in storage cabinet in the main electrical room.

4. Provide storage cabinet.

PART 2- PRODUCTS

2.1. FUSES - GENERAL

1. Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.

2. Fuses: product of one manufacturer.

3. HRC fuses to CSA C22.2 No. 106-05 (R2010).

2.2. FUSES - TYPES

1. Class L fuses (formerly HRC-L).

    1. Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

    2. Type L2, fast acting.

2. Class J fuses (formerly HRCI-J).

    1. Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

    2. Type J2, fast acting.

3. Class R fuses (formerly HRCI-R). For UL Class RK1 fuses, peak let-through current and I2t values not to exceed limits of UL 198E-1982, table 10.2.

    1. Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.

    2. Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.

    3. Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.

4. Class-C fuses (formerly HRCII-C).

PART 3- EXECUTION

3.1. INSTALLATION

1. Install fuses in mounting devices immediately before energizing circuit.

2. Ensure correct fuses fitted to physically matched mounting devices.

    1. Install Class R rejection clips for HRCI-R fuses.

3. Ensure correct fuses fitted to assigned electrical circuit.

4. Where UL Class RK5 fuses are specified, install warning label "Use Only UL Class RK-5

fuses for replacement" on equipment.

END OF SECTION 16478

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. Atomic Energy Control Board Regulations.
2. Canadian Code for Preferred Packaging.
3. Canadian Standards Association (CSA)
    1. CSA C22.2 No. 141-10, Unit Equipment for Emergency Lighting.
    2. CSA C860-11, Performance of Internally-Lighted Exit Signs.
4. Natural Resources Canada (NRCan)
    1. NRCan C860 Registered.
5. National Fire Protection Association (NFPA) requirements.

1.3. PRODUCT DATA

1. Submit product data in accordance with Division 1. Include product characteristics, performance criteria, physical size, limitations and finish.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1, and with Waste Reduction Workplan.
2. Place materials defined as hazardous or toxic waste in designated containers.
3. Ensure emptied containers are sealed and stored safely for disposal away from children.
4. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
5. Fold up metal banding, flatten and place in designated area for recycling.

PART 2- PRODUCTS

2.1. PICTOGRAM EXIT LIGHTS - GENERAL

1. Pictogram Exit lights: to CSA C22.2 No. 141 and CSA C860.
2. Housing: one piece extruded aluminum, baked white enamel finish.
3. Face and back plates: extruded aluminum, baked white enamel finish.
4. Lamps: LED, non-protruding type, maximum 2 watts per face, to operate from 120V emergency lighting circuit.
5. Designed for 25 year life of continuous operation without relamping.
6. Interchangeable Pictogram Face Plate.
7. Face plate to remain captive for relamping.
8. CSA C860-11 listed and certified model with five year warranty.
9. NRCan Registered.

2.2. DESIGN

1. Universal type for wall, end to wall, or ceiling mounted as required.
2. Number of faces as per drawings.
3. Three faceplates to be provided with each Pictogram Exit, with final faceplate selection based on drawings and site conditions.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install pictogram exit lights as indicated, in accordance with OBC 2012.
2. Connect fixtures to exit light circuits as indicated.
3. Connect emergency circuit to universal DC backup power source as per installation instructions.
4. Ensure that exit light circuit breaker is locked in on position.
5. Provide T-bar grid support brackets for installations on T-bar ceiling.

END OF SECTION 16519

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1, including:
    1. Electrical data of components, including input and output voltages, operating time, phase, AC and DC ampere ratings.
    2. Mounting methods, dimensional outline and accessories.
    3. Lamp heads type, watt/ampere, lumen output, horizontal and vertical adjustments.
    4. Data for battery, charger and auxiliary instruments and devices.

1.3. DELIVERY

1. Deliver batteries in dry state, unless hermetically sealed.
2. Provide electrolyte in hazard-proof container.

1.4. WARRANTY

1. For batteries, the 12 months warranty period prescribed in subsection GC 32.1 of General Conditions “C” is extended to 120 months, with a no-charge replacement during the first 5 years and a pro-rate charge on the second 5 years.
2. Provide written copy of terms of battery guarantee in maintenance manual, and note date of acceptance for start of guarantee period.

PART 2- PRODUCTS

2.1. EQUIPMENT

1. Unit equipment for emergency lighting: to CSA C22.2 No. 141.
2. Supply voltage: Universal Voltage 120 VAC.
3. Output voltage: 12 VDC.
4. Battery: sealed, maintenance free, sized to 30 min. operation plus 20% spare capacity.

Battery capacity to be 360 W, unless otherwise noted.

5. Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variation.

6. Solid state transfer circuit.

7. Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

8. Signal lights: solid state, life expectancy 100,000 h minimum, for 'AC Power ON' and 'High Charge'.

9. Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

10. Finish: white baked enamel.

11. Auxiliary equipment:

    1. Lamp disconnect switch.

    2. Momentary test switch.

    3. Time delay relay.

    4. Battery disconnect device.

    5. Shelf.

    6. Cord and plug connection for ac.

    7. Self-diagnostics (auto-test).

2.2. WIRING OF REMOTE HEADS

1. Conduit: type EMT, to Section 16111.

2. Conductors: RW90 type to Section 16122, sized to limit voltage drop to 5%.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install unit equipment for emergency lighting in accordance with CSA C22.1-12.

2. Install unit equipment and remote mounted fixtures as indicated.

3. Unit equipment shall be mounted with the bottom of the enclosure not less than 2 meters above the floor.

4. Receptacles to which unit equipment is to be connected shall be not less than 2.5 meters above the floor.

5. Connect exit lights to unit equipment as indicated.

6. Clean all heads and direct as indicated by Consultant at type of acceptance.

7. Test each unit and verify operation of all remote heads.

8. Unit equipment shall be installed in such a manner that it will be automatically actuated upon failure of the power supply to the normal lighting in the area covered by that unit equipment.

9. For all battery units that are equipped with self-diagnostics (auto-test), ensure that the system is connected as per manufacturer's instructions. Note that some battery packs with self-diagnostics have two circuits and the circuits should be balanced as close as possible for the system to work properly. Also, the DC side of the system must be connected first before the AC is initiated to prevent damage to the circuit board electronics.

10. Provide complete instruction for the operation and maintenance of the unit equipment for emergency lighting as per the OBC and the manufacturer's recommendations. Instructions to include testing unit equipment at least once a month to ensure proper operation. Installation instructions to be posted on the premises in a frame under glass.

END OF SECTION 16536

ONTC HEARST
MECHANICAL SHOP
HEARST, ON
PROJECT NO. 6083D
MARCH 2024

Piotrowski Consultants Ltd.
1820 Bond Street
North Bay, ON P1B 4V6

I N D E X

PART 1- GENERAL

1.1. GENERAL

1. This section covers items common to all sections of Division 15 and is supplementary to requirements of Division 1.

2. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

3. Coordinate all requirements with General Contractor.

1.2. CODE OF STANDARDS

1. Do complete installation in compliance with latest editions and all amendments of the following Codes and Standards. Where conflicts in requirements occur, the higher standard shall apply:

    1. ASHRAE

    2. SMACNA

    3. CSA

    4. Ontario Building Code

    5. All governing municipal requirements

    6. ULC

    7. LEED Canada for New Construction and Major Renovations 2009.

1.3. DEFINITIONS

1. “Provide” means supply and install.

2. “Approved” means approved in writing by Consultant.

3. “Consultant” means designated qualified professional engineer acting as representative of Owner for monitoring of work.

4. “Manual” means Operations and Maintenance manual.

1.4. CARE, OPERATION, START-UP AND INSTRUCTION TO OWNERS

1. Provide certified personnel to instruct Owner of operation mechanical equipment. Provide maintenance specialist personnel to instruct on maintenance and adjustment of mechanical equipment and any changes or modification equipment must be under terms of guarantee.

2. Provide instruction during regular work hours prior to acceptance and turn over to Owner's staff for regular operation.

3. Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

4. Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn three manuals over to the Owner.

5. Operation and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

6. Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

1.5. PERMITS, CERTIFICATES, FEES AND INSPECTIONS

1. Submit to the Building Department the necessary number of drawings and specifications for examination prior to commencement of work to obtain a building/plumbing permit. Obtain and pay for all building/plumbing permits. Include all costs in the tender price.

2. Submit Notice of Project to Ministry of Labour.

3. Contractor shall be responsible to pay associated fees.

4. Notify Consultant of changes required by Building Department prior to making changes.

5. Notify Consultant upon completion of work.

1.6. COORDINATION WITH EXISTING UTILITIES

1. Before commencing any Work, the Contractor shall determine the locations of all underground utilities and structures indicated in or inferable from the Contract Documents, or that are inferable from an inspection of the Place of the Work.

2. All existing utilities are to be maintained and protected for the length of construction.

3. Contractor to notify consultant if any conflicts arise and allow for minimum 48 hours for consultants review.

1.7. EQUIPMENT REQUIREMENTS AND INSTALLATION

1. Permit equipment maintenance and disassembly by use of unions or flanges to minimize disturbance to connecting piping and duct systems and without interference from building structure or other equipment.

2. Provide accessible means for lubricating equipment including permanent lubricated "lifetime" bearings.

3. Pipe drain lines to drains.

4. Line-up equipment, rectangular cleanouts and similar items with building walls wherever possible.

5. Provide equipment commissioning and preliminary balancing and confirm the proper operation of all equipment and related systems.

1.8. RESPONSIBILITY FOR TRIAL USAGE

1. Obtain written permission to start and test permanent equipment and systems prior to acceptance by Consultant.

2. Consultant may use ventilating equipment and systems for testing.

3. Protect equipment and systems' openings from dirt, dust and other foreign materials during test usage.

1.9. ELECTRICAL

1. Division 15 shall supply and install motors, controls and control wiring, supply starters, switches and relays, for all motor driven equipment under Division 15. Starters, switches and relays shall be handed over to Division 16 for installation and wiring.

2. Electrical equipment not supplied by Division 15 is listed on the drawings or elsewhere in the Specification for quality of material and workmanship.

3. Safety disconnect switches shall be supplied for each rotating equipment unless within viewing distance for motor control but max 6 m (20') supplied by Division 15 and installed by Division 16.

4. Wiring and controls for connections below 50 V, which are related to control systems are the responsibility of Division 15. Refer to Division 16 for quality of materials and workmanship.

    1. Control cables, type LVT, soft annealed copper conductors with thermoplastic insulation and colour coding. Installation in EMT conduit.

    2. Two conductors parallel with an overall thermoplastic jacket; three or more conductors twisted with an overall thermoplastic jacket.

    3. Cable to be installed in EMT conduit or to be plenum rated FT6 type.

1.10. THERMOSTATS AND SENSORS

1. All thermostats, sensors etc to be mounted at 1200mm (47”) above finished floor to centre line of device. Any interference with other devices such as switches, etc to be coordinated with Consultant.

1.11. MOTORS

1. Provide motors for mechanical equipment as specified.

2. If delivery of specified motor will delay delivery of installation of any equipment, install an acceptable motor for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

3. Motors under 373 W (1/2 HP) speed as indicated, continuous duty high efficiency, built in overload protection, resilient mount, single phase, 120 V unless otherwise specified or indicated.

4. Motors 373 W (1/2 HP) to 150 kW (200 HP) T frame, to or exceeding the current Ontario Hydro Motor Efficiency Levels and be listed in the current Ontario Hydro Motor Efficiency Levels Guide as tested to CSA C390M 1985 or IEEE 112B and approved under the Canadian Safety Code, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C (72°F), 3 phase, 208 V or 600 V unless otherwise specified or indicated.

5. Provide a suitable manual or magnetic starter for each piece of equipment supplied under this Division.

6. Provide safety disconnect switches for the above equipment.

7. Division 16 will install all starters, disconnects and line voltage control devices and perform all wiring under supervision of this Division.

1.12. PIPE HANGERS AND SUPPORTS

1. See Section 15140 – Hangers and Supports.

1.13. BELT DRIVES

1. Fit reinforced belts in sheaves matched to drive. Multiple belts to be matched set.

2. Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

3. For motors up to 7.5 kW (10 HP) standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid position of range for specified r/min. Use fixed sheaves for motors 7.6 kW (10 HP) and over. Replace sheaves during balancing if required.

4. Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturers design requirements on prime mover shafts.

5. Motor slide rail adjustment plates to allow for centre line adjustment.

1.14. GUARDS

1. Provide guards for unprotected drives.

2. Guards for belt drives:

1. Expanded metal screen welded to steel frame.

2. Minimum 1.3 mm (18 GA) galvanized sheet metal tops and bottoms.

3. 40 mm (1 1/2") dia holes on both shaft centres for insertion of tachometer.

4. Removable for servicing.

3. Provide means to permit lubrication and use of test instruments with guards in place.

4. Install belt guards to permit movement of motors for adjusting belt tension.

1.15. BUILDING PERMIT

1. Prepare permit application and apply for building permit at local Building Department. Include all costs in tender price. Consultant will provide contract documents in PDF format, contractor responsible to produce hard copies.

1.16. DRAIN VALVES

1. Locate at low points and at section isolating valves unless otherwise specified.

2. Minimum NPS 3/4 unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

1.17. PENETRATIONS

1. Where pipes pass through fire rated walls, floors or partitions, maintain fire rating of assembly in compliance with OBC. Submit shop drawings and details on all products.

2. Provide pipe sleeves at penetrations where pipes pass through masonry or concrete, or where protection is required from galvanic action or physical abrasion.

    1. Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc-rich paint.

    2. Where sleeves pass through masonry or concrete: backfill space around sleeve with masonry or concrete.

    3. Where sleeves pass through walls or floors: caulk space between insulation and sleeve or between pipe and sleeve with waterproof fire retardant non-hardening mastic.

    4. In foundation walls and below grade floors: pipe sleeve to be 1.25x pipe outside diameter or minimum 50mm. Fill space between pipe and sleeve with soft foam insulation.

3. Ensure no contact between copper tube or pipe and ferrous material or sleeve.

4. Continue insulation through penetrations where pipe is required to be insulated.

5. Temporarily plug all openings during construction.

1.18. SLEEVES

1. Size:

    1. Provide 5 mm (1/4") clearance between sleeve and pipe or between sleeve and insulation.

    2. Where piping passes below footings, provide min clearance of 50 mm (2") between sleeve and pipe. Fill void with elastic, water proof material. Backfill up to underside of footing with concrete of same strength as footing.

2. Provide sleeves of minimum 1.0 mm (20 GA) galvanized sheet steel with lock seam joints or use PVC pipe in non rated walls.

3. Use cast iron or steel pipe sleeves with annular fin continuously welded at mid-point through foundation walls.

1.19. ESCUTCHEONS AND PLATES

1. Provide on pipes passing through finished walls, partitions, floors and ceilings.

2. Use split type chrome plated brass, with set screws for ceiling or wall mounting.

3. Inside diameter shall fit around finished pipe. Outside diameter shall cover opening or sleeve.

4. Where sleeve extends above finished floor, escutcheons or plates shall clear sleeve extension.

5. Secure to pipe or finished surface but not insulation.

1.20. TESTS

1. Provide the following supplementary requirements to tests specified:

    1. Give 48 h notice of date when tests will be made.

    2. Do not insulate or conceal work until tested and approved.

    3. Conduct tests in presence of Consultant.

    4. Bear costs including retesting and make good.

    5. Pipe pressure:

        1. Hydraulically test water supply systems at 1-1/2 times system operating pressure or minimum 1050 kPa (150 psig).

2. Maintain test pressures without loss of 4 h unless otherwise specified.

3. Record pressure test results, indicating:

    1. Portion of piping tested.

    2. Test pressure.

    3. Test duration.

    4. Results/Comments.

    5. Type of pipe.

    6. Type of system.

    7. Size of pipe.

4. Submit results to Consultant.

1.21. PAINTING

1. Apply at least one coat of corrosion resistant primer paint to supports, and equipment fabricated from ferrous metals.

2. Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.22. SPECIAL TOOLS

1. Provide one set of special tools required to service equipment as recommended by manufacturers.

1.23. ACCESS DOORS

1. Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

2. Flush mounted 600 mm x 600 mm for body entry and 300 mm x 300 mm for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

3. Material:

    1. Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.

    2. Remaining areas: use prime coated steel.

4. Installation:

1. Locate so that concealed items are accessible.

2. Locate so that hand or body entry (as applicable) is achieved.

3. Installation is specified in applicable sections.

5. Acceptable Material: Nailor 0900 or approved equal.

1.24. DIELECTRIC COUPLINGS

1. Provide wherever pipes of dissimilar metals are joined.

2. Provide felt or rubber gaskets to prevent dissimilar metal contact.

1.25. CUTTING AND PATCHING

1. All cutting and patching shall be by Division 2, coordinated by Division 15. Coordinate with other trades. Notify Structural Engineer before cutting any structural members and obtain written permission.

1.26. CONCRETE WORK

1. Provide 100mm concrete housekeeping pads for all floor mounted equipment, including: boilers, air handlers, pumps, heat and energy ventilators, tanks and furnaces.

1.27. EXCAVATION AND BACKFILLING

1. This Division shall be responsible for coordination for bedding of lines or equipment and for backfilling and compaction to 98% Standard Proctor Density.

1.28. EXISTING SYSTEMS

1. Before submitting tender price verify on job site location of all accessible existing systems affecting execution of this contract. Difficulties arising during construction will not be considered as grounds for additional payment.

2. Where work involves breaking into or connecting to existing systems, carry out work at times directed by governing authorities, with minimum of disturbance to pedestrian traffic.

3. Submit schedule to and obtain approval from Consultant for any shut down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

4. Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

1.29. INSTRUCTIONS TO OWNERS

1. Provide certified personnel to instruct Owner of operation mechanical equipment. Provide maintenance specialist personnel to instruct on maintenance and adjustment of mechanical equipment and any changes or modification equipment must be under terms of guarantee.

2. Training plans to be submitted prior to the execution of the training. At a minimum, training plans to include the list of systems and equipment which are to be trained on. Instructor's name and qualifications and allotted time for training. Training plans to be reviewed and approved by Owner and Consultant prior to commencement of training.

3. Provide instruction during regular work hours prior to acceptance and turn over to Owner's staff for regular operation.

4. Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn three manuals over to the Owner.

5. Operation and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

1.30. OPERATION & MAINTENANCE MANUALS

1. Provide one (1) paper copy and one "PDF" format on USB stick of Mechanical Operation and Maintenance Manuals complete with As-built Drawings, in accordance to the following and Section 01300 - Submittals.

2. Mechanical Operation and Maintenance Manuals to be delivered to the Engineer's office in accordance with Section 01300 - Submittals.

3. Manuals to be bound in hard cover neatly labeled: "OPERATING AND MAINTENANCE INSTRUCTIONS".

4. The Operation and Maintenance Manuals shall be divided into sections with neatly labeled and tabbed dividers between each section. The sections to be included in the manual are:

    1. Section I – General

    2. Section II – Piping and Pump Systems

    3. Section III – Heating, Air Conditioning and Ventilation

    4. Section IV – Automatic Controls

    5. Section V – Sprinkler System

    6. Section VI – Air and Hydronic Balancing Report

5. The following information shall be contained within the sections:

    1. SECTION I: A list giving name, address and telephone number of the Consultant, Engineers, Construction Manager, Mechanical Trade and Controls Trade. Written guarantees for the Mechanical Systems. A copy of the Valve directory giving number, valve location, normal valve position, and purpose of valve. A framed copy of valve directory to be hung in Mechanical Room. Equipment lists and certificates

shall be provided. Certificates shall be signed and sealed by the appropriate suppliers. All major equipment including but not limited to boilers, cooling towers, chillers, air handling units, isolators, silencers, pumps and humidifiers are to be inspected by the manufacturer to ensure the equipment has been installed in accordance with their recommendations.

2. SECTION II, III and IV: A copy of all pressure tests and operational tests for pumping system. A copy of Gas Operational Tests for gas fired equipment. A list giving name, address and telephone number of all suppliers. A copy of all approved Shop Drawings. Copies of warranties.

3. SECTION IV: Complete Control Diagrams, Wiring Diagrams and description of Control system and the functioning of the system. A copy of all shop drawings and all calibration certificates. Shop drawings shall be the updated record drawings.

4. SECTION V: A copy of all shop drawings. Copies of all warranties. Maintenance information.

5. SECTION VI: Provide complete air balance report including pump and fan curves, measured values and floor plans showing location of all traverse readings and grille measurements. Provide copies of all pressure tests completed on the systems.

6. MAINTENANCE MATRIX

1. A maintenance matrix is to be provided in the Operation and Maintenance Manuals. The matrix shall indicate each piece of equipment and the required maintenance tasks and the frequency at which they are to be carried out.

1.31. OWNER OCCUPANCY SCHEDULE

1. The existing building will remain occupied during normal occupancy hours.

2. Provide temporary protection for all finishes, appliances or equipment in the existing building.

3. Protect and maintain existing boiler room and electrical room operations during the work.

1.32. AS-BUILT DRAWINGS

1. Site records:

1. One set to be kept on site and all changes to be recorded on daily basis. At the completion of the project, all changes shall be transferred to clean set, signed and passed to the Consultant. Provide “PDF” format of As-Built Drawings on USB stick with Maintenance Manuals at completion of project.

2. Make these drawings available for reference purposes and to inspection at all times.

2. Submit 2 copies of as-built marked up prints with final TAB report.

3. As-built drawings must be delivered before system acceptance.

1.33. BUILDING SERVICE CONNECTIONS

1. Make arrangements with all Utilities for building service connections and include all costs in tender price.

1.34. SPARE PARTS

1. Provide three (3) sets of spare filters for each air handling unit, heat recovery ventilator.
2. One (1) set of belts from any motor driven mechanical components.
3. Leave spare parts on site. Coordinate storage location with the Owner.

1.35. TRAINING

1. Provide minimum of two 6 hour training sessions on systems.
2. Include for training in Fall to winterize system.

END OF SECTION 15010

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate on manufacturer's catalogue literature the following:
    1. Thermometers.
    2. Pressure gauges.
    3. Stop cocks.
    4. Wells.

1.3. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified.

PART 2- PRODUCTS

2.1. GENERAL

1. Thermometers and pressure gauges to operate at mid point of scale or range.

2.2. DIRECT READING THERMOMETERS

1. Industrial, variable angle type, liquid in glass, cast aluminum case, lens front, 225 mm (9”) scale length, dual °F and °C range. Stem lengths to be 50% of pipe i.d. Thermometers to meet: CAN/CGSB 14.4, ASME B40.4.

2.3. REMOTE READING THERMOMETERS

1. 100 mm diameter activated dial type, accuracy within one scale division, brass movement, stainless steel capillary, stainless steel spiral armour, stainless steel bulb and polished brass or stainless steel case for wall mounting. Capillary to have an extra length of at least 5 ft. Thermometers to meet: CAN/CGSB 14.4, ASME B40.

2.4. THERMOMETER WELLS

1. Copper pipe: copper or bronze.
2. Steel pipe: brass or stainless steel.
3. Provide extension necks where insulation is present.
4. Acceptable Product: WIKA TI.901; Winters TIM.

2.5. PRESSURE GAUGES

1. 112 mm, dial type, grade A, 1% accuracy full scale unless otherwise specified. Wetted parts to be of phosphor bronze bourdon tube. Dual scale PSI/Kpa.
2. Acceptable Material: WIKA 213.53.
3. Provide liquid fill on all pump systems
4. Provide siphons for steam service
5. Provide bronze stop cocks for isolation
6. Provide diaphragm seals for corrosive services.

PART 3- EXECUTION

3.1. GENERAL

1. Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.
2. Install engraved lamicoid nameplates as specified in Section 15190 - Identification, identifying medium.
3. Install between equipment and first fitting or valve.

3.2. THERMOMETERS

1. Install in wells on all piping. Provide heat conductive material for inside of well.
2. Install in locations as indicated and on:
    1. Common return to boilers.
    2. Outlet of every boiler.
    3. On each return and supply.

4. On every heating coil.

5. Outlets of heat exchanger.

3. Use extensions where thermometers are installed through insulation.

4. Provide well in supply pipe header for indoor/outdoor controller temp. sensor.

3.3. PRESSURE GAUGES

1. Install in following locations:

    1. Suction and discharge of pumps.

    2. In other locations as indicated.

2. Use extensions where pressure gauges are installed through insulation.

END OF SECTION 15130

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ASME B31.1-2012, (SI), Power Piping, (SI Edition).
2. MSS-SP-58-2009, Pipe Hangers and Supports - Materials, Design and Manufacture.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate on manufacturer's catalogue literature the following:
    1. Upper attachment.
    2. Middle attachment.
    3. Pipe attachment.
    4. Riser clamps.
    5. Shields and saddles.
    6. Sway braces.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.

PART 2- PRODUCTS

2.1. GENERAL

1. Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58.
2. Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

2.2. UPPER ATTACHMENTS

1. Concrete:
    1. Anchors for existing concrete roof structure, heavy duty anchors Hilti HSL.
2. Steel beam (bottom flange):
    1. Cold piping NPS 2 and under: malleable iron C clamp to MSS-SP-58, type 19. ULC listed.
    2. Cold piping NPS 2-1/2 and larger and all hot piping: malleable iron beam clamp to MSS-SP-58, type 28 or 29. ULC listed.
3. Steel beam (top):
    1. Cold piping NPS 2 and under: malleable iron "top of beam" C clamp to MSS-SP-58, type 19. ULC listed.
    2. Cold piping NPS 2-1/2 and larger and all hot piping: steel jaw, hook rod with nut, spring washer and plain washer, to MSS-SP-58, type 25. ULC listed.
4. Steel joist:
    1. Cold piping NPS 2 and under: steel washer plate with double locking nuts.
    2. Cold piping NPS 2-1/2 and larger and all hot piping: steel washer plates with double locking nut, carbon steel clevis and malleable iron socket.
5. Steel channel or angle (bottom):
    1. Cold piping NPS 2 and under; malleable iron C clamp to MSS-SP-58, type 23. ULC listed.
    2. Cold piping NPS 2-1/2 and larger and all hot piping; universal channel clamp. ULC listed.
6. Wood trusses and joists.
    1. Hold piping NPS2 and under. Secure angle iron 32 x 32 x 3 mm (1 1/2" x 1 1/2" x 3/16") on top of joist or bottom chord trusses. Space min. 2 joints. Use rod hanger with locking nut and clevis hanger.
    2. Cold piping NPS 2 1/2 and larger. Secure angle iron 50 x 50 x 4 mm on top of joists or bottom chord of trusses. Span min. 4 members. Use rod hangers with locking nut and clevis hanger.

2.3. MIDDLE ATTACHMENT (ROD)

1. Carbon steel threaded rod black finish, galvanized in mechanical rooms.

2.4. PIPE ATTACHMENT

1. Cold piping, steel or cast iron: hot piping steel, with less than 25 mm, 1" horizontal movement; hot piping, steel, with more than 300 mm, 12" middle attachment rod length: adjustable clevis to MSS-SP-58, type 1. ULC listed.

2. Cold copper piping; hot copper piping with less than 25 mm, 1" horizontal movement; hot copper piping with more than 300 mm, 12" middle attachment rod length: adjustable clevis to MSS-SP-58, type 1. Copper plated.

3. Suspended hot piping, steel and copper, with horizontal movement in excess of 25 mm, 1"; hot steel piping with middle attachment rod 300 mm, 12" or less; pipe roller to MSS-SP-58, type 43.

4. Bottom supported hot piping, steel and copper: pipe roller stand to MSS-SP-58, type 45.

2.5. RISER CLAMPS

1. Steel or cast iron pipe: black carbon steel to MSS-SP-58, type 42. ULC listed.

2. Copper pipe: carbon steel copper finished to MSS-SP-58, type 42.

2.6. SADDLES AND SHIELDS

1. Hot and Cold piping NPS 1-1/4 and over: protection shield with high density insulation under shield with uninterrupted vapour barrier.

PART 3- EXECUTION

3.1. HANGER SPACING

1. Spacing and middle attachment rod diameter as specified in paragraphs below or as in table below, whichever is more stringent.

    1. Plumbing piping: most stringent requirements of Ontario Building Code, or authority having jurisdiction.

    2. Fire protection: to applicable fire code.

    3. Gas piping: up to NPS 1/2: every 6', 1.8 m

    4. Copper piping: up to NPS 1/2: every 5' 1.5 m

    5. Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

    6. Within 12" of each horizontal elbow.

Pipe Size (Nominal)	Rod Diameter	Maximum Steel	Spacing Cooper
NPS 1/2	10 mm 3/8"	1.8m 6'	5' 1.5m
NPS 3/4, 1	10 mm 3/8"	2.1m 7'	6' 1.8m
NPS 1-1/4	10 mm 3/8"	2.1m 7'	8' 2.4m
NPS 1-1/2	10 mm 3/8"	2.7m 9'	8' 2.4m
NPS 2	10 mm 3/8"	3.0m 10'	9' 2.7m
NPS 2-1/2	10 mm 3/8"	3.0m 10'	10' 3.0m
NPS 3 to 4	10 mm 3/8"	4.6m 15'	12' 3.6m
NPS 6	19 mm 3/4"	5.1 m 17'	--

3.2. HANGER INSTALLATION

1. Offset hanger so that rod is vertical in operating position.

2. Adjust hangers to equalize load.

3. Loads suspended from steel structure to be reviewed and analyzed with structural engineer/general contractor.

END OF SECTION 15140

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. CGSB 1-GP-60M, Enamel, Interior, Gloss, Alkyd Type.
2. CGSB 24-GP-3a Identification and Classification of Piping Systems.

1.3. SAMPLES

1. Submit samples in accordance with Section 01300 - Submittals.
2. Submit samples and lists of proposed wording for approval before engraving.

PART 2– PRODUCTS

2.1. MANUFACTURERS NAMEPLATES

1. Provide metal nameplate on each piece of equipment, mechanically fastened complete with raised or recessed letters.
2. Indicate size, equipment model, manufacturer's name, serial number, voltage, cycle, phase and power of motors.

2.2. SYSTEM NAMEPLATES

1. Colour:
    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, square corners, letters accurately aligned and machine engraved into core.
3. Sizes:

1. Conform to following table:

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

2. Use average of 25 letters/numbers (maximum) per nameplate.

3. Use size #6 for terminal cabinets and control panels.

4. Use size #9 for equipment in mechanical rooms.

5. Facilities Inspection Program (FIP) identification:

1. General: use system of Main Identifier, Source Identifier, Destination Identifier.

2. Equipment and Mechanical Rooms: Main Identifier: size #9; Source and Destination Identifiers: size #5.

3. Elsewhere: Sizes as appropriate.

2.3. PIPING

1. General

1. To CGSB 24-GP-3a.

2. Identify medium by lettered legend, classification by primary and secondary colours, direction of flow by arrows.

2. Sizes:

1. Legend: block capitals to following table:

Outside Dia. of Pipe or Insulation mm	in	Size of Letters mm	in
30	1-1/4	13	1/2
50	2	19	3/4
150	6	32	1-1/4
250	7	63	2-1/2
Over 250	8	88	3

2. Primary colour bands:

    1. At valves and fittings: 460 mm, 18" long.

    2. Elsewhere: 1.8 m, 42" long.

    3. Secondary colour bands: 50 mm, 2" wide, 75 mm, 3" in from one end of primary colour band.

3. Arrows:

    1. Outside diameter of pipe/insulation 75 mm and greater: 150 mm, 6" long x 50 mm, 2" high.

    2. Outside diameter of pipe/insulation less than 75 mm, 3": 100 mm, 4" long x 50 mm, 2" high.

    3. Use double headed arrows where flow is reversible.

3. Material:

    1. Paint: to CGSB 1-GP-60M.

    2. Legend markers, arrow colour bands: plastic coated cloth material with protective overcoating and waterproof contact adhesive undercoating, suitable for 100% RH and continuous operating temperature of 150°C (300°F). Apply to prepared surfaces. Wrap tape around pipe or pipe covering with ends overlapping one (1) pipe diameter.

    3. Waterproof and heat resistant plastic marker tags: for pipes and tubing 3/4" nominal and smaller.

    4. Acceptable material: Brady

4. Colours:

    1. Where not covered by table below, submit legend, primary and secondary classification colours to Consultant for approval.

5. Table:

    1. Pipe and valve identification.

Pipe Marker Legend	Valve Tag Legend	Primary Colour	Secondary Colour
Hot Water Htg Supply	H.W.H.S	Green	None
Hot Water Htg Return	H.W.H.R.	Green	None
Glycol Heating Supply	G.H.S.	Green	None

Glycol Heating Return	G.H.R.	Green	None
Gas Line	Gas	Green	None
Cold Water	C.W.	Green	None
Hot Water	H.W.	Green	None
Recirc. Hot Water	R.H.W.	Green	None

2. Legend and arrows:

    1. Black or white to contrast with primary colour.

    2. Fire protection: white on red background.

3. Fire protection system:

    1. Exposed piping identify only.

4. Natural gas:

    1. Paint entire system.

5. Low voltage control wiring installed by Division 15.

2.4. DUCTWORK

1. 2" high black stencilled letters and directional flow arrows 6" long x 2" high.

2.5. VALVES AND CONTROLLERS

1. Brass tags with 1/2" stamped code lettering and numbers filled with black paint.

2. Furnish Consultant with six identification flow diagrams of approved size for each system. Include valve tag schedule, designating number, service, function and location of each tagged item and normal operating position of valves.

2.6. CONTROLS IDENTIFICATION

1. Identify all systems, equipment, components, controls and sensors.

2. Inscription to identify function and fail-safe position.

PART 3- EXECUTION

3.1. GENERAL

1. Do identification work in accordance with CGSB 24-GP-3a except where specified otherwise.

2. Provide ULC and/or CSA registration plates, as required by respective agency.

3. Identify systems and equipment to conform to PWC, FIP.

3.2. LOCATION OF NAMEPLATES

1. In conspicuous location to facilitate easy reading from operating floor and to properly identify equipment and/or system.

2. Provide stand-offs for nameplates on hot surfaces and insulated surfaces.

3. Do not insulate or paint over plates.

3.3. PIPING

1. Locations:

    1. On long straight runs in open areas in boiler rooms, mechanical room, and tunnel so that at least one is clearly visible from any one viewpoint in operating areas or walking aisles and not at more than 15 m, 50' intervals.

    2. Adjacent to all changes in direction.

    3. At least once in each small room through which piping passes.

    4. On both sides of visual obstruction or where run is difficult to follow.

    5. On both sides of any separation such as walls, floors and partitions.

    6. Where piping is concealed in pipe chase, ceiling space, or other confined space, at entry and leaving points and adjacent to each access opening.

    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. Where this is not possible, place identification as close to valve as possible, preferably on upstream side.

    9. Legend to be easily and accurately readable from usual operating areas and all readily accessible points.

    10. Plane of legend to be approximately at right angles to most convenient line of sight with consideration of operating positions, lighting conditions, reduced visibility of colour or legends caused by dust and dirt and risk of physical damage.

3.4. DUCTWORK

1. Stencil over final finish only.

2. Locations of ductwork identification:

    1. On long straight runs in open areas in boiler rooms, equipment rooms, so that at least one is clearly visible from any one viewpoint in operating areas or walking isles and not at more than 15 m, 50' intervals.

    2. Adjacent to all changes in direction.

    3. At least once in each small room through which ductwork passes.

    4. On both sides of visual obstruction or where run is difficult to follow.

    5. On both sides of any separation such as walls, floors and partitions.

    6. Where ductwork is concealed in duct chase, or other confined space, at entry and leaving points and adjacent to each access opening.

    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 dampers. Where this is not possible, place identification as close to damper as possible, preferably on upstream side.

    9. Legend to be easily and accurately readable from usual operating areas and all readily accessible points.

    10. Plane of legend to be approximately at right angles to most convenient line of sight with consideration of operating positions, lighting conditions, reduced visibility of colour or legends caused by dust and dirt and risk of physical damage.

    11. Beside each access door.

3.5. VALVES AND CONTROLLERS

1. Secure tags with non-ferrous chains or closed "S" hooks for valves and operating controllers except at plumbing fixtures and radiation.

2. Install one copy of flow diagram and valve schedule mounted in frame with non-glare glass where directed by Consultant. Provide one copy in each operating and maintenance instruction manual.

3. Consecutively number valves system.

END OF SECTION 15190

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. Do thermal insulation in accordance with ACNBC, ASTM E96-66(1972) and ASTM C411-61 (1975).

2. Fire hazard rating:

    1. Meet NFPA 90A-2002, NFPA 225-1984 and CAN4-S102-M83 for all components of insulation system.

3. LEED Canada for New Construction and Major Renovations 2009.

1.3. DEFINITIONS

1. “CONCEALED” - insulated mechanical services in chases, furred spaces, pipe shafts or hung ceilings.

2. “EXPOSED” - will mean “not concealed” as defined herein.

PART 2- PRODUCTS

2.1. FORMED FIBROUS GLASS TO 200°C

1. Application: insulation system for piping, valves, heat exchangers, headers, fittings, etc. maximum temperature 200°C. On domestic hot water and recirculating piping, fittings and all hydronic heating hot water and glycol systems.

2. Materials:

    1. CGSB 51-GP-9M, rigid mineral fibre sleeving for piping, including foilcraft laminate packet with open mesh fibre scrim reinforcing.

    2. Acceptable materials: Knauff; Fibreglass Rigid-Wrap pipe insulation.

3. Thickness:

    1. Domestic hot water and recirculating lines – located in conditioned spaces:

Line Size Nominal	Thickness Nominal
Up to NPS 1 1/4"	25 mm (1")

NPS 1 1/2" and larger	40 mm (1 1/2")
Run-outs to fixtures	
For max. of 2.4 m (8')	25 mm (1")

2. Hydronic hot water and glycol heating media temperature up to 200°F/93°C:

Line Size Nominal	Thickness Nominal
Run-outs Up to	
3.7 m (12')	38 mm (1 1/2")
NPS 3/4" to 1 1/4"	38 mm (1 1/2")
NPS 1 1/2" to 8"	50 mm (2")

3. Steam and condensate piping systems:

Line Size Nominal	Thickness Nominal
Run-out up to 1"	63 mm (2 1/2")
NPS 1" to 4"	63 mm (2 1/2")
NPS 4" to 8"	76 mm (3")

2.2. FORMED FIBROUS GLASS WITH V.B. -14 TO 37°C

1. Application: insulation system for piping, valves, heat exchangers, headers, fittings, etc., for temperature range - 14 to 37°C. On domestic cold water, rain water leaders, above grade storm and condensate lines.

   Media Temperature 41 to 56°F / 5 to 13°C

Line Size Nominal	Thickness Nominal
Up to NPS 1 1/4"	13 mm (1/2")
NPS 1 1/2 and over	25 mm (1")

2. Materials:

   1. CGSB 51-GP-9M, rigid mineral fibre sleeving for piping, and CGBS 51-GP-52M vapour barrier jacket. Complete with factory applied foil laminate, reinforced with open mesh fibre scrim.

3. Thickness – Media temperature <41°F/<5°C:

Line Size Nominal	Thickness Nominal
Up to NPS 3/4"	13 mm (1/2")
Up to NPS 1" - 6"	25 mm (1")
NPS 8" and larger	38 mm (1 ½")

2.3. FLEXIBLE ELASTOMERIC CLOSED CELL FOAM TO 82°C

1. Application – insulation of refrigeration lines, oil cooler piping, purge lines, evaporator heads, and other parts subject to sweating.

2. Material:

1. ASTM C534, sheet self-adhering, roll type, elastomeric closed cell foam, thermal performance 0.04 W/M/C @ 24°C.

3. Acceptable Material:

1. Armstrong – AP Armaflex self-adhering sheet insulation; Rubatex

2. Insulation Thickness – 20 mm

2.4. FASTENINGS

1. Self-adhesive tape and 100% coverage lagging adhesives.

1. Self-adhesive tape rated under 25 for flame spread and under 50 for smoke development.

2. For vapour barrier:

1. Quick-setting adhesive for joints and lamps sealing of vapour barriers. Flame spread 10 smoke development 0.

2.5. JACKETS

1. Fire retardant PVC jackets:

1. Apply in all exposed areas (mechanical, boiler, storage rooms, classrooms, etc,) or other areas as noted on drawings.

2. One-piece moulded type and sheet with pre-formed shapes at elbows, tees, valves, end-caps, reducers etc. as required.

3. Fastening: Use solvent weld adhesive compatible with insulation, tacks, and/or vinyl tape of matching colour to seal laps and joints.

4. Indoor: flame/smoke rating of 25/50 or less.

5. Outdoor: UV rated material at least 0.5 mm thick.

2. Canvas:

1. Compact, firm, ULC listed, fire rated, heavy plain weave cotton fabric at 220g/m^2 (0.83 oz/sq. ft.)

2. On concealed valves and fittings use ULC listed, fire rated, plain weave cotton fabric at 120 g/m^2 (0.38 oz/sq. ft.)

3. Aluminum Outer Jacket:

1. Fabricated weather resistant coating, gauge as manufacturer's recommendation.

2. Apply to piping exposed to weather.

PART 3- EXECUTION

3.1. APPLICATION

1. Apply insulation after required tests have been completed and approved by Consultant. Insulation and surfaces shall be clean and dry when installed and during application of any finish. Apply insulation materials, accessories and finishes in accordance with manufacturer's recommendations and as specified herein.

2. On piping with insulation and vapour barrier, install high density calcium silicate block under hanger shield and metal saddle. Maintain integrity of vapour barrier over full length of pipe without interruption at sleeves, fittings and supports.

3.2. INSTALLATION

1. Install in accordance with ANSI/NFPA 90A and ANSI/NFPA 90B.

2. Perform insulation work using qualified insulation applicators, in accordance with latest trade application methods and to the Consultant’s approval.

3. Work to begin only when building is enclosed preventing insulation from getting wet due to elements such as rain, snow, construction, etc. All damaged or wet insulation to be replaced.

4. All piping (Section 15260) and ductwork (Section 15270) insulation to be continuous except at fire barriers.

5. Preformed: sectional up to NPS 12, sectional or curved segmented above NPS 12.

6. Multi-layered: staggered butt joint construction.

7. Vertical pipe over NPS 3: insulation supports welded or bolted to pipe directly above lowest pipe fitting. Thereafter, locate on 3 m, 15' centres.

8. Expansion joints in insulation: terminate single layer and each layer of multiple layers in straight cut at intervals recommended by manufacturer. Leave void of 25 mm, 1" between terminations. Pack void lightly with flexible mineral insulation.

9. Seal and finish exposed ends and other terminations with insulating cement.

10. Expansion joints in piping: provide for adequate movement of expansion joint without damage to insulation or finishes.

11. Orifice plate mounting flanges, flanges and unions at equipment, expansion joints, valves, other components requiring regular maintenance.

12. Insulation is not required for:

1. Chrome plated piping, valves and fittings.

3.3. FASTENINGS

1. Secure pipe insulation by tape at each end and centre of each section, but not greater than 1 m (36") on centres.

END OF SECTION 15260

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ASTM C411-11, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
2. CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.
3. ANSI/NFPA 90A-2012, Air Conditioning and Ventilating Systems, Installation of.
4. ANSI/NFPA 90B-2012, Warm Air Heating and Air Conditioning Systems.
5. CGSB 51-GP-10M-76, Thermal Insulation, Mineral Fibre, Block or Board, for Ducting, Machinery and Boilers.
6. CGSB 51-GP-11M-76, Thermal Insulation, Mineral Fibre, Blanket for Piping, Ducting, Machinery and Boilers.
7. CGSB 51-GP-52Ma-89, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

1.3. SHOP DRAWINGS

1. Submit shop drawings in accordance with Section 01300 - Submittals.
2. Submit for approval manufacturer's catalogue literature related to installation.

1.4. DEFINITIONS

1. For purposes of this section:
    1. "CONCEALED" - insulated mechanical services and equipment in hung ceilings and non-accessible chases and furred spaces.
    2. "EXPOSED" - will mean "not concealed" as defined herein.

PART 2 - PRODUCTS

2.1. GENERAL

1. All components of insulation system to have maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with CAN/ULC-S102.

2. Materials to be tested in accordance with ASTM C411.

2.2. D-2 MINERAL FIBER BLANKET WITH VAPOUR BARRIER MINUS 40 TO PLUS 150°F

1. Application: on round or oval ducting, either cold or dual temperature.

    1. Supply air conditioning ducting with exception of where exposed to conditioned space.

    2. Fresh air intake from louvre to HRV, ERV and A/H units.

    3. Exhaust and relief air ducting from HRV, ERV and A/H units to exhaust louvre or hood.

    4. Exhaust air from exhaust fan, hood.

    5. Or as indicated.

2. Material:

    1. CGSB 51-GP-11M, mineral fiber blanket; CGSB 51-GP-52M for vapour barrier.

    2. Acceptable material: Fibreglass MDS 103

3. Thickness: 25 mm, 1"

2.3. D-3 MINERAL FIBER BLANKET - ELEVATED TEMPERATURE TO 537°C (1000°F)

1. Application:

    1. Boiler breeching and boiler vent stack - round.

2. Material:

    1. CGSB 51-GP-11M inorganic glass fiber bonded by high temperature thermosetting resin.

3. Thickness: 50 mm (2").

2.4. D-4 MINERAL FIBER RIGID WITH VAPOUR BARRIER TO 65°C

1. Application: on cold or dual temperature rectangular ducting.

    1. Supply air conditioning ducting with exception of where exposed in conditioned space.

2. Fresh air intakes from louvre to HRV, ERV and A/H units.

3. Exhaust and relief air ducting from HRV, ERV and A/H units to exhaust louvre or hood.

4. Exhaust air from exhaust fan, hood.

5. Or as indicated.

2. Material:

1. CGSB 51-GP-10M, rigid mineral fiber board; CGSB 51-GP-52M vapour barrier, jacket and facing material.

2. Acceptable material: Fibreglass MDS 101

3. Thickness:

1. One 25 mm, 1" layer on: supply return and exhaust air ducts.

2. Two-1 1/2" layers on: intake ducts, supply and return ductwork installed on roof or outside.

2.5. FASTENINGS

1. Tape: self adhesive, 100 mm, 4" wide, aluminum, ULC labelled for less than 25 flame spread and less than 50 smoke developed.

2. Contact adhesive: quick-setting.

3. Lap seal adhesive: quick-setting for joints and lap sealing of vapour barriers.

4. For Canvas:

1. Washable adhesive for cementing canvas lagging cloth to duct insulation.

5. Pins.

1. Weld pins 4 mm, 3/16" diameter, with 40 mm, 1 1/2" diameter head for installation through the insulation. Length to suit thickness of insulation.

2.6. JACKET

1. Canvas.

1. Apply in exposed areas (boiler, mechanical, electrical, IT rooms and other areas as noted on drawings): ULC listed, fire rated, plain weave, cotton fabric at 220 g/m^2.

2. Acceptable material: Fatal Thermo Canvas

2. Aluminum Outer Jacket:

    1. Fabricated weather resistant coating, 24 gauge with rising seams.

    2. Apply to ductwork exposed to weather.

    3. Apply to breeching, chimney insulation.

PART 3– EXECUTION

3.1. APPLICATION

1. Apply insulation after required tests have been completed and approved by Consultant. Insulation and surfaces shall be clean and dry when installed and during application of any finish. Apply insulation materials, accessories and finishes to manufacturer's recommendations and as specified.

2. Vapour barriers and insulation to be unbroken over full length of duct or surface, without penetration for hangers, standing duct seams and without interruption at sleeves and supports.

3. Use stand-offs for all duct mounted control accessories.

4. Apply 1 mm. 20 ga galvanized sheet metal corners to all ductwork in mechanical rooms.

3.2. INSTALLATION

1. General:

    1. Install in accordance with ANSI/NFPA 90A and ANSI/NFPA 90B.

    2. Perform insulation work using qualified insulation applicators, in accordance with latest trade application methods and to the Consultant’s approval.

    3. Work to begin only when building is enclosed preventing insulation from getting wet due to elements such as rain, snow, construction, etc. All damaged or wet insulation to be replaced.

    4. All piping (Section 15260) and ductwork (Section 15270) insulation to be continuous except at fire barriers.

    5. Adhere and seal vapour barrier using vapour seal adhesives.

    6. Stagger longitudinal and horizontal joints, on multilayered insulation.

2. Mechanical fastenings:

    1. On rectangular ducts, use 50% coverage of insulating cement and weld pins at not

more than 200 mm, 8" centres, but not less than 2 rows per side and bottom.

END OF SECTION 15270

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ANSI/NFPA 10, Portable Fire Extinguishers.
2. CAN4-S508, Rating and Fire Testing of Fire Extinguishers.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.

PART 2- PRODUCTS

2.1. MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS

1. Cartridge operated type or Stored pressure rechargeable type with hose and shut-off nozzle, ULC labelled for A, B and C class protection. Size 4.5 kg 4-A, 60-BC rated.

2.2. EXTINGUISHER BRACKETS

1. Type recommended by extinguisher manufacturer.

2.3. FIRE EXTINGUISHER CABINETS

1. Flush type or semi recessed as indicated, constructed of 1.6 mm (16 GA) thick steel, 180° opening door of 2.5 mm (12 GA) thick steel with latching device.
2. Cabinet to maintain fire resistive rating of construction in which they occur.
3. Cabinet door: with glass.
4. Finish:

1. Tub: prime coated.

2. Door and frame: brushed stainless steel.

2.4. IDENTIFICATION

1. Identify extinguishers in accordance with recommendations of ANSI/NFPA 10 CAN4-S508.

2. Attach bilingual tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install or mount extinguishers in cabinets or on brackets as indicated.

2. Install fire safety blankets as indicated.

END OF SECTION 15305

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. All brass, bronze fittings and valves shall be “Lead Free Design”.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.

1.3. SHOP DRAWINGS

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following: valves.

PART 2- PRODUCTS

2.1. PIPING

1. Domestic hot, cold and recirculating tubing, within building.
    1. Above ground: copper tube, hard drawn, type L: to ASTM B88M-16.
    2. Buried: soft copper tube, type K soft, with silfoss soldered joints: to ASTM B88M-16.

2.2. FITTINGS

1. Brass or bronze flanges and flanged fittings: to ASME B16.24-2016.
2. Brass or bronze threaded fittings: to ASME B16.15-2013.
3. Cast bronze to ASME B16.18-2012 or wrought copper and bronze to ASME B16.22-2013.

2.3. JOINTS

1. Solder, tin antimony, 95:5 to ASTM B32-08 (2014) or approved type lead free.

2.4. VALVES

1. For Sizes 50mm (2”) and under 1034KPA (150psig) 600 WOG,

    1. Brass Body to NSF/ANSI 61-G (Lead Free Brass) Full Port, PTFE Seats, Double ”O” Ring or Teflon packing. TEA Plated Forged Brass C49300 Vented Solid Ball, Blowout Proof Stem, Lever handle.

    2. Standard of Acceptance:

        1. Kitz 859 (Solder) Kitz 858 (NPT) or approved Equal

2. NPS 2 1/2 and over, grooved ends:

    1. Epoxy Coated Cast Iron Body Grooved ends, Teflon Fused Solid Ball, Full Port Rated 200 WOG @200F Class VI shutoff, 100% Lead Free,Ansi,NSF61-8

    2. Acceptable material: American 3700V or Approved Equal

        1. Option American 3700 Flanged end connection 2” to 8” or Approved Equal

2.5. SWING CHECK VALVES

1. Check Valves- Back Flow Prevention

    1. For sizes 50mm (2”) and under, 860kPa (125psig) 200WOG. Bronze body to ASTM C89530 (Lead Free Bronze) Screwed Cap C49300 (Lead Free Brass) Integral Seat, PTFE Disc.

        1. Swing “ Y” Pattern

        2. Screwed Ends Kitz 822T

        3. Soldered Ends Kitz 823T

    2. For sizes 65mm (2 ½”) and over use Class 150 Stainless Steel A351 CF8M Body, Trim#10, Bolted Cover PTFE Gasket, Flanged.

        1. Swing Check Flanged Kitz 150UOAM or Approved Equal

        2. Option:

            1. Wafer Check
            2. Stainless Steel, A351 CF8M Body, Class 150, 316 Stainless steel Trim

        3. Single Flapper – Moygro W15A-666 or Approved Equal

        4. Double Door

            1. Stainless Steel A351 CF8M body, Class 150, 316 Stainless steel Trim

        5. Mueller Steam Specialty Model # 72HHHTH, or Approved Equal.

2.6. DOMESTIC BALANCING VALVES

1. Lead free 200psi. Non-shock cold working pressure, NSF/ANSI 61 and 372 certified. NIBCO PC-1810-LF or approved equal.

PART 3- EXECUTION

3.1. INSTALLATION

1. Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.

2. Install tubing close to building structure to minimize furring, conserve head room and space. Group exposed piping and run parallel to walls.

3. Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.

4. Lay buried tubing in accordance with AWWA Class "B" bedding.

5. Isolate equipment, fixtures and branches with gate valves.

6. Provide necessary chemicals and equipment and disinfect system to requirements of authority having jurisdiction.

7. Coordinate with the Building Inspector to witness tests and inspect work.

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.
2. LEED Canada for New Construction and Major Renovations 2009.

PART 2- PRODUCTS

2.1. COPPER TUBE AND FITTINGS

1. Above ground sanitary and vent Type DWV to: ASTM B306-13 up to 2 1/2".
    1. Fittings.
        1. Cast brass: to CSA B158.1-1976.
        2. Wrought copper: to ANSI B16.29-2012.
    2. Solder: tin-lead, 50:50, to ASTM B32-08, type 50A.

2.2. CAST IRON PIPING AND FITTINGS

1. Above ground sanitary storm and vent: to CAN3-B70-M86 3" and larger.
    1. Joints.
        1. Mechanical joints.
            1. Neoprene or butyl rubber compression gaskets with stainless steel clamps.
    2. Cast iron couplings.
        1. Complete with neoprene gaskets and stainless steel bolts and nuts.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Install buried pipe on 6" bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. Backfill with 6" of clean washed sand.

2. Install piping parallel and close to walls and ceilings to conserve headroom and space, and to grade indicated.

3. Coordinate with the Building Inspector to witness tests and inspect work.

END OF SECTION 15413

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.

2. LEED Canada for New Construction and Major Renovations 2009.

PART 2- PRODUCTS

2.1. PIPING AND FITTINGS

1. For buried sanitary storm and vent piping up to NPS3 to:

    1. CAN3-B181.2-M87 for PVC DWV with solvent weld joints.

2. For buried sanitary and storm piping NPS 4 and larger to:

    1. CAN/CSA-B182.1 and B182.2, BNQ 3624-130DR35. With Ring-Tite joints.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install buried pipe on 6" bed of washed clean sand, shaped to accommodate fittings, to line and grade as indicated. Backfill with washed clean sand.

2. Pipe referenced in this section for **below grade only**. For above grade refer to Section 15413.

3. Provide ULC or Warnock Hersey listed and labelled fire seals at penetration of fire rated walls, ceilings, etc.

4. Do not install in ceiling spaces used as return air plenums.

5. Installation shall be in accordance with manufacturer's instructions and building code.

6. Coordinate with the Building Inspector to witness tests and inspect work.

END OF SECTION 15414

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do the work in accordance with Ontario Building Code and local authority having jurisdiction except where specified otherwise.

2. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS

1. Submit shop drawings in accordance with Section 01300 - Submittals.

1.4. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.

2. Indicate dimensions, construction details and materials for the following: floor drains, backflow preventers, hose bibbs, strainers, traps, trap seal primer.

1.5. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.

2. Data to include:

    1. Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

    2. Details of operation, servicing and maintenance.

    3. Recommended spare parts list.

PART 2- PRODUCTS

2.1. FLOOR DRAINS

1. Floor drains and trench drains: to CAN3-B79.

2. Type I: general duty; cast iron body round, adjustable head, nickel bronze strainer, integral seepage pan, and clamping collar.

    1. Acceptable material: Zurn ZN 401B; Watts FD-100-C-A.

3. Type II: general duty where sheet vinyl flooring is used. Cast iron body round, adjustable head, nickel bronze strainer, integral seepage pan, clamping ring suitable for sheet vinyl flooring.

    1. Acceptable material: Zurn ZN-211-R6; Watts FD-200-FC.

4. Type III: combination funnel floor drain; cast iron body with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral funnel.

    1. Acceptable material: Zurn 401B; Watts FD-100-C-EG.

5. Type IV – Shower drain – cast iron body with rectangular 4” x 8” polished nickel bronze strainer, clamping collar, 4” threaded end for strainer, bottom outlet.

    1. Acceptable Material: Zurn #ZN-400-J and ZN-211.

2.2. ROOF DRAINS

1. Standard roof drain with cast iron body with cast iron dome, under-deck clamp to suit roof construction, flashing clamp ring with integral gravel guard.

    1. Acceptable Material: Zurn Z100, Enpoco E2600, Smith 1010.

2.3. CLEANOUTS

1. In floors:

    1. Line size for NPS 2, NPS 3 and NPS 4 and NPS 4 in larger lines

2. Consisting of:

    1. Seal and test plug

    2. Cast iron body with clamp and collar

    3. In unfinished areas:

        1. cast iron frame heavy duty scoriated cast iron round or square tractor cover and internal plug, and

    4. In finished areas:

        1. nickel bronze frame and round or square nickel bronze adjustable access cover

2. recessed for tile infill in tiled areas

3. recessed for carpet infill in carpeted areas

4. deeply recessed for terrazzo infill in terrazzo finished areas, and with

5. extended flange around frame in areas with monolithic floor finishes.

3. Standard of Acceptance: J.R. Smith 4000 series; Mifab C1100 series; Zurn Z-1400 series.

1. In exposed areas, ceiling spaces and accessible pipe chases:

1. Cast iron caulking ferrule with neoprene jacket and plug secured to body with cap screws.

2.4. WALL HYRDANTS

1. Concealed key operated non-freeze type with:

1. vacuum breaker,

2. stainless steel or bronze box,

3. hinged locking door,

4. galvanized casing, and

5. adjustable wall flange.

6. Standard of Acceptance: J.R. Smith 5509QT; Mifab MHY-26; Zurn Z-1320.

2. Key operated non-freeze type with:

1. bronze face,

2. galvanized casing and

3. adjustable wall flange

4. Standard of Acceptance: J.R. Smith 5609QT; Mifab MHY-16; Zurn ZN-1321

2.5. WATER HAMMER ARRESTERS

1. Stainless steel construction with precharged air chamber of nesting bellows.

2. Selected in accordance with Plumbing and Drainage Institute Standard PD1-WH201.

3. Standard of Acceptance: J.R. Smith Hydrotrol 5000 series; Mifab WHB series; Zurn Shocktrol Z-1700 series

2.6. PRESSURE REDUCING VALVES

1. Self-contained type with:

    1. bronze body,

    2. single renewable nickel alloy seat and resilient disc,

    3. diaphragm suitable for 90°C service,

    4. close coupled bronze strainer with stainless steel screen.

2. Standard of Acceptance: Watts, Zurn, Fisher Controls, Conbraco.

2.7. BACK FLOW PREVENTERS

1. Reduced pressure principle type: to CSA B64.11.

2. Double check valve assembly: to CAN3-B64.6/B64.7.

3. Back flow preventer with intermediate atmospheric vent: to CSA B64 Series-2011.

2.8. VACUUM BREAKERS

1. Atmospheric vacuum breaker: to CSA B64 Series-2011.

2. Hose connection vacuum breaker: to CSA B64 Series-2011.

2.9. TRAP SEAL PRIMERS

1. All brass, with integral vacuum breaker, pressure drop (3-5 psi) activated, NPS 1/2 solder ends, NPS 1/2 drip line connection, to be "lead free", NSF 61.

2. Acceptable material: PPP PR-500, MIFAB M500, J.R. Smith 2694 Series.

2.10. STRAINERS

1. 100 psi, Y type with 20 mesh, monel, bronze or stainless steel removable screen.

2. NPS 2 and under, bronze body, screwed ends, with brass cap.

    1. Acceptable material: Watts 7775, Mueller LF351

3. NPS 2 1/2 and over, cast iron body, flanged ends, with bolted cap.

    1. Acceptable material: Watts, Zurn, Mueller LF358

PART 3– EXECUTION

3.1. INSTALLATION

1. Install in accordance with manufacturer's instructions and as specified.
2. Coordinate with the Building Inspector to witness tests and inspect work.

3.2. CLEANOUTS

1. Install at base of soil and waste stacks, and rainwater leaders and at changes in direction. .
2. Extend cleanouts flush to wall or finished floor unless serviceable from below floor.
3. Install cleanouts located in floors clear of obstructions.

3.3. WALL HYDRANTS

1. Install 600 mm above finished grade.

3.4. WATER HAMMER ARRESTERS

1. Select and install in accordance with PDI-WH 201 on branch supplies to each fixture or group of fixtures.

3.5. PRESSURE REDUCING VALVES

1. Install with shut-off valve upstream and 115 mm dia. pressure gauge downstream.

3.6. BACK FLOW PREVENTORS

1. Install and test in accordance with CSA B64.10-11, where indicated and elsewhere as required by code. Submit Certification.
2. Pipe discharge to nearest drain or service sink.

3.7. TRAP SEAL PRIMERS

1. Install on cold water supply to nearest plumbing fixture, in concealed space.
2. Install soft copper tubing to floor drain.
3. Use distribution units as required.

3.8. STRAINERS

1. Allow sufficient room to remove basket.

3.9. COMMISSIONING

1. After start-up, test and adjust to suit site conditions.

END OF SECTION 15430

PART 1- GENERAL

1.1. RELATED WORK

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. See Section 15430 - Plumbing Specialties and Accessories.

PART 2- PRODUCTS

2.1. PLUMBING FIXTURES AND TRIM

1. Plumbing fixtures shall be product of one manufacturer, and of same colour in any one washroom or location, unless listed otherwise.

2. Materials:

    1. Vitreous china to CSA B45.1-02 (R2013).

    2. Stainless steel fixtures to CSA B45.04-02 Class II, type 302 unless otherwise stated.

    3. Plumbing fittings to CSA B125-01.

    4. Exposed plumbing brass and metal work shall be heavy triple chromium plated.

    5. Acceptable manufacturers of same quality, appearance and colour as selected fixtures:

        Crane, Kohler, Fiat, Kindred Industries, Bradley, Symmons, American Standard, AMI, Acudor-Acorn, Zurn, MOEN Commercial.

2.2. COUNTER SINKS

1. CS #1: COUNTERTOP MOUNT SINK - SINGLE HANDLE FAUCET

    Franke Commercial #LBD6408-1/1 Double Bowl Countertop Mount Sink, 1 hole, 794 mm (31-1/4") wide x 521 mm (20-1/2") long x 203 mm (8") high deep, spillway, Counter mounted, backledge, Grade 18-10 20 GA. (0.9 mm) type 302 stainless steel, self-rimming, Satin finish rim and bowls, Mounting kit provided, Fully undercoated to reduce condensation and resonance, factory applied rim seal, 3-1/2" (89 mm) crumb cup waste assembly with 1-1/2" (38 mm) tailpiece.
    Chicago Faucets #430-ABCP Single handle Faucet, Chrome plated finish, Center hole only, ECAST construction lead free (equal or less than 0.25%) ECAST brass construction, volume control and Hot Water Limit Stop cartridge, 5.7 LPM (1.5 GPM) pressure compensating Laminar Flow (non-aerating) outlet, 241 mm (9-1/2") projection rigid cast brass spout, Single metal lever handle. McGuire #LFBV170 Faucet Supplies, Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers. McGuire #8912CB P-Trap, heavy

cast brass adjustable body, with slip nut, 38 mm (1-1/2") size, Box flange and Seamless tubular wall bend.

2.3. LAVATORIES

1. L#1: COUNTER MOUNTED SELF-RIMMING / DROP-IN BASIN - SINGLE HANDLE FAUCET

   American Standard Cadet Universal Access #9494.001.020 Basin, 3 holes, 4" (102 mm) center, 533 mm x 445 mm x 175 mm (21" x 17-1/2" x 6-7/8") high, Oval, Vitreous china, White Finish, Self-rimming / Drop-in, Side rear overflow, faucet ledge. **Provide basin rim sealant. Chicago Faucets #420-E2805-ABCP Single handle Faucet,** Chrome plated finish, ECAST construction lead free (equal or less than 0.25%) ECAST brass construction, 1.9 LPM (0.5 GPM) vandal resistant pressure compensating Econo-Flo non-aerating spray outlet, 117 mm (4-5/8") projection rigid cast brass spout, Single metal lever handle. **McGuire #155A Open Grid Drain,** cast brass one piece top, 17 GA. (1.5 mm) tubular 32 mm (1-1/4") tailpiece. **McGuire #LFH170BV Faucet Supplies,** Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers. **McGuire #8872C P-Trap,** heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, Shallow wall flange and Seamless tubular wall bend.

2. L#2: COUNTER MOUNTED SELF-RIMMING / DROP-IN BASIN - SINGLE HANDLE FAUCET - POINT OF USE THERMOSTATIC WATER MIXING VALVE (Barrier-Free)

   American Standard Cadet Universal Access #9494.001.020 Basin, 3 holes, 4" (102 mm) center, 533 mm x 445 mm x 175 mm (21" x 17-1/2" x 6-7/8") high, Oval, Vitreous china, White Finish, Self-rimming / Drop-in, Side rear overflow, faucet ledge. Provide basin rim sealant. **Chicago Faucets #420-E2805-ABCP Single handle Faucet,** Chrome plated finish, ECAST construction lead free (equal or less than 0.25%) ECAST brass construction, 1.9 LPM (0.5 GPM) vandal resistant pressure compensating Econo-Flo non-aerating spray outlet, 117 mm (4-5/8") projection rigid cast brass spout, Single metal lever handle. **Lawler #570-86820, Point Of Use Thermostatic Water Mixing Valve,** nickel plated bronze body, temperature adjusting spindle, 10 mm (3/8") inlets and outlet FNPT connections, Integral checks, offer temperature range between 35 °C (95 °F) and 46 °C (114.8 °F). Set valve temperature at 46 °C (114.8 °F). Provide tee, adaptors and flex. copper tubing to suit installation. Provide tempered water to hot side of faucet. **McGuire #155WC Offset Open Grid Drain,** cast brass one piece top, 17 GA. (1.5 mm) mm tubular 32 mm (1-1/4") tailpiece. **McGuire #LFH170BV Faucet Supplies,** Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers. **McGuire #8872C P-Trap,** heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, Shallow wall flange and Seamless tubular wall bend. **McGuire PROWRAP #PW2000WC Sanitary Covering vandal-resistant,** flexible seamless moulded closed-cell PVC resin, formulated with anti-microbial additive to limit the growth of fungus and bacteria, to exposed piping (to protect against heat/contusions) as per local codes.

2.4. LAUNDRY SINK

1. LT#1: SCULLERY SINK - TWO HANDLES - MANUAL FAUCET

Franke Commercial #SL2424-1/2 Single Bowl Scullery Sink, 2 hole, 8" (203 mm) center, 695 mm (27-3/8") wide x 691 mm (27-3/16") long x 889 mm (35") high deep, Floor mounted, faucet on backsplash, Grade 18-10 16 GA. (1.5 mm) type 304 stainless steel, rim and bowl polished satin finish, 229 mm (9") high backsplash, radius coved corners on front and back only, rolled rim, stainless steel tubular legs with adjustable feet, 3-1/2" (89 mm) crumb cup waste assembly with 1-1/2" (38 mm) tailpiece.
Chicago Faucets #510-GC613AL12ABCP Wall Mounted Two handles Manual Faucet, Chrome plated finish, solid brass exposed body, 3.8 LPM (1.0 GPM) @ 60 PSI Spray Valve, 12" (305 mm) swing spout with full flow outlet, Quaturn compression operating cartridge and vandal proof lever handle secondary control. **Provide service stops in accessible ceiling space. McGuire #8912CB P-Trap,** heavy cast brass adjustable body, with slip nut, 38 mm (1-1/2") size, Box flange and Seamless tubular wall bend.

2.5. WATER CLOSETS

1. WC #1**:** CADET® PRO™ ELONGATED TOILET

American Standard 215CA174.020 7381231-200.0020A Toilet - Floor mounted, Two Piece, Vitreous china, White finish, Toilet, Elongated, Gravity, Features the Cadet® flushing system, Manual, 3" flush valve, Fully-glazed 2-1/8" trapway, Polished chrome trip lever on left hand 7381231-200.0020A, Generous 9" x 8" water surface area, 1,000 g MaP Score** at 1.28 gpf, 767 x 441 x 733 mm (30-1/8" x 17-3/8" x 28-7/8") , Color match bowl caps, High Efficiency Toilet (HET), ultra-low consumption (4.8 Lpf/1.28 gpf), EverClean® surface included, PowerWash® rim scrubs bowl with each flush, Minimum 305 mm (12") rough-in from wall to the center of waste outlet, THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET, CSA B45.1-08, ASME A112.19.2.
Centoco 1500STSCCFE-001 Seat - FAST-N-LOCK, For elongated bowl, Open front, Heavy duty, For commercial applications, Polypropylene, Toilet seat, Less seat cover, Plastic commercial check hinges, and Stainless steel hinge pin, Specified in White finish, FAST-N-LOCK mounting system takes the guess work out when tightening the hardware. The specially designed fasteners in click" when the appropriate torque is reached. The bolt and nut material shall be stainless steel, Dimensions:32 mm (1-1/4") high, 473 mm (18-5/8") long, 368 mm (14-1/2") wide
McGuire LFH166LK Supply - Lead free, Premiere heavy loose supply, Chrome-plated finish, 10 mm (3/8") I.P.S. x 10 mm (3/8") outer Ø heavy stop valve, 304 mm (12") steel braided risers, Convertible loose key handle, Toilet, Shallow steel flange

2. WC #2: CADET® PRO™ RIGHT HEIGHT® ELONGATED TOILET (Barrier Free)

American Standard 215AA174.020 Toilet - Floor mounted, Two Piece, Vitreous china, White finish, Toilet, Elongated, Gravity, Features the Cadet® flushing system, Manual, 3" flush valve, Fully-glazed 2-1/8" trapway, Polished chrome trip lever on left hand 7381231-200.0020A, Generous 9" x 8" water surface area, 1,000 g MaP Score** at 1.28 gpf, 767 x 441 x 771 mm (30-1/8" x 17-3/8" x 30-3/8") , 16-1/2" rim height for accessible applications, Color match bowl caps, High Efficiency Toilet (HET), ultra-low consumption (4.8 Lpf/1.28 gpf), utilizes 20% less water, EverClean® surface included, PowerWash® rim scrubs bowl with each flush, Minimum 305 mm (12") rough-in from wall to the center of waste outlet, THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET., CSA B45.1-08, ASME A112.19.2.
Centoco 820STSFE-001 Seat - FAST-N-LOCK, For elongated bowl, Open front, Heavy duty, For commercial applications, Polypropylene, Toilet seat, With seat cover, Plastic commercial check hinges, and Stainless steel hinge pin, Specified in White finish, FAST-N-LOCK mounting system takes the guess work out when tightening the hardware. The specially designed fasteners in click" when the appropriate torque is reached. The bolt and

nut material shall be stainless steel, Dimensions:25 mm (1") high, 470 mm (18-1/2") long, 362 mm (14-1/4") wide
McGuire LFH166LK Supply - Lead free, Premiere heavy loose supply, Chrome-plated finish, 10 mm (3/8") I.P.S. x 10 mm (3/8") outer Ø heavy stop valve, 304 mm (12") steel braided risers, Convertible loose key handle, Toilet, Shallow steel flange.

2.6. EYEWASH

1. EW#1: EYE/FACE WASH, WALL MOUNTED, STAINLESS STEEL BOWL

Guardian G1750-T Emergency Equipment - Chrome-plated brass tailpiece and trap with 38 mm (1-1/2") I.P.S. connection, Eye/face wash with stainless steel bowl, Wall mounted, Corrosion resistant powder coated finish, 283 mm (11-1/8") Ø bowl size, Two FS-Plus spray heads with flip top dust cover each, 13 mm (1/2") Ø IPS Chrome plated brass stay open ball valve, 13 mm (1/2") Ø NPT female inlet, 32 mm (1-1/4") Ø NPT female outlet, Heavy duty cast aluminum wall bracket, ANSI compliant.

2.7. MIXING VALVE

1. MV#1: THERMOSTATIC MIXING VALVE MODEL 911®E/F EMERGENCY EYEWASH/FACEWASH

Lawler 911E/F-Unit 84908 Mixing Valve - Emergency mixing valve, Thermostatic High-low master water mixing valve, Rough bronze finish, 9" X 8" X 5" (229 mm X205 mm X127 mm) , Temperature adjustment shall be vandal-resistant, 7.5 LPM (2 GPM) tempered flow rate @ 5 PSI pressure drop, 11 LPM (3 GPM) tempered flow rate @10 PSI pressure drop, 18 LPM (5 GPM) tempered flow rate @ 20 PSI pressure drop, 26 LPM (7 GPM) tempered flow rate @ 20 PSI pressure drop, In the event that the liquid motor fails, the control mechanism closes off the hot water port with the reverse seat and fully opens the internal variable bypass to allow cold water flow, The control mechanism shall employ a liquid-filled thermostatic motor to drive the valve without additional power requirements. The control mechanism shall employ a stainless steel sliding piston control device with reverse seat closure and both fixed and variable cold water bypass, Listed to ASSE 1071, 32 mm (1-1/4") NPT inlet, 32 mm (1-1/4") NPT outlet, In the event of interruption of the hot water supply, the control mechanism shall allow cold flow through both the fixed and variable bypass., Outlet Thermometer, In the event of interruption of the cold water supply, the control mechanism closes off the hot water port, stopping all flow. Positive hot water shut-off, 85 F, 125 PSI max inlet pressure, 70-90 F, 120 F Recommended inlet temperature, 65 PSI recommended operating pressure, 38 LPM (10 GPM) tempered flow rate @ 40 PSI pressure drop.

2.8. SHOWER UNIT

1. SH#1: ACRYLIC SHOWER AND TRIM

Chicago Faucets #1905-VOCCP-CP Thermostatic & pressure balancing Shower Valve set, chrome plated finish, 216 mm (8-1/2") dia trim face plate, On/off and temperature control single lever handle, integral service stops, integral service stops. **Chicago Faucets #620-LCP Shower Head,** Chrome plated finish, 5.7 LPM (1.5 GPM) flow rate @ 80 psi, Pressure compensating flow control device, Swivel ball joint. **Chicago Faucets #749-016JKCP/415-021JKCP Wall Mount Shower Arm,** Round escutcheon. **Watts #FD-100-C-A Floor Drain,** epoxy coated cast iron, 5" (127 mm) adjustable round

nickel bronze strainer, reversible clamping collar with primary & secondary weepholes. **Provide P-Trap,** Same material as the connecting pipe drain. CSA B125.16. 84”h x 48”w x 32”d one piece acrylic shower c/w centre drain, 5-1/2” threshold height, 2” ABS drain with stainless steel strainer, reinforced shower base, self draining shelves, front ledge with drip lip, 30” stainless steel grab bar, and round serenity brass shower drain infinity style, chrome. Longevity Acrylic Waterford 2048. Shower to be complete with stainless steel shower rod.

2. SH#2: ACRYLIC SHOWER AND TRIM (BARRIER FREE)

Chicago Faucets #1905-VOCCP-CP Thermostatic & pressure balancing Shower Valve set, chrome plated finish, 216 mm (8-1/2") dia trim face plate, On/off and temperature control single lever handle, integral service stops, integral service stops. **Chicago Faucets #620-LCP Shower Head,** Chrome plated finish, 5.7 LPM (1.5 GPM) flow rate @ 80 psi, Pressure compensating flow control device, Swivel ball joint. **Chicago Faucets #749-016JKCP/415-021JKCP Wall Mount Shower Arm,** Round escutcheon. **Chicago Faucets #624-LCP Adjustable Hand Shower,** 5.7 LPM (1.5 GPM) flow rate @ 80 psi, Pressure compensating flow control device. **Chicago Faucets #9800-036CP Hand Shower Grab Bar/Slide Bar Combination,** Chrome plated finish Stainless steel construction, 38 mm (1-1/2") dia x 914 mm (36") high bar, Adjustable bracket for personal shower, locking wall flanges, Includes mounting hardware. **Chicago Faucets #24-59NF Hand Shower Metal Hose 1501 mm (59.1") long. Chicago Faucets #E24JKCP Hand Shower In-Line Vacuum Breaker,** Installed between supply outlet and shower hose, maximum hot water temperature of 60 °C (140 °F), maximum working pressure of 861.25 kPa PSI. **Chicago Faucets #622-001CP Hand Shower Wall Supply,** Chrome plated finish, 13 mm (1/2") NPT female thread inlet, 13 mm (1/2") hose connection. **Chicago Faucets #763-CP In-Wall 3-Way Diverter Trim And Valve Kit,** Metal lever handle, brass valve construction, Rotational control to alternate water flow between three (3) different shower outlets. **Watts #FD-100-C-A Floor Drain,** epoxy coated cast iron, 5" (127 mm) adjustable round nickel bronze strainer, reversible clamping collar with primary & secondary weepholes. **Provide P-Trap,** Same material as the connecting pipe drain. 1676mm (66") w x 946mm (37 1/4") d x 2235mm (88")h one piece, barrier free, acrylic shower. Four shelves, grab bars 32mm (1 1/4") stainless steel with concealed mounting, 1016mm (40") horizontal straight grab bar, 762mm (30") horizontal straight grab bar, stainless steel drain, stainless steel shower curtain rod, and factory installed fold up seat with stainless steel supports. Mirolin AROS66L/R.

PART 3 - EXECUTION

3.1. FIXTURE INSTALLATION

1. Connect fixtures complete with supplies and drains, trapped, supported level and square. Each fixture must have lockshield valves on supplies. Hot water faucet shall be on left. Mixing faucets and thermostatically controlled mixing valves to have check valves on supplies. Fixtures on outside walls to have supplies from floor; other fixtures to be served from wall.

2. Provide chrome plated rigid supplies to fixtures with screwdriver or handwheel stops, reducers and escutcheons.

3. Provide supports, required to set fixtures level and square. Mount fixtures so that 200 lb mass will not loosen or distort mounting.

4. Provide shock absorbers for each fixture or group of fixtures.

5. Mounting heights for wall hung fixtures and showers measured from finished floor:

    1. Standard: to comply with manufacturers roughing-in details and Ontario Building Code, unless otherwise indicated or specified.

    2. Physically handicapped: to comply with OBC 2012.

6. Installation to follow manufacturer installation instructions/recommendations.

7. Test all devices and equipment.

END OF SECTION 15440

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ANSI/ASME Boiler and Pressure Vessel Code, Section VIII Pressure Vessels - 1992.
2. ASTM A53-90a, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
3. ASTM A181/181M-87, Specification for Forgings, Carbon Steel, for General Purpose Piping.
4. ANSI/ASME B16.5-1988, Pipe Flanges and Flanged Fittings.
5. ANSI/ASME B16.11-1991, Forged Steel Fittings, Socket-Welded and Threaded.
6. CSA B51-03 - Boiler, Pressure Vessel, and Pressure Piping Code.

1.3. SHOP DRAWINGS

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate:
    1. Equipment including connections, piping and fittings, valves, strainers, control assemblies and ancillaries, identifying factory and field assembled.
    2. Complete wiring diagrams including schematics.
    3. Dimensions, construction details, materials, recommended installation and support, mounting bolt holes, sizes and locations, and point loads.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.
2. Data to include:
    1. Description of equipment giving manufacturer's name, type, model year, capacity and serial numbers.
    2. Details of operation, servicing and maintenance.

3. Recommended spare parts list.

PART 2- PRODUCTS

2.1. AIR COMPRESSOR – Existing to be reused

2.2. PIPING

1. Piping: to ASTM A53, schedule 40 welded black steel.

2. Fittings:

    1. NPS 3" and smaller: to ANSI/ASME B16.11, schedule 40 steel, screwed, or to ANSI/ASME B16.3, malleable iron, screwed.

    2. NPS 2 1/2 and larger: to ANSI/ASME B16.11, schedule 40 steel, butt or socket welded.

3. Couplings: to ANSI/ASME B16.11, socket welded or threaded half coupling type.

4. Unions: 3447 kPA malleable iron with brass-to-iron ground seat.

5. Dissimilar metal junctions: use dielectric unions.

6. Flanges:

    1. NPS 2 and smaller: to ANSI/ASME B16.5, forged steel, raised face and socket welded.

    2. NPS 2 1/2 and larger: to ANSI/ASME B16.5, forged steel, raised face and slip-on or weld neck.

7. Joints:

    1. NPS 2 and smaller: screwed.

    2. NPS 2 1/2 and larger: welded.

2.3. BALL VALVES

1. Three piece design or top entry for ease of in-line maintenance.

    1. To ASTM A181/A181M, Class 70, carbon steel body, screwed ends, carbon steel ball and associated trim suitable for compressed air application.

    2. To withstand 1034 kPa maximum pressure.

2. Acceptable Material: Jamesbury style BWS 2277, Worcester Valve Fig. 4404466TT-SW,

Newman Hattersley Fig. 1969; MAS (MA Stewart) #CSS-F-3-N.

2.4. COUPLERS/CONNECTORS

1. Industrial interchange series, full-bore.
2. Maximum inlet pressure: 1700 kPa.
3. Valve seat: moulded nylon.
4. Body: zinc plated steel.
5. Threads: NPT.
6. Acceptable Material: ARO

PART 3- EXECUTION

3.1. COMPRESSOR STATION

1. Install on vibration isolators on housekeeping pad as indicated.

3.2. COMPRESSED AIR LINE FILTER

1. Install on discharge line from refrigerated air dryer.

3.3. MAIN AIR PRESSURE REGULATORS

1. Install at air compressor station.
2. Install additional regulators on connections to equipment as indicated.

3.4. COMPRESSED AIR PIPING INSTALLATION

1. Install flexible connection in accordance with Section 15516 - Flexible Connections, Expansion Joints, Anchors and Guides.
2. Apply and coordinate for TSSA approval. Submit all required documentation, pay all costs and submit certification to Consultant.
3. Install shut-off valves at outlets, major branch lines and elsewhere as indicated.
4. Install quick-coupler chucks and pressure gauges on drop pipes.
5. Install unions to permit removal or replacement of equipment.

6. Install tees in lieu of elbows at all changes in direction of piping. Install plug in all open ends of tees.

7. Grade piping at 1% slope minimum.

8. Install compressed air trap and pressure equalizing pipe at each moisture collecting point. Drain pipe to nearest floor drain.

9. Make branch connections from top of main.

10. Install compressed air trap at bottom of each riser and at low points in mains, piped to nearest drain. Distance between drain points to be 30 m maximum.

11. Provide automatic condensate drains for refrigerated air dryer and compressor.

12. Welded steel piping.

    1. To ASME Code and requirements of authority having jurisdiction.

    2. Weld all concealed and inaccessible piping regardless of pipe size.

13. Cleaning:

    1. Blow out all piping to clean interior thoroughly of all oil and foreign matter.

14. Testing:

    1. Pressure test in accordance with requirements of Section 15010 - Mechanical General Requirements, for 4 h minimum, to 1100 kPa, with outlets closed and with compressor isolated from system. Pressure drop not to exceed 10 kPa.

15. Commissioning:

    1. Commission system and demonstrate operation to satisfaction of Consultant.

END OF SECTION 15486

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do work in accordance with:
    1. SMACNA HVAC Duct Construction Standards, Metal and Flexible, 2005.
    2. SMACNA HVAC Duct Leakage Test Manual, 2012 Edition.
    3. ASHRAE Handbook, Fundamentals, and Systems Volumes.
    4. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Indicate following:
    1. Sealants
    2. Tape
    3. Proprietary Joints

1.4. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

PART 2– PRODUCTS

2.1. CLASSIFICATION

1. Ductwork classification as follows:

Maximum Pressure		SMACNA Seal
Pa	" WG	Class

500	2	B
250	1	C
125	0.5	C

2.2. SEAL CLASSIFICATION

1. Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

2. Class B: longitudinal seams, transverse joints and connections made airtight with sealant tape or combination thereof.

3. Class C: transverse joints and connections or made air tight with gaskets, sealant tape or combination thereof. Longitudinal seams unsealed.

4. Unsealed seams and joints.

2.3. SEALANT

1. Sealant: water based polymer type flame resistant duct sealant. Temperature range of minus 30°C to plus 93°C.

    1. Acceptable material: Duro-Dyne DWN/water based, 3M Fastbond 900.

2.4. TAPE

1. Tape: polyvinyl treated, open weave fiberglass tape, 50 mm (2") wide.

    1. Acceptable material: Duro-Dyne

2.5. DUCT LEAKAGE

1. In accordance with SMACNA HVAC Duct Leakage Test Manual, 2012 Edition.

2. In accordance with ASHRAE 90.1

2.6. FITTINGS

1. Fabrication: to SMACNA.

2. Radiused elbows: standard radius and or short radius with single thickness turning vanes.

3. Square elbows: to 460 mm (18") with single thickness turning vanes.

4. Square elbows: over 460 mm (18") with double thickness turning vanes.

5. Main supply duct branches with splitter damper.

6. Sub branch duct with 45° entry and balancing damper on branch or sub branch duct with square connection, volume extractor and branch duct balancing damper.

7. Transitions:

    1. Diverging: 20° maximum included angle.

    2. Converging: 30° maximum included angle.

8. Offsets: square elbows or full radiused elbows.

9. Obstruction deflectors: maintain full cross-sectional area. Maximum included angles as for transitions.

2.7. FIRESTOPPING

1. Retaining angles all around duct, on both sides of fire separation.

2. Firestopping material and installation must not distort duct.

2.8. GALVANIZED STEEL

1. Lock forming quality: to ASTM A525M-86, Z90 zinc coating.

2. Thickness: to ASHRAE and SMACNA.

3. Fabrication: to ASHRAE and SMACNA.

4. Joints: to ASHRAE and SMACNA or proprietary manufactured duct joint.

    1. Acceptable material: Duct-Mate

2.9. HANGERS AND SUPPORTS

1. Strap hangers: of same material as duct, but next sheet metal thickness heavier than duct.

2. Hanger configuration: to ASHRAE and SMACNA. Maximum size duct supported by strap hanger 20".

3. Hangers: galvanized steel angle with black steel rods to ASHRAE and SMACNA.

PART 3– EXECUTION

3.1. GENERAL

1. Install ducts in accordance with ASHRAE and SMACNA.

2. Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 100 mm (4") beyond insulated duct.

3. Support risers in accordance with ASHRAE and SMACNA.

4. Install breakaway joints in ductwork on each side of fire separation.

3.2. HANGERS

1. Strap hangers: install in accordance with SMACNA.

2. Angle hangers: complete with locking nuts and washers.

3. Hanger spacing: in accordance with ASHRAE.

3.3. WATERTIGHT DUCT

1. Provide watertight duct for:

    1. Fresh air intake.

    2. Range hood exhaust.

    3. Dishwasher exhaust

    4. Shower areas.

    5. As indicated.

2. Form bottom of horizontal duct without longitudinal seams. Seal all other joints with duct sealer.

3. Slope horizontal branch ductwork down towards hoods served. Slope header ducts down toward risers.

4. Fit base of riser with 100 mm (4") deep drain sump and 1 1/4" drain connected, with deep seal trap and discharging to open funnel drain.

3.4. LEAKAGE TESTS

1. In accordance with SMACNA HVAC Duct Leakage Test Manual, 2012 Edition.

2. Make trial leak test to demonstrate workmanship.

3. Install no additional ductwork until trial test has been passed.

4. Test section minimum of 30 m (100') long with not less then 3 branch takeoffs and 2 90° elbows.

5. Conduct leak testing in accordance with Air Balance Council (AABC) recommended procedures – See Section 15990.

3.5. SEALING AND TAPING

1. Apply sealant to outside of joint to manufacturer's recommendations.

2. Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturer’s recommendations.

END OF SECTION 15891

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. AMCA 99-10, Standards Handbook.
2. AMCA 210-07, Laboratory Methods of Testing Fans for Rating.
3. AMCA 300-08, Reverberant Room Method for Sound Testing of Fans.
4. AMCA 301-06, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
5. CGSB 1-GP-181M, Coating, Zinc Rich, Organic, Ready Mixed.
6. ASHRAE Standard 51-2007 -- Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI/ASHRAE Approved) (ANSI/AMCA Standard 210-07)
7. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Section 01300 - Submittals.
2. Product data to include fan curves and sound rating data, showing point of operation.
3. Indicate the following: motors, wheels, bearings, shafts and enclosures.

1.4. OPERATION AND MAINTENANCE DATA

1. Provide operation and maintenance data for incorporation into manual specified in Section 01300 - Submittals.

1.5. MAINTENANCE MATERIALS

1. Provide maintenance materials in accordance with Section 01300 – Submittals.
    1. Spare parts to include:
        1. Matched sets of belts.
        2. Furnish list of individual manufacturer’s recommended spare parts for

equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

1.6. MANUFACTURED ITEMS

1. Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards in force.

2. Provide confirmation of testing.

PART 2– PRODUCTS

2.1. FANS – GENERAL

1. Capacity, total static pressure, revolutions per minute, power, model, size, sound power data and as indicated.

2. Sound ratings: comply with AMCA (Air Moving and Conditioning Association) 301, tested to AMCA 300. Unit shall bear AMCA certified sound rating seal.

3. Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.

4. Performance ratings: based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51. Unit shall bear AMCA certified rating seal, except for propeller fans smaller than 12" diameter.

5. Motors: for use with variable speed controllers where indicated.

6. Motors: sizes as indicated.

7. Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, coupling guards, fan inlet outlet safety screens, outlet dampers and vanes as indicated.

8. Factory primed before assembly in colour standard to manufacturer.

9. Scroll casing drains: as indicated.

10. Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

11. Provide 18” high roof curbs for all roof mounted fans, unless otherwise specified.

12. Flexible connections: to Section 15911 - Duct Accessories.

13. Acceptable Product: Penn, Cook, Jenco, Greenheck, Broan, Nutone.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install fans as indicated, complete with resilient mountings supplied by manufacturer.

2. Install fan restraining snubbers as indicated.

3. Install fan complete with vibration isolation, flexible electrical wiring, flexible duct connections to inlet and discharge air ductwork.

4. Flexible connections shall not be in tension during running.

5. Provide sheaves and belts required for final air balance.

END OF SECTION 15860

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do work in accordance with the following standards except where specified otherwise:
    1. CAN/ULC S110-13 for fire tests for air ducts.
    2. UL 181-2013 for factory made air ducts and connectors.
    3. NFPA 90A-2012 for installation of air conditioning and ventilating systems.
    4. NFPA 90B-2012 for installation of warm air heating and air conditioning systems.
    5. SMACNA HVAC Duct Construction Standards - Metal and Flexible, 1995.
    6. LEED Canada for New Construction and Major Renovations 2009.

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Thermal properties.
    2. Friction loss.
    3. Acoustical loss.
    4. Leakage.
    5. Fire rating.

1.4. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

1.5. SAMPLES

1. Submit samples with product data of each different type of flexible duct being used in

accordance with Section 01300 - Submittals.

PART 2– PRODUCTS

2.1. GENERAL

1. Factory fabricated.
2. Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.
3. Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2. METALLIC - UNINSULATED

1. Spiral wound flexible aluminum.
2. Performance:
    1. Minimum working pressure: 2500 Pa (10"WG)
    2. Maximum relative pressure drop coefficient: 3.
3. Acceptable material: Flexmaster triple lock.

2.3. METALLIC - INSULATED

1. Spiral wound flexible aluminum with factory applied flexible glass fibre thermal insulation with vapour barrier and aluminum jacket.
2. Performance:
    1. Minimum working pressure: 2500 Pa (10" WG)
    2. Maximum relative pressure drop coefficient: 3.
3. Acceptable material: Flexmaster

PART 3– EXECUTION

3.1. DUCT INSTALLATION

1. Install where indicated and in accordance with SMACNA.
2. Support in accordance with SMACNA.
3. Maximum length of flexible duct: 1.8 m, 6' for diffuser / grille duct connection.

END OF SECTION 15893

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Flexible connections.
    2. Sealants and tapes.
    3. Duct access doors.
    4. Turning vanes.
    5. Instrument test ports.

1.3. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

PART 2– PRODUCTS

2.1. FLEXIBLE CONNECTIONS

1. Frame: galvanized sheet metal frame 16 GA, 1.6 mm, with fabric clenched by means of double locked seams.
2. Material:
    1. Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40°F to plus 200°F, density of 0.3 lb/sq.ft.
    2. Flame resistant, 0.56 mm thick vinyl coated fabric, 12 kg/m^3 fibreglass insulation for operation of 82°C continuous – connections for insulated duct system, less than 250 mm dia or less than 300 mm – negative pressure duct connection.
        1. Duro-Dyne-Insulflex

3. Silicon rubber coated woven fibreglass fabric to UL 214 for operation up to 260°C – for fume hood exhaust systems.

    1. Duro-Dyne-Thermafab.

2.2. ACCESS DOORS IN DUCTS

1. Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

2. Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

3. Gaskets: neoprene or foam rubber.

4. Hardware:

    1. Up to 250 mm x 250 mm, 12 x 12": 2 sash locks complete with safety chain.

    2. 275 to 460 mm, 13 to 18": 4 sash locks complete with safety chain.

    3. 485 mm to 910 mm, 19 to 36": piano hinge and minimum 2 sash locks.

    4. Doors over 920 mm, 37": piano hinge and 2 handles operable from both sides.

    5. Hold open devices.

    6. 250 mm x 250 mm, 12" x 12": glass viewing panels.

2.3. TURNING VANES

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

2.4. INSTRUMENT TEST PORTS

1. 1.6 mm, 16 GA steel zinc plated after manufacture.

2. Cam lock handles with neoprene expansion plug and handle chain.

3. 1" minimum inside diameter. Length to suit insulation thickness.

4. Neoprene mounting gasket.

PART 3– EXECUTION

3.1. INSTALLATION

1. Flexible connections.
    1. Install in following locations:
        1. Inlets and outlets to supply air units and fans.
        2. Inlets and outlets of exhaust and return air fans.
        3. As indicated.
    2. Length of connection: 6" (150 mm)
    3. Minimum distance between metal parts when system in operation: 3" (75 mm)
    4. Install in accordance with recommendations of SMACNA.
    5. When fan is running:
        1. Ducting on each side of flexible connection to be in alignment.
        2. Ensure slack material in flexible connection.
2. Access doors:
    1. Size: to allow inspection and servicing.
    2. Location:
        1. At fire and smoke dampers.
        2. At control dampers.
        3. At devices requiring maintenance.
        4. At locations required by code.
        5. At reheat coils.
        6. As indicated.
3. Instrument test ports.
    1. General:
        1. Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
    2. Locations.
        1. For traverse readings:
        2. At ducted inlets to roof and wall exhausters.

1. At inlets and outlets of other fan systems.
2. At main and sub-main ducts.
3. And as indicated.

3. For temperature readings:

1. At outside air intakes.
2. In mixed air applications in locations as approved by Consultant.
3. At inlet and outlet of coils.
4. Downstream of junctions of two converging air streams of different temperatures.
5. And as indicated.

4. Turning vanes.

1. Install in accordance with recommendations of SMACNA and as indicated.

END OF SECTION 15911

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCE STANDARDS

1. Do work in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, 1995, except where specified otherwise.

2. LEED Canada for New Construction and Major Renovations 2009.

1.3. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.

PART 2– PRODUCTS

2.1. SPLITTER DAMPERS

1. Of same material as duct but one sheet metal thickness heavier.

2. Single thickness construction.

3. Control rod with locking device.

4. Bend end of rod to prevent end from entering duct.

5. Pivot: piano hinge.

2.2. SINGLE BLADE DAMPERS

1. Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

2. Size and configuration to recommendations of SMACNA, except maximum height 9", 225 mm.

3. Locking quadrant.

4. Inside and outside end bearings.

2.3. MULTI-BLADED DAMPERS

1. Factory manufactured of material compatible with duct.

2. Opposed blade: configuration to recommendations of SMACNA.

3. Maximum blade height: 4", 100 mm.

4. Bearings: pin in bronze bushings.

5. Linkage: shaft extension with locking quadrant.

6. Channel frame of same material as adjacent duct, complete with angle stop.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install at each take off and where indicated.

2. Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

3. For supply, return and exhaust systems, volume dampers are to be located in each branch duct. Each grille, register and diffuser connection to have volume damper located as close as possible to main ducts.

END OF SECTION 15912

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. ASTM A525M-87, Specification for General Requirements for Steel and Extruded Aluminum frame.
2. American Society for Testing and Materials International (ASTM)
    1. ASTM A 653/A653M-04a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
3. Health Canada/Workplace Hazardous Materials Information System (WHMIS).
    1. Material Safety Data Sheets (MSDS).
4. LEED Canada for New Construction and Major Renovations 2009.

1.3. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Pressure drop curve.
    2. Free area.

1.4. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency.

PART 2– PRODUCTS

2.1. MULTI-LEAF DAMPERS

1. Use opposed for mixing duty, parallel for tight shut-off.
2. Extruded aluminum, interlocking blades, complete with butyl rubber, extruded vinyl seals or

neoprene on blade edges and frames top and bottom and side seals.

3. Thermally broken frames and blades, frames insulated with extruded polystyrene foam with 12 2.19 or better, blades constructed from aluminum extension with internal hollows insulated with polyurethane or polystyrene foam RSI 0.88.

4. Pressure fit self-lubricated bronze bearings.

5. Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.

6. Operator: 24 V electric actuator with spring return for "fail safe" – supplied by control contractor.

7. Performance: leakage in closed position to be less than 2% of rated air flow at 1200 kPa differential across damper. Pressure drop at full open position to be less than 25 Pa differential across damper at maximum air flow.

8. Acceptable Products for insulated dampers to be Tamco 9000BF, Nailor 2020IBF, Alumavent 3960. Acceptable Products for non-insulated dampers to be Tamco 1000, Nailor 2020IB, Alumavent 3100.

2.2. BACK AND RELIEF DRAFT DAMPERS

1. Automatic gravity operated, multi-single leaf, aluminum construction with nylon bearings, centre pivotted, spring assisted.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install where indicated. Provide insulated dampers on all ducts leading to outside.

2. Install in accordance with recommendations of SMACNA and manufacturer's instructions.

3. Seal multiple damper modules with silicon sealant.

4. Upon system start-up, ensure that dampers operate properly.

END OF SECTION 15913

PART 1– GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. NFPA 90A-2012, Installation of Air Conditioning and Ventilating Systems.
2. CAN/ULC-S112-10, Fire Test of Fire Damper Assemblies.
3. CAN/ULC-S112.2-07, Fire Test of Ceiling Firestop Flap Assemblies.
4. ULC-S505-1974, Fusible Links for Fire Protection Service.
5. LEED Canada for New Construction and Major Renovations 2009.

1.3. PRODUCT DATA

1. Submit product data in accordance with Section 01300 - Submittals.
2. Indicate the following:
    1. Fire dampers.
    2. Smoke dampers.

1.4. MAINTENANCE DATA

1. Provide maintenance data for incorporation into manual specified in Section 01300 - Submittals.
2. Provide following:
    1. 6 fusible links of each type.

1.5. CERTIFICATION OF RATINGS

1. Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

PART 2– PRODUCTS

2.1. FIRE DAMPERS

1. Fire dampers: listed and bear label of ULC and meet requirements of provincial fire authority and NFPA 90A - to be dynamic type.

2. Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

3. Top hinged: interlocking type sized to maintain full duct cross section.

4. Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.

5. 40 x 40 x 3 mm (1 1/2" x 1 1/2" x 1/8") retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

6. Acceptable material: Ruskin, Alumavent, Nailor.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install in accordance with NFPA 90A and in accordance with conditions of ULC listing.

2. Fire damper assemblies to be fire tested in accordance with CAN/ULC-S112.

3. Fire stop flap assemblies to be fire tested in accordance with CAN4-S112.2.

4. Maintain integrity of fire separation.

5. After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

6. Install access door adjacent to each damper. See Section 15911 - Duct Accessories.

7. Coordinate with installer of firestopping.

8. Select interlocking curtain type blade damper frames as follows; (Width is duct dimension parallel to blades. Height is duct dimension perpendicular to blades.)

    1. Type A - folded blades completely within airstream:

        1. for rectangular ducts with both height and width greater than 300 mm, and where duct velocity is less than 7.5 m/s.

    2. Type B - folded blades out of airstream:

        1. for rectangular ducts 200 mm to 350 mm in height and width greater than

200 mm, and where duct velocity is less than 7.5 m/s.

3. Type C – folded blades and damper frame shielded with airstream impingement:

    1. for circular or flat oval ducts

    2. for rectangular duct less than 200 mm in height

    3. for rectangular duct less than 350 mm in height when width is less than 200 mm, and

    4. for rectangular ducts where duct velocity is greater than 7.5 m/s.

END OF SECTION 15914

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SUMMARY

1. Section Includes:
    1. Mechanical louvers; intakes; vents; and reinforcement and bracing for air vents, intakes and gooseneck hoods.

1.3. REFERENCES

1. American National Standards Institute (ANSI)/ National Fire Protection Association (NFPA)
    1. ANSI/NFPA 96-14, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
2. American Society for Testing and Materials International (ASTM)
    1. ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
3. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    1. Material Safety Data Sheets (MSDS).
4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

1.4. SYSTEM DESCRIPTION

1. Performance Requirements:
    1. Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

1.5. SUBMITTALS

1. Product Data:

1. Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01300 - Submittals. Include product characteristics, performance criteria, and limitations.

    1. Submit two (2) copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01300 - Submittals.

2. Indicate following:

    1. Pressure drop.

    2. Face area.

    3. Free area.

    4. Water penetration characteristic.

2. Quality assurance submittals: submit following in accordance with Section 01300 - Submittals.

    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. Engineer will make available 1 copy of systems supplier's installation instructions.

3. Test Reports:

    1. Submit certified data from independent laboratory substantiating acoustic and aerodynamic performance to ASTM E 90.

1.6. QUALITY ASSURANCE

1. Health and Safety Requirements: do construction occupational health and safety in accordance with Division 1.

1.7. DELIVERY, STORAGE, AND HANDLING

1. Packing, shipping, handling and unloading:

    1. Deliver, store and handle in accordance with Division 1.

    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 Division 1.

PART 2- PRODUCTS

2.1. SUSTAINABLE REQUIREMENTS

1. Materials and products in accordance with Division 1.

2.2. GOOSENECK HOODS

1. Thickness: to ASHRAE and SMACNA.

    1. Kitchen: to ANSI/NFPA 96.

    2. Elsewhere: to ASHRAE, SMACNA.

2. Fabrication: to ASHRAE and SMACNA.

    1. Kitchen: to ANSI/NFPA 96.

    2. Elsewhere: to ASHRAE, SMACNA.

3. Joints: to ASHRAE and SMACNA and/or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint considered class A seal.

4. Supports: as indicated.

5. Complete with integral birdscreen of 2.7 mm diameter aluminum wire. Use 12 mm mesh on exhaust 19 mm mesh on intake.

6. Vertical or Horizontal backdraft dampers as indicated.

2.3. FIXED LOUVRES - ALUMINUM

1. Construction: welded with exposed joints ground flush and smooth.

2. Material: extruded aluminum alloy 6063-T5.

3. Blade: stormproof pattern with centre watershed in blade, reinforcing bosses and maximum blade length of 1500 mm.

4. Frame, head, sill and jamb: 150 mm deep one piece extruded aluminum, minimum 3 mm thick with approved caulking slot, integral to unit.

5. Mullions: at 1500 mm maximum centres.

6. Fastenings: stainless steel SAE-194-8F with SAE-194-SFB nuts and resilient neoprene washers between aluminum and head of bolt, or between nut, ss washer and aluminum body.

7. Screen: 12 mm exhaust 19 mm intake mesh, 2 mm diameter wire aluminum birdscreen on inside face of louvres in formed U-frame.

8. Finish: factory applied enamel. Colour: to Engineer’s approval.

9. Accepted Product: Construction Specialties 4110 or Ventex.

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. In accordance with manufacturer's and SMACNA recommendations.

2. Reinforce and brace as indicated.

3. Anchor securely into opening. Seal with caulking to ensure weather tightness.

3.3. FIELD QUALITY CONTROL

1. Verification requirements in accordance with Division 1 Contractor's Verification, include:

    1. Materials and resources.

    2. Storage and collection of recyclables.

    3. Construction waste management.

    4. Resource reuse.

    5. Recycled content.

    6. Local/regional materials.

    7. Low-emitting materials.

3.4. CLEANING

1. Proceed in accordance with Division 1.

2. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION 15941

PART 1– GENERAL

1.1. SHOP DRAWINGS

1. Submit shop drawings and technical information in accordance with Section 01300 - Submittals.

2. Clearly indicate the following: material, gauge, finish, ratings and accessories.

1.2. RELATED WORK

1. Low Pressure Ductwork - Section 15891.

2. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.3. MANUFACTURED ITEMS

1. Grilles, registers and diffusers shall be product of one manufacturer.

1.4. CERTIFICATION OF RATINGS

1. Catalogued or published ratings shall be those obtained from tests carried out by an independent testing agency signifying adherence to applicable codes and standards.

PART 2– PRODUCTS

2.1. GRILLES, REGISTERS AND DIFFUSERS GENERAL

1. Sizes indicated are nominal. Provide correct standard product nearest to nominal for capacity noise level, throat and outlet velocity.

2. Furnish factory prime coated steel frames for setting into fire protecting membrane.

3. Where penetrating fire partitions, provide approved steel sleeve attached to structure and secured in accordance with NFPA 90.

4. Frame:

    1. Steel: Prime coated, cold rolled steel with exposed joints welded and ground flush, mitred corners and completely closed.

    2. Provide full perimeter sponge rubber gaskets.

3. Provide plaster frame or gypsum board.

4. Provide concealed fasteners and operators.

5. Sizes and capacities: as indicated.

6. Standard of Acceptance: E.H. Price, Krueger, Titus, Nailor Industries, Metal Aire.

2.2. SUPPLY GRILLES AND REGISTERS

1. Double deflection with horizontal face and vertical rear bars or as indicated in schedule.

2. Steel or aluminum construction.

2.3. EXHAUST GRILLES AND REGISTERS

1. Single deflection, horizontal adjustable bar type or as indicated in schedule.

2. Steel or aluminum construction.

2.4. AIR DIFFUSERS

1. Square, rectangular or linear with removable, flow straightening core and blank-off quadrants.

2. Steel or aluminum construction.

2.5. LINEAR GRILLES

1. Aluminum bar core type with margin as indicated, pattern adjustment, plaster frames, sealing strips, end caps, mitered corners and alignment key strips for multiple sections.

2.6. FINISHES

1. Primer: to CGSB 1-GP-40M, off white.

2. Enamel: to CGSB 1-GP-88E, off white.

PART 3– EXECUTION

3.1. INSTALLATION

1. Install in accordance with manufacturers instructions.

2. Fit frame with gasket to prevent leakage, and smudging.

3. Install with flat head screws in countersunk holes where fastenings are visible.

4. Diffusers to be installed with concealed fastenings.

END OF SECTION 15942

PART 1 - TAB AGENCY

1. General:

    1. The basic testing and balancing shall be provided by Division 15 and in accordance with this Section.

    2. The independent TAB Agency employed and paid by Division 15 will be providing the final testing and balancing.

    3. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. Quality assurance:

    1. TAB to be performed to standards of ASHRAE.

3. Co-ordination:

    1. Co-ordinate all work specified in this Section.

    2. Provide all facilities required by TAB Agency in order to carry out work of this Section.

4. Adequacy of work for TAB:

    1. TAB Agency to review contract documents before work is started and confirm in writing to Consultant adequacy of provisions for TAB and all other aspects of installation pertinent to TAB.

    2. Division 15 shall provide equipment commissioning and preliminary balancing and confirm the proper operation of all systems.

5. List of TAB Agencies:

    1. ABG Air Balance Group
    (416) 283-0637

    2. Aerodynamics Inspecting Consultants Ltd.
    (905) 625-4388

    3. Design Test Balance
    (905) 886-6513

PART 2- GENERAL

1. TAB: means to test, adjust and balance all systems to perform in accordance with Contract Documents.

2. Follow start-up procedures as recommended by manufacturer unless otherwise specified.

3. Special start-up procedures may be specified elsewhere.

4. Notify Consultant 7 days prior to start of TAB.

5. Operate all systems to permit TAB to be performed.

6. TAB to apply to systems, equipment and related controls specified in Division 15.

7. Reference organization standards:

    1. Do TAB over entire operating range in accordance with most stringent conditions of this specification and standard of following organization.

8. Alternate season testing to be provided by TAB Contractor where applicable.

9. TAB Contractor to inspect site during construction in order to assure that all balancing devices are installed properly and in pre-selected locations.

10. Mechanical contractor to provide the TAB contractor with all related approved shop drawings and change notices.

11. Start TAB only when building is essentially completed, including:

    1. Installation of ceilings, doors, windows and other construction affecting TAB.

    2. Application of sealing, caulking and weatherstripping.

    3. All pressure, leakage and other tests specified elsewhere in Division 15 completed.

    4. All provisions for TAB are installed and operational.

12. Start-up, verification for proper, safe and normal operation of mechanical and associated electrical and control systems affecting TAB including, but not limited to, the following:

    1. Proper thermal overload protection in place for electrical equipment.

    2. Air Systems:

        1. Filters in place and in clean condition.

        2. Duct systems clean of debris.

        3. Air shafts, ceiling plenums are airtight to within specified tolerances.

        4. Correct fan rotation.

        5. Fire and volume dampers in place and open.

        6. Coil fins cleaned and combed.

        7. Access doors closed and duct end caps in place.

8. All outlets installed and connected.

13. Accuracy tolerances:

    1. Do TAB to following tolerances of design values:

        1. HVAC systems: Plus 5%; minus 5%.

        2. As original tolerances.

        3. Measurements to be accurate to within plus or minus 2% of actual values.

    2. Instrument calibration: to be in accordance with TAB referenced organization standard, but within 3 months of commencement of TAB.

14. Submittals prior to commencement of TAB:

    1. Proposed methodology and procedures for performing TAB.

    2. Proposed check lists and report forms.

    3. List of instrumentation, including details and certificates of calibration.

15. Report:

    1. Format to be in accordance with TAB referenced organization standard, but using SI units.

    2. Report to include as built full system schematics showing results of TAB.

    3. Submit, prior to formal submission of TAB reports, for checking and approval by Consultant, sample of rough TAB sheets. Include:

        1. Details of instruments used.

        2. Details of TAB procedures employed.

        3. Calculations procedures.

        4. Summaries.

    4. Submit 3 copies of TAB reports, each in "D" ring binders, complete with index tabs for verification and approval of Consultant.

16. Verification:

    1. Reported measurements shall be subject to verification by Consultant. Provide instrumentation and manpower to verify results of up to 30% of all reported measurements. Number and location of verified measurements to be at discretion of Consultant.

    2. Bear costs to repeat TAB, as required, to satisfaction of Consultant.

1. Settings: lock and permanently mark settings as required by reference standard.

2. Completion: TAB to be considered complete only when final reports are approved by Consultant.

PART 3- AIR MOVING SYSTEMS

1. General: measurements as required by referenced organization standards, including, but not limited to, following:

    1. Measurements:

        1. Air velocity.

        2. Static pressure.

        3. Velocity pressure.

        4. Temperature:

            1. Dry bulb.

        5. Cross sectional area.

        6. RPM.

        7. Electrical power:

            1. Voltage
            2. Current draw.

2. Location of equipment measurements:

    1. Inlet and outlet of each:

        1. Fan.

        2. Coil.

        3. Filter.

        4. Damper.

        5. Humidifiers.

        6. Terminal Units.

        7. Other auxiliary equipment.

3. Location of system measurements at:

1. Main ducts.
2. Main branch ducts.
3. Sub-branch ducts.
4. Each supply, exhaust and return air inlet and outlet.
5. Other auxiliary equipment.
6. All areas served by system.
7. Each thermostatically controlled zone.

PART 4- BUILDING GENERALLY

1. Measure DBT, WBT, %RH, air velocity, air flow patterns, and noise data in occupied zone of all occupied areas.

END OF SECTION 15990

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. This Section covers items common to Sections of Division 16. This Section supplements requirements of Division 1.

3. Coordinate all requirements with general contractor.

1.2. CODES AND STANDARDS

1. In this document, all references to Code numbers shall mean “Latest Edition”.

2. Do complete installation in accordance with Ontario Electrical Safety Code.

3. Do complete installation in accordance with CSA C22.1-12 except where specified otherwise.

4. Comply with all CSA and inspection Authority Bulletins in force at time of Tender.

5. Do overhead and underground systems in accordance with CSA C22.3 No.1-10 except where specified otherwise.

6. Abbreviations for electrical terms: to CSA Z85-1983.

7. Where requirements of this specification exceed those of above-mentioned standards, this specification shall govern.

1.3. DEFINITIONS

1. “Provide” means supply and install.

2. “Approved” means approved in writing by Consultant.

3. “Inspection Authority” means Electrical Safety Authority.

4. “Supply Authority” means ***Hearst Power.***

5. “Consultant” means designated qualified professional engineer acting as representative of Owner for monitoring of work.

6. “Manual” means Operations and Maintenance manual.

7. “OESC” means latest edition of Ontario Electrical Safety Code

1.4. CARE, OPERATION, START-UP AND INSTRUCTION TO OWNERS

1. Provide certified personnel to instruct Owner of operation of electrical equipment. Provide maintenance specialist personnel to instruct on maintenance and adjustment of electrical equipment and any changes or modification of equipment must be under terms of guarantee.

2. Provide instruction during regular work hours prior to acceptance and turn over to Owner's staff for regular operation.

3. Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

4. Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn three manuals over to the Owner.

5. Operation and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

1.5. AS-BUILT DRAWINGS

1. Site records:

    1. One set to be kept on site and all changes to be recorded on daily basis. At the completion of the project, all changes shall be transferred to clean set, signed and passed to the Consultant.

    2. Make these drawings available for reference purposes and to inspection at all times.

2. As-built drawings must be delivered before system acceptance.

1.6. VOLTAGE RATINGS

1. Operating voltages: to CAN3-C235-83 (R2006).

2. Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.7. PERMITS, FEES AND INSPECTION

1. Submit to Inspection Authority and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

2. Consultant will provide drawings and specifications required by Inspection Authority and Supply Authority at no cost.

3. Submit to the Building Department the necessary number of drawings and specifications for examination prior to commencement of work to obtain a building permit. The Contractor shall obtain and pay for the building permit. Include all costs in the tender price.

4. Submit Notice of Project to Ministry of Labour.

5. Pay associated fees and obtain all permits required for the performance of the work.

6. Notify Consultant of changes required by Inspection Authority or Building Department prior to making changes.

7. Furnish Certificates of Acceptance from Inspection Authority on completion of work to Consultant.

1.8. MATERIALS AND EQUIPMENT

1. Provide materials and equipment in accordance with Division 1.

2. Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Inspection Authority.

3. Factory assemble control panels and component assemblies.

1.9. ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

1. Verify installation and co-ordination responsibilities related to motors, equipment and controls with other trades and as indicated.

2. Mechanical contractor shall supply and install all motors, controls and control wiring. Mechanical contractor shall supply all disconnect switches, starters, motor rated switches and relays, for all motor driven equipment under mechanical contract. All disconnect switches, starters, motor rated switches and relays shall be handed over to electrical contractor for installation and wiring. Both mechanical and electrical contractors to coordinate to ensure proper protection and equipment is provided and included in contract.

3. Control wiring and conduit to be installed in accordance with Section 16111 and 16122, except for connections below 50V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

4. Electrical equipment not supplied by mechanical contractor is listed on the drawings or elsewhere in the specifications. Electrical contractor to coordinate with mechanical contractor to ensure proper protection and equipment is provided for all equipment and is included in Contract.

1.10. EQUIPMENT IDENTIFICATION

1. Identify electrical equipment with nameplates and labels as follows:

2. Nameplates:

    1. Lamacoid 3 mm (1/8") thick plastic engraving sheet, white face, black core, mechanically attached with self tapping screws. For emergency power circuits, use a red face and black core.

NAMEPLATE SIZES

Size 1	10 x 50 mm (3/8 x 2")	1 line	3 mm (1/8") high letters
Size 2	12 x 70 mm (1/2 x 3")	1 line	5 mm (1/4") high letters
Size 3	12 x 70 mm (1/2 x 3")	2 lines	3 mm (1/8") high letters
Size 4	20 x 90 mm (3/4 x 4")	1 line	8 mm (3/8") high letters
Size 5	20 x 90 mm (3/4 x 4")	2 lines	5 mm (1/4") high letters
Size 6	25 x 100 mm (1" x 4")	1 line	12 mm (1/2") high letters
Size 7	25 x 100 mm (1" x 4")	2 lines	6 mm (1/4") high letters

3. Labels:

    1. Embossed plastic labels with 6 mm (1/4") high letters unless specified otherwise.

4. Wording on nameplates and labels to be approved by Consultant prior to manufacture.

5. Allow for average of twenty-five (25) letters per nameplate and label.

6. Identification to be English.

7. Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

8. Disconnects, starters and contactors: indicate equipment being controlled and voltage.

9. Terminal cabinets and pull boxes: indicate system and voltage.

10. Transformers: indicate capacity, primary and secondary voltages.

11. Coordinate names of equipment and systems with Division 15 to ensure that identical names are used.

1.11. WIRING IDENTIFICATION

1. Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

2. Maintain phase sequence and colour coding throughout.

3. Colour code: to CSA C22.1.

4. Use colour coded wires in communication cables, matched throughout system.

1.12. CONDUIT AND CABLE IDENTIFICATION

1. Colour code conduits, boxes and metallic sheathed cables.

2. Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

3. Colours: 25 mm (1") wide prime colour and 20 mm (3/4") wide auxiliary colour.

	PRIME	AUXILIARY
up to 250 V	yellow	
up to 600 V	yellow	green
up to 5 kV	yellow	blue
up to 15 kV	yellow	red
Telephone	green	
Other communication systems	green	blue
Fire alarm	red	
Emergency Voice	red	blue
Other security systems	red	yellow

1.13. WIRING TERMINATIONS

1. Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.14. MANUFACTURERS AND CSA LABELS

1. Ensure that manufacturer's registration plates are properly affixed to all apparatus showing the size, name of equipment, serial number, and all information usually provided, including voltage, cycle, phase and the name and address of the manufacturer.

2. Do not paint over registration plates or approved labels. Leave openings through insulation for viewing the plates. Contractors or sub-contractors nameplate not acceptable.

1.15. WARNING SIGNS

1. As specified and to meet requirements of Inspection Authority and Consultant.

1.16. SINGLE LINE ELECTRICAL DIAGRAMS

1. Provide single line electrical diagrams under plexiglass in glazed frames as follows:

    1. Electrical distribution system: locate in main electrical room.

2. Drawings: 600 x 600 mm (24" x 24") minimum size.

1.17. LOCATION OF OUTLETS

1. Locate outlets as shown on drawings.

2. Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.

3. Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10 ft) and information is given before installation.

4. Locate light switches on latch side of doors. Locate disconnect devices in mechanical rooms on latch side of door.

1.18. MOUNTING HEIGHTS

1. Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

2. If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3. Install electrical equipment at following heights unless indicated otherwise.

    1. Local switches: 1100 mm (43")

    2. Wall receptacles:

        1. General: 400 mm (16")

        2. Above top of continuous baseboard heater: 200 mm (8")

        3. Above top of counters or counter splash backs: 175 mm (7")

        4. Behind clothes washing machine: 914mm (36”)

        5. In mechanical rooms: 1400 mm (55")

    3. Panelboards to top of trim: 1800 mm (72”)

    4. Telephone outlets: 400 mm (16")

    5. Wall mounted telephone outlets: 1200 mm (47")

    6. Emergency lighting heads: 2300 mm (90")

    7. Emergency Call Button:

        1. With centre located not less than 1000 mm and not more than 1100 mm from the floor or ground.

        2. Emergency Sign to be located directly above button

    8. Barrier-free Door Operators:

        1. Provide 100 mm x 100 mm junction;

        2. With centre located not less than 1000 mm and not more than 1100 mm from the floor or ground; and

        3. Be located not less than 600 mm beyond the door swing where the door opens towards the control.

1.19. LOAD BALANCE

1. Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

2. Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

3. Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.20. SLEEVES

1. Provide pipe sleeves at points where conduits (53 mm and larger) pass through masonry or concrete.

2. Provide sleeves of minimum 1.0 mm (20 GA) galvanized sheet steel with lock seam joints.

3. Use cast iron or steel pipe sleeves with annular fin continuously welded at mid-point.

    1. Through foundation walls.

    2. Where sleeve penetrates fire rated wall or floor ceiling assembly.

4. Sizes:

    1. Provide 5 mm (1/4") clearance all around, between sleeves and conduits.

    2. Where piping passes below footings, provide min clearance of 50 mm (2") between sleeve and conduit. Fill void with elastic, water proof material. Backfill up to underside of footing with concrete of same strength as footing.

5. Fill voids around pipes. Remove plastic sleeves.

    1. Caulk between sleeve & conduit in foundation walls and below grade floors with oakum that lead between sleeve and pipe.

    2. Where sleeves pass through walls or floors, caulk space between conduit and sleeve with waterproof fire retardant non-hardening mastic.

    3. Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint.

6. Where pipes pass through fire rated walls, floors and partitions, maintain fire rating integrity assembly in compliance with OBC. Submit shop drawings and details on all products prior to commencing work.

7. Temporarily plug all openings during construction.

1.21. CONDUIT AND CABLE INSTALLATION

1. Install conduit and sleeve prior to pouring of concrete.

2. Install cables, conduits and fittings to be embedded or plasters over, neatly and close to building structure so furring can be kept to minimum.

3. Protect alarm and emergency system wiring from fire for the required length of time.

1.22. FIELD QUALITY CONTROL

1. All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks – the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

2. The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province that the work is being constructed.

3. Conduct and pay for following tests:

    1. Power distribution system including phasing, voltage, grounding and load balancing.

    2. Circuits originating from branch distribution panels.

    3. Lighting and its control. Contractor shall provide completed Lighting Controls Commissioning Checklist. Refer to Specification 16141.

    4. Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

4. Furnish manufacturer’s certificate or letter confirming the entire installation as it pertains to each system has been installed to manufacturer’s instructions.

5. Insulation resistance testing.

    1. Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

    2. Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

    3. Check resistance to ground before energizing.

6. Carry out tests in presence of Consultant.

7. Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

8. Submit test results for Consultant's review.

1.23. CONCRETE WORK

1. Provide 100mm concrete housekeeping pads for all floor mounted equipment, including:

transformers, automatic transfer switches, switchboard, MCCs and panels.

1.24. EXCAVATION AND BACKFILLING

1. This Division shall be responsible for coordination for bedding of lines or equipment and for backfilling and compaction to 98% Standard Proctor Density.

1.25. CO-ORDINATION WITH POWER SUPPLY UTILITY

1. Make arrangements with power supply utility for power line extension, transformers and connections. Pay all costs.

1.26. DEMOLITION

1. Disconnect and make safe electrical equipment and services as required on site.

2. Be responsible for demolition and removal of electrical equipment and services designated on drawings for removal and as required by work unless specified otherwise under other divisions.

3. Electrical work being removed by other division shall be carried out under direction of this division. Do all disconnecting prior to authorizing removal.

1.27. FIREPROOFING

1. Where cables or conduits pass through floors and fire rated walls, pack space between wiring and sleeve full with firestopping system to CAN 4-S115.

1.28. COORDINATION WITH EXISTING UTILITIES

1. Before commencing any Work, the Contractor shall determine the locations of all underground utilities and structures indicated in or inferable from the Contract Documents, or that are inferable from an inspection of the Place of the Work.

2. All existing utilities are to be maintained and protected for the length of construction.

3. Contractor to notify consultant if any conflicts arise and allow for minimum 48 hours for consultants review.

END OF SECTION 16010

PART 1- GENERAL

1.1. RELATED SECTIONS

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. Section 16010 – Electrical General Requirements.

PART 2- PRODUCTS

2.1. PVC DUCTS

1. PVC ducts, type DB2**.**
2. Rigid PVC when traversing beneath vehicular areas.

2.2. PVC DUCT FITTINGS

1. Rigid PVC opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors as required to make complete installation.
2. Expansion joints.
3. Rigid PVC 5 angle couplings.

PART 3- EXECUTION

3.1. DUCT INSTALLATION

1. Install underground duct banks.
2. Build duct bank on undisturbed soil or on well compacted granular fill not less than 150mm (6”) thick, compacted to 95% of maximum proctor dry density.
3. Open trench completely between manholes to be connected before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.
4. Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.
5. Install base spacers at maximum intervals of 1.5 m (5’) levelled to grades indicated for bottom layer of ducts.
6. Lay PVC ducts with configuration as indicated with preformed interlocking, rigid plastic

intermediate spacers to maintain spacing between ducts at not less than 75mm (3") horizontally and vertically. Stagger joints in adjacent layers at least 150mm (6") and make joints watertight.

7. Make transpositions, offsets and change in direction using 5° bend sections, do not exceed a total of 20° with duct offset.

8. Use bell ends at duct terminations in manholes or buildings.

9. Use conduit to duct adapters when connecting to conduits.

10. Terminate duct runs with duct coupling set flush with the end of concrete envelope when dead ending duct bank for future extension.

11. Cut, ream and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.

12. Clean ducts before laying. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

13. After installation of ducts, pull through each duct a wooden mandrel not less than 300mm (12") long and of a diameter of 6mm (1/4") less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

14. In each duct install pull rope continuous throughout each duct run with 3m (10') spare rope at each end.

3.2. CABLE INSTALLATION IN DUCTS

1. Installation of service entrance power cables, conduits, etc. will be by electrical contractor, unless otherwise noted.

2. Primary duct banks and manholes are existing to remain.

3. Install cables as indicated in ducts.

4. Do not pull spliced cables inside ducts.

5. Install multiple cables in duct simultaneously.

6. Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

7. To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.

8. Before pulling cable into ducts and until cables properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

9. After installation of cables, seal duct ends with duct sealing compound to prevent entrance of

moisture or gases.

10. Service entrance raceway shall contain no other than the service entrance conductors.

3.3. MARKERS

1. Mark ducts every 50’ along straight runs and changes in direction.

2. Provide drawings showing locations of markers.

3.4. AS-BUILTS

1. Provide As-Built drawings, indicating location of all underground conductor, cable or raceway installations including depth of burial and type of installation.

3.5. FIELD QUALITY CONTROL

1. Perform tests in accordance with Section 16010 - Electrical General Requirements.

2. Perform tests using qualified personnel. Provide necessary instruments and equipment.

3. Check phase rotation and identify each phase conductor of each feeder.

4. Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

5. Pre-Acceptance Tests:

    1. After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

    2. Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

6. Acceptance Tests:

    1. Ensure that terminations and accessory equipment are disconnected.

    2. Ground shields, ground wires, metallic armour and conductors not under test.

    3. Leakage Current Testing:

        1. Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.

        2. Hold maximum voltage for time period specified by manufacturer.

        3. Record leakage current at each step.

4. High Potential (Hipot) Testing shall be completed in the factory.

    1. Conduct Hipot Testing in accordance with IPCEA recommendations.

7. Provide Engineer with list of test results showing location at which each test was made, circuit tested and result of each test.

8. Remove and replace entire length of cable if cable fails to meet any of the test criteria.

END OF SECTION 16106

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. LOCATION OF CONDUIT

1. Drawings do not indicate conduit runs.

2. All conduits under floor slab shall be zoned in groups and run in as straight a line as possible.

1.3. REFERENCES

1. Canadian Standards Association (CSA)

    1. CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.

    2. CSA C22.2 No. 56-04 (R2009), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

    3. CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.

    4. CSA C22.2 No. 211.2-06 (R2011), Rigid PVC (Unplasticized) Conduit.

    5. CSA C22.2 No. 227.3-05 (R2010), Flexible Non-metallic Tubing.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1.

2. Place materials defined as hazardous or toxic waste in designated containers.

3. Ensure emptied containers are sealed and stored safely for disposal away from children.

4. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Division 1.

PART 2- PRODUCTS

2.1. CONDUITS

1. Electrical metallic tubing (EMT): with steel couplings, sized as indicated.

2. Rigid PVC conduit, sized as indicated.

3. Epoxy coated conduit: with zinc coating and corrosion resistant epoxy finish inside and outside.

4. Flexible metal conduit and liquid-tight flexible metal conduit, sized as indicated.

5. Flexible PVC conduit, sized as indicated.

2.2. CONDUIT FASTENINGS

1. One hole steel straps to secure surface conduits 50 mm (2") and smaller. Two hole steel straps for conduits larger than 50 mm (2").

2. Beam clamps to secure conduits to exposed steel work.

3. Channel type supports for two or more conduits at 3 m (9') o/c.

4. 6 mm dia threaded rods to support suspended channels.

2.3. CONDUIT FITTINGS

1. Fittings: manufactured for use with conduit specified. Coating: same as conduit.

2. Fittings to be suitable sized for conduit used.

3. Fittings used for EMT to be steel, not cast.

4. Factory "ells" where 90° bends are required for 25 mm (1") and larger conduits.

2.4. EXPANSION FITTINGS FOR RIGID CONDUIT

1. Weatherproof expansion fittings with internal bonding assembly suitable for 100 or 200 mm linear expansion.

2. Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.

3. Weatherproof expansion fittings for linear expansion at entry to panel.

2.5. FISH CORD

1. Polypropylene.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

2. Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

3. Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.

4. Use rigid PVC conduit for installation underground and in slabs.

5. Use flexible metal conduit for final connection to devices in ceiling space max. length 3 m.

6. Use liquid tight flexible metal conduit for final connection to a vibrating piece of equipment.

7. Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

8. Mechanically bend steel conduit over 21 mm diameter.

9. All unterminated conduit ends to be reamed and protected by insulating bushings.

10. Install fish cord in empty conduits and all conduits 53 mm and greater.

11. Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

12. Dry conduits out before installing wire.

13. Use water tight fittings at connections to taps or sides of sprinkler proof equipment or seal with approved sealant.

3.2. SURFACE CONDUITS

1. Run parallel or perpendicular to building lines.

2. Locate conduits behind infrared or gas fired heaters with 1500 mm clearance.

3. Run conduits in flanged portion of structural steel.

4. Group conduits wherever possible on suspended channels.

5. Do not pass conduits through structural members except as indicated.

6. Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.

7. All exposed conduits in areas other than service spaces are to be painted to match existing finishes.

3.3. CONCEALED CONDUITS

1. Run parallel or perpendicular to building lines.

2. Do not install horizontal runs in masonry walls.

3. Do not install conduits in terrazzo or concrete toppings.

3.4. CONDUITS IN CAST-IN-PLACE CONCRETE

1. Locate to suit reinforcing steel. Install in centre one third of slab.

2. Protect conduits from damage where they stub out of concrete.

3. Install sleeves where conduits pass through slab or wall.

4. Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.

5. Do not place conduits is slabs in which slab thickness is less than 4 times conduit diameter.

6. Encase conduits completely in concrete with minimum 25 mm concrete cover.

7. Organize conduits in slab to minimize cross-overs. Do not install horizontal runs in masonry walls.

3.5. CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

1. Run conduits 25 mm (1") and larger below slab and encased in 75 mm (3") concrete envelope. Provide 50 mm (2") of sand over concrete envelope below floor slab.

3.6. CONDUITS UNDERGROUND

1. Slope conduits to provide drainage and prevent moisture or gases from entering the building.

2. Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

END OF SECTION 16111

PART 1- GENERAL

1.1. RELATED SECTIONS

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. Section 16151 – Wire and Box Connections – 0 – 1000V.

1.2. REFERENCES

1. CSA C22.2 No. 0.3-09, Test Methods for Electrical Wires and Cables.

1.3. PRODUCT DATA

1. Submit product data in accordance with Division 1.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1.
2. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Division 1.
3. Fold up metal banding, flatten and place in designated area for recycling.

PART 2- PRODUCTS

2.1. GENERAL

1. All conductors to be copper, unless otherwise noted.

2.2. BUILDING WIRES

1. All conductors to be copper, unless otherwise noted.
2. Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG for power and # 16 AWG for controls and fire alarm.
3. Copper conductors: size as indicated, with insulation of chemically cross-linked thermosetting polyethylene material type RW90, or with thermoplastic insulation and nylon jacket, type T-90 nylon.
4. 600V rating for nominal 208V system voltage; 1000V rating for nominal 600V system

voltage.

5. All outdoor circuit conductors, including service entrance conductors to be type RWU90 or USEI-90, unless otherwise noted.

6. Wire and conduit sizes shown are based on RW75 XLPE and are minimum sizes. Contractor is responsible for wire and conduit sized for other approved wires.

7. Conductors shall be colour coded. Conductors size 10 AWG and smaller shall have colour impregnated into insulation at time of manufacture.

    1. Colour code wiring for 120 / 208 Volt equipment as follows

        1. Phase conductors: Red, Black, Blue

        2. Neutral conductors: White

        3. Bonding to ground: Green

    2. Colour code wiring for 347 / 600 Volt equipment as follows

        1. Phase conductors: Red, Black, Blue

        2. Neutral conductors: White

        3. Bonding to ground: Green

2.3. ARMOURED CABLES

1. Conductors insulated copper sizes as indicated, minimum wire size #12 AWG.

2. Type: AC90.

3. Armour: interlocking type fabricated from aluminum strip.

4. Connectors: to suit.

5. Fastenings:

    1. One hole steel straps to secure surface cables 25 mm and smaller. Two hole steel straps for cables larger than 25 mm.

    2. Channel type supports for two or more cables at 1500 mm centres.

    3. Threaded rods: 6 mm dia. To support suspended channels.

6. Approved compression type lugs accurately sized to allow bolted connections at each cable end.

7. All wiring shall be concealed in floor slabs, walls, ceiling and furred spaces. AC90 armoured cable may be used only for drops to fixtures, maximum length 3 m in concealed ceiling

spaces, or drops to receptacles in GWB partitions, maximum length 4.5 m. Otherwise cables shall be in EMT conduit.

2.4. CONTROL CABLES

1. Type LVT: 2 soft annealed copper conductors sized as indicated with thermoplastic insulation and outer covering thermoplastic jacket.

2. Plenum rated cable (FT-6) required in ceiling space where not in conduit.

PART 3- EXECUTION

3.1. INSTALLATION OF BUILDING WIRES

1. Install wiring in conduit in accordance with Section 16111, unless otherwise noted.

2. Use type RW90 where required by Ontario Electrical Safety Code, for all panelboard feeders and for all conductors sized 250 MCM and larger.

3. Use type RW90 or T-90 for branch circuit wiring unless otherwise indicated.

4. Minimum wire size shall be No. 12 AWG. For 15A, 120V branch circuit home runs which exceed 23 m length shall be minimum No. 10 AWG, and minimum No. 8 AWG for runs which exceed 36 m. For 20A, 120V branch circuit home runs which exceed 17 m in length shall be minimum No. 10 AWG, and minimum No. 8 AWG for runs which exceed 27 m. Where existing wiring is re-used, minimum wire sizes shall apply and wiring shall be replaced when it does not meet the minimum size.

5. Existing wiring may only be re-used if permitted by Engineer.

3.2. INSTALLATION OF ARMOURED CABLES

1. Use only for drops to fixtures maximum length 3 m in concealed ceiling spaces, or drops to receptacles in GWB partitions maximum length 4.5 m.

2. Terminate cables in accordance with Section 16151.

3. Installation of all single conductor armoured cable shall be in such a way as to prevent the flow of sheath currents (current flow in the sheath caused by induced voltage on the sheath), as per Ontario Electrical Safety Code Rule 4-008. To prevent the flow of sheath currents, it is necessary to make sure that all paths (at terminations and supports) in which they may circulate are eliminated. Cable sheaths shall be grounded at the supply end termination only and isolated from ground and each other at the load end termination by a minimum of a 6 mm thick insulated material plate. Provide a lamacoid at the supply end of the conductors indicating “ENSURE CABLES ARE INSTALLED TO PREVENT SHEATH CURRENTS”.

3.3. INSTALLATION OF CONTROL CABLES

1. Install control cables in conduit in accordance with Section 16111.

2. Ground control cable shield.

END OF SECTION 16122

PART 1 – GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SCOPE OF WORK

1. Category 6 100 OHM balanced unshielded twisted pair (UTP) plenum horizontal cable is deployed through plenum pathways from the Telecommunications Room (TR) to the wall or furniture outlets. Plenum cable is rated for air handling spaces. Horizontal UTP cable is terminated into a modular jack in the wall outlet, and is punched into a cross-connect panel in the TR. This portion of horizontal cabling, including terminations, is defined as the permanent link. Standards permit one consolidation point inter-connection in the permanent link for zone cable distribution. Several codes and standards apply to installation and termination of 100 OHM balanced UTP cable. It is the responsibility of the cable installer to follow industry standards to assure proper cable performance and long-term reliability.

2. The Telecommunications Room (TR) is Mech Rm 104.

3. This section includes minimum requirements for the following:

    1. Category 6 100 OHM Balanced UTP Cable.

1.3. VOICE AND DATA CABLING

1. Equipment price breakdown

    1. The Contractor shall provide a complete Category 6 voice/data/VOIP cabling system including terminations, patch panels and single manufacturer certification as specified below.

    2. This specification defines the cabling infrastructure required to provide Voice and Data service.

    3. The need to amend or modify the installation specification may arise. All changes, modifications or amendments must be approved by the consultant prior to commencement of the installation.

1.4. QUALITY ASSURANCE

1. Installation of Category 6 cable shall adhere to manufacturer’s guidelines.

2. Category 6 cable shall be installed according to recognized Category 6 installation practices, and applicable codes and standards.

3. Installed Category 6 cable shall be manufactured by an ISO 9001-2000 Certified facility.

4. Installed Category 6 cable shall be free from defects in material or workmanship from the manufacturer, and shall be of the quality indicated.

5. Specified cable is based on acceptable manufacturers listed in this specification.

6. All methods of construction that are not specified in the contract documents shall be subject to control and approval by the Technical Authority.

7. Installed cable shall be lot-traceable by lot number and date of manufacture printed on the outer cable jacket.

8. All critical internal manufacturing operations for Category 6 cable shall have documented in-process inspection and testing according to ISO9001-2000.

9. Where “approved equal” is stated, any substitute product shall be equivalent to all requirements specified, and is subject to approval.

10. Materials and work specified in this document shall comply with, and are not limited to the standards, codes, and publications listed below:

    1. ANSI/TIA/EIA-568-B.1, Commercial Building Telecommunications Cabling Standard (and all published addenda), Part 1: General Requirements, 2001.

    2. ANSI/TIA/EIA-568-B.2, Commercial Building Telecommunications Cabling Standard (and all published addenda), Part 2: Balanced Twisted Pair Cabling Components, 2001.

    3. ANSI/TIA/EIA-568-B.2-1, Commercial Building Telecommunications Cabling Standard (and all published addenda), Part 2: Balanced Twisted Pair Cabling Components, Addendum 1: Transmission Performance Specifications for 4-Pair 100-Ohm Category 6 Cabling 2002.

    4. National Fire Protection Association, Inc., NFPA 70: National Electric Code(NEC), 2002.

        1. NEC Article 250: Grounding

        2. NEC Article 800: Communications Circuits

    5. ANSI J-STD-607A, Commercial Building Grounding and Bonding Requirements for Telecommunications, 2002.

    6. ISO/IEC 11801, Ed. 2:2002, Information Technology – Generic Cabling for Customer Premises, 2002.

    7. ANSI.TIA/EIA-569-B, Commercial Building Standards for Telecommunications Pathways and Spaces, 2003.

    8. ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure, 2002.

9. IEEE 802.3af, Data Terminal Equipment (DTE) Power Over Media Dependent Interface (MDI).

10. IEEE 802.3ab, Specification for 1000 Mb/s (Gigabit Ethernet) Operation over Category 5 or higher 4-Pair Balanced Twisted Pair Cabling.

11. IEEE 802.3an, Specification for 10 Gb/s (10 Gigabit Ethernet) Operation over Category 6 or higher 4-Pair Balanced Twisted Pair Cabling.

12. TIA/TSB-155, Telecommunications System Bulletin: Characterizing Existing Category 6 cabling for 10 Gb/s Ethernet Operation over 55 Meters Channel Length.

13. Underwriter's Laboratory, Inc., UL1863: Standard for Safety – Communications Circuit Accessories, 4th Ed, 2004.

14. Telecommunications Distribution Methods Manual, 10th Ed., Building Industry Consulting Services International (BICSI), 2003.

15. Information Transport Systems Installation Manual, 4th Ed., Building Industry Consulting Services International (BICSI), 2004.

11. Installations shall, as minimum, comply with the latest issues of the following Building Codes: All municipal By-laws, Provincial Codes, the National Building Code, Canadian Labour Code, and the National Fire Code. In the case of conflict or discrepancy, the more stringent code shall apply.

1.5. DEFINITIONS

1. The Technical Authority, Piotrowski Consultants Ltd. is defined as the consultant.

2. The "Contractor" is defined as the supplier of the scope of work defined in this specification.

1.6. SHOP DRAWINGS

1. Shop drawings shall be submitted to the Consultant and shall include:

    1. Specification sheets on all items, including cable types and manufacturer's cabling system specification numbers.

    2. An outline drawing of the cabling system for the Communications Rooms, showing floor plan and wall layouts for termination blocks, typical connections and major components must be included. Verification that all equipment will be supplied by manufacturer authorised Canadian Distributors.

    3. Verification that the installers are trained and authorised by the Cabling Application warranty approved manufacturer.

1.7. ACCEPTABLE BIDDERS AND BID PROCEDURES

1. Communications Contractor shall be system certified with minimum five (5) years experience. References to be available upon request.

2. Supplier shall have an in-place support facility within 450 kilometers of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

PART 2 - PRODUCTS

2.1. DESCRIPTION OF EQUIPMENT

1. Supply and install all cabling, jacks, patch panels and terminations, to provide a complete and operating Voice/Data Cabling system to support future computer network systems in the building. (Network hub equipment and accessories are NOT included in the scope of work unless otherwise noted).

2. The system shall comprise of horizontal UTP (Unshielded Twisted Pair) wiring from the patch panels to each Data outlet jack. Voice Backbone cable to be terminated at **Voice Backboard.**

3. When voice or data outlets are identified with multiple cables, provide one outlet box complete with 27 mm conduit. Refer to Legend for Wiring Details and Number of Cables per Drop.

4. The cabling system must meet or exceed Category 6 Channel performance as defined in TSB 568-B and provide a Single Manufacturer 25 year system performance certification.

2.2. HORIZONTAL CABLE

1. The Voice Cable shall be be Four Pair, Twisted 24 AWG solid copper, unshielded twisted cable meeting TIA/EIA-568-B Category 6. The maximum cable length for each run shall be limited to 90 meters. Cable to have white sheath.

2. The Data Cable shall be Four Pair, Twisted 24 AWG solid copper, unshielded twisted cable meeting TIA/EIA-568-B Category 6. The maximum cable length for each run shall be limited to 90 meters. Cable to have blue sheath.

3. All cables shall be permanently identified with indelible marker, or permanent labels. The label shall be located within .05 meters of both ends of the installed cable. The labelling shall conform to the requirements as defined in CAN/CSA-T528-93 Section 6 (Wiring System Administration).

2.3. DATA JACKS

1. Data cable workstation data jacks shall be T568A Wire Map configuration, 8 pin modular jacks (RJ45) approved to TIA/EIA-568-B, Category 6 standard.

2. The jack modules must accept RJ45 computer plugs without causing any damage or degradation to the connectors.

2.4. WORK AREA WIRING

1. All cables shall be terminated in an eight position 8-MOD. T568A MDVO module at the Voice/Data outlet. This shall be wired in a T568A configuration.

2. Each workstation module shall be a separate colour to identify its function Voice or Data. Colour of jacks to be coordinated with the Technical Authority.

3. Where the Voice/Data outlet is located within a private office, the contractor will supply a minimum of one wall mounted 4-port outlet faceplate/box' unless otherwise specified by the Technical Authority.

4. Contractor shall supply one(1)7ft, and one(1)4ft Cat 6 Modular Patch Cords, for each Data circuit terminating at each Patch Panel / Voice/Data Outlet.

5. These patch cords will be used to patch network hardware to the Patch Panels in TC and Voice/Data outlet box to the customer supplied workstation equipment.

6. Contractor shall install wiring to modular workstation in such a manner to ensure the EMI/RFI separation distances are maintained.

7. Surface mounted electrical raceways and connectivity products must match where required.

2.5. COMMUNICATIONS ROOM WIRING

1. Contractor shall supply and install a 20U, wall mounted communications cabinet with an adequate number of 24-port patch panels, in conjunction with the scope of work, to terminate all horizontal Data designated cables from the respective Voice/Data outlets. All 24-port patch panels must have an integrated rear cable management bar and front labeling space to facilitate port identification. All patch panels must be installed with an accompanying 2U wire management channel, for all Data patch cables. All connectors shall be wired in a T568A configuration.

2. Contractor will supply and install an adequate number of termination mounts and connectors, in a cross connect configuration, to terminate all horizontal Voice designated cables from the respective Voice/Data outlets.

2.6. STANDARD OF ACCEPTANCE

1. Belden

2. Hubbell

3. Panduit

PART 3 - EXECUTION

3.1. PREPARATION

1. Horizontal pathways (conduit, cable tray, raceway, etc.) shall be fully deployed from the main telecommunication room to each voice/data outlet location according to applicable codes and standards.

2. Metallic horizontal cable pathways shall be bonded to an approved ground according to ANSI-J-STD-607.

3.2. INSTALLATION

1. Pull cable into conduits, or place into raceway or cable tray as specified. Do not exceed 25 Lb pull force per cable. Use appropriate lubricants as required to reduce pulling friction.

2. All exposed wiring shall be installed in surface raceway.

3. All wiring above ceilings or below access floors shall be installed in cable tray or open-top cable hangers. Where cable tray is not provided, J Hook supporting system is to be provided.

4. Cable slack and service loops shall be stored properly above the ceiling or under the access floor. A “figure-eight” service loop is recommended for Category 6 cabling to reduce EMI coupling.

5. Pathway fill ratio in conduit, tray, raceway, etc. shall not exceed 40% of pathway cross-sectional area.

6. Installed cable bend radius shall be greater than 4X cable diameter. Avoid kinking or twisting the cable during installation.

7. Do not over-tighten cable ties, and do not use staples or clamps to anchor cables. Velcro straps to be used for large bundles.

8. Spacing of cable supports above the ceiling shall be maximum 48”.

9. Maintain the following clearances from EMI sources:

    1. Power cable: 6 in.

    2. Transformers and electrical service enclosures: 36 in.

10. Communications cabling that must cross power cables or conduit shall cross at a 90-degree angle and shall not make physical contact.

11. Length of each horizontal cable run from the main telecommunication room to the wall outlet shall not exceed 90 meters.

12. Leave sufficient slack for 90 degree sweeps at all vertical drops.

13. Do not install cable in wet areas, or in proximity to hot water pipes or boilers.

14. Cable ends for termination shall be clean and free from crush marks, cuts, or kinks left from pulling operations.

15. Installed cable jackets shall have no abrasions with exposed conductor insulation or bare copper 'shiners". The installer is responsible to replace damaged cables.

16. Horizontal cables extending from mounted jacks or panels shall maintain a minimum bend radius of at least 4 times the cable diameter.

17. Firestop all cable penetrations through fire-rated barriers per local codes.

3.3. WORK SCHEDULE

1. Prior to work commencing, a schedule will be provided by Contractor to Technical Authority. Schedule will show anticipated progress stages and final completion of work. Interim reviews of work progress based on schedule will be conducted as decided by the Technical Authority. The schedule may be updated by Contractor in conjunction with and with the approval of the Technical Authority.

3.4. WORK AREA LABELLING

1. Contractor will clearly label all outlet boxes for both. The labels shall be machine printed adhesive labels. Hand labeling is not permitted.

2. The labeling will conform to CAN/CSA-T528-93, "Design Guideline for Administration of Telecommunications Infrastructure in Commercial Buildings".

3. Workstation labeling will identify unique No. (001-999), and use (V=VOIP, D=Data, P=Phone).

3.5. COMMUNICATIONS ROOM LABELLING

1. Contractor will clearly label all wiring blocks at the IT Cabinets. The labels shall be machine printed adhesive labels. Hand labeling is not permitted / only mechanical printed labels will be accepted.

2. IT cabinets labelling will identify unique No. (001-999), and use (V=VOIP, D=Data, P=Phone).

3. Supply "As Built Drawings" for completed project.

3.6. CABLE AUDIT

1. A random visual inspection by the Technical Authority, prior to the commencement of Installer with Channel Performance and Functional testing will be required. The

installation will be validated for compliance with the industry standards with particular attention given to the following criteria:

1. Cable jacket removal and connector termination

2. Routing and pathway supports

3. Cable bend radius and cable tie slack

4. Neatness, clamping, and harnessing of cabling and wiring.

5. Wire and cable identification and labelling.

6. Nameplates, identification, plates, and markings

3.7. TESTING

1. After all terminations are complete, the Contractor shall be responsible to test each UTP cable installed. All testing shall be in accordance with the ANSI/TIA/EIA 568.2-D standards (including most recent additions and addendum), and the testing Specifications herein. The horizontal UTP cable shall be tested as described below.

2. All test equipment must meet current industry standardsincluding most recent additions and addendums. Test equipment must meet ANSI/TIA-1152-A Level III or above for Category 6, Level IIIe for Category 6a and Level IV for Category 7. All testing shall be performed using a Level III or above tester.

3. For any given project, the Contractor must use the same test equipment manufacturer and model for all UTP cable tests. Mixing of different manufacturer's test equipment is not permitted.

4. The Contractor shall provide documentation verifying the test equipment's last calibration. (Calibration date must be within Twelve months of the date the tests are to be performed. If calibration is required, it shall be at the Contractors expense.)

5. At the time testing begins, all test equipment must be operating under the latest version of software as provided by the respective manufacturer. All costs associated with test equipment software upgrades are the responsibility of the Contractor.

6. Prior to testing, the Contractor shall perform the following test equipment setup procedures.

    1. The Contractor shall ensure that all relevant project data (e.g., Technician/Operator Name, Date of Test, Project Name, Building, Floor, TO/Jack position number, etc.,) is entered into the test equipment.

    2. The Contractor shall ensure that the appropriate cable manufacturer, manufacturer's model number and electrical parameters (e.g., NVP - Nominal Velocity of Propagation, FEXT, NEXT, etc.) are loaded into the test equipment.

    3. The Contractor shall ensure that the scanner is properly calibrated to the injector.

7. All UTP cable tests shall be performed by connecting an injector to the respective jack and the scanner to the respective Bix /110-wiring block or patch panel. The Contractor shall ensure that the appropriate TO number is loaded into the test equipment. A Permanent Link test, as described in the ANSI/TIA/EIA 568-B standards (including most recent additions and addendum) is required for all UTP testing. At a minimum, each UTP cable must be tested for the following parameters, but not limited to:

    1. Pair-to-Pair NEXT (Near End Cross Talk)

    2. Power Sum NEXT

    3. Pair-to-Pair ELFEXT (Equal Level Far End Cross Talk)

    4. Power Sum ELFEXT

    5. Attenuation (Insertion Loss)

    6. Return Loss

    7. Propagation/Delay Skew

    8. Cable length

    9. Wire map

8. As part of the test procedure, the Contractor shall verify that the TO number matches the number on the patch panel.

9. The Contractor shall test each cable installed by the Contractor under this procurement.

10. The Contractor shall troubleshoot and correct, repair or replace each cable that does not meet specification.

11. A test result marked with an "*" (or Marginal Result) will not be accepted.

12. A test summary and each individual UTP cable test shall be included as part of the Contractor's as-built documentation submittal. Only the Test Summary Sheet shall be printed, and submitted in hardcopy format. The individual UTP cable tests shall be submitted in electronic format only. The Test Summary Sheet for each Telecommunications Room shall be signed and dated by the Contractor's Project Manager. The Contractor shall submit the original signed Test Summary Sheets as part of the final as-built submittal. In addition, the Contractor shall submit all cable test results in electronic form via electronic media. The electronic test results must be submitted in the original software format of the respective test equipment manufacturer. Text files or files that have been imported into a word processor will not be accepted.

3.8. CABLING SYSTEM CHANNEL APPLICATION WARRANTY

1. All cabling products and workmanship must include coverage as follows:

    1. All Data channel cabling components in the scope of work of this document must be included in the 25 year parts & labour warranty document.

2. Product is warranted free of defects in material or workmanship.

3. Product is warranted to perform the intended function within design limits.

3.9. APPROVED CONTRACTORS

1. TC-Tel

   Adam Chretien
   Telephone: (705) 499-5529

2. Northern Voice & Data Cabling Services Inc.

   Dave Lammi
   Telephone: (705) 673-6207

3. Helix IT

   Rob Loxton
   Telephone: (705) 345-5956

END OF SECTION 16124

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. CSA C22.1-12 Canadian Electrical Code, Part 1.

1.3. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1, and with the Waste Reduction Workplan.

2. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Division 1.

PART 2- PRODUCTS

2.1. OUTLET AND CONDUIT BOXES - GENERAL

1. Size boxes in accordance with CSA C22.1.

2. 102 mm (4") square or larger outlet boxes as required for special devices.

3. Gang boxes where wiring devices are grouped.

4. Blank cover plates for boxes without wiring devices.

5. 347V outlet boxes for 347V switching devices.

6. Combination boxes with barriers where outlets for more than one system are grouped.

2.2. SHEET STEEL OUTLET BOXES

1. Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

2. Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm

3. 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.

4. 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished tile walls.

2.3. MASONRY BOXES

1. Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4. CONCRETE BOXES

1. Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5. CONDUIT BOXES

1. Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle.

2. Electro-galvanized utility tape for indoor surface wiring.

2.6. FITTINGS - GENERAL

1. Bushing and connectors with nylon insulated throats.

2. Knock-out fillers to prevent entry of debris.

3. Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

4. Double locknuts and insulated bushings on sheet metal boxes.

PART 3- EXECUTION

3.1. INSTALLATION

1. Support boxes independently of connecting conduits.

2. Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

3. For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

4. Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

5. Provide a suitable outlet box for each light, switch, receptacle or other outlet, approved for the particular area in which it is to be installed.

6. Locate outlet boxes, mounted in hung ceiling space, so they do not obstruct or interfere with the removal of lay-in ceiling tiles.

7. Offset outlet boxes, shown back to back in partitions, horizontally to minimize noise transmission between adjacent rooms.

8. Seal electrical switch and outlet boxes that penetrate vapour barrier with moulded box vapour barrier wrap boxes with film sheet providing minimum 300 mm perimeter lap flange.

END OF SECTION 16132

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Division 1.
2. Occupancy Sensor shop drawings to be complete with a floor plan layout drawing from the manufacturer indicated proper layout requirements, as well as all wiring details and diagrams to provide lighting control as indicated on drawings.
3. Identify the sensor type on the top of the page of the shop drawing. (For Example: Type 23)

PART 2 - PRODUCTS

2.1. SWITCHES

1. 20A, 120V single pole, three-way, or four-way specification grade, as indicated.
2. Manually-operated general purpose ac switches with following features:
    1. Terminal holes approved for No. 10 AWG wire.
    2. Silver alloy contacts.
    3. Urea or melamine moulding for parts subject to carbon tracking.
    4. Suitable for back and side wiring.
    5. White toggle.
3. Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
4. Provide motor rated switches, where indicated. To be complete with pilot light.
5. Switches of one manufacturer throughout project.
6. Acceptable materials: Hubbell, Bryant, Leviton, Pass & Seymour.

2.2. WIRED DIMMERS

1. Wall box dimmer, Cat5 connected, white in colour to match switches and outlets.

2. Manually operated wallpod.

3. Solid-state, 0-10V control to match connected fixtures.

4. Mechanical air-gap switch to disconnect load power.

5. Power failure memory.

6. RFI suppression.

7. Electrostatic discharge tested.

8. Dimmers controlling LED fixtures to be rated for such loads and shall meet all light fixture and lamp manufacturer's requirements.

9. Acceptable materials: nLight nPODMA series or equivalent WaveLinx Wired by Cooper.

2.3. RECEPTACLES

1. Duplex receptacles, CSA NEMA configuration 5-15R, 125V, 15A, U ground, with following features:

    1. White urea moulded housing.

    2. Suitable for No. 10 AWG for back and side wiring.

    3. Break-off links for use as split receptacles.

    4. Eight back wired entrances, four side wiring screws.

    5. Triple wipe contacts and riveted grounding contacts.

2. Housekeeping receptacles duplex CSA NEMA configuration 5-20R, 125V, 20A, U ground with following features:

    1. White urea moulded housing.

    2. External nickel-plated brass back wire clamps with #10 brass terminal screws.

    3. Ground terminal back wire clamp.

    4. 0.04" thick nickel-plated brass, triple-wiped power contacts.

    5. Nickel-plated one-piece mounting strap with integral ground and two screw anchor strap to back body.

3. 20A Specification Grade Dead Front Self-Test GFCI Duplex Receptacle CSA NEMA configuration 5-20R, 125V, 20A, U ground with following features:

    1. White urea moulded housing.

2. External nickel-plated brass back wire clamps with #10 brass terminal screws.

3. Ground terminal back wire clamp.

4. 0.04” thick nickel-plated brass, triple-wiped power contacts.

5. Nickel-plated one-piece mounting strap with integral ground and two screw anchor strap to back body.

6. Test/Reset push buttons.

7. Performs an automatic test every three seconds to insure that ground fault protection is active.

8. Indicator lights.

9. Rated as a 1-1/2 HP motor control switch.

4. Other receptacles with ampacity, voltage and NEMA configuration as indicated.

5. All receptacles of CSA NEMA configuration 5-15R & 5-20R within a dwelling unit are to be tamper-resistant type, with the exception of receptacles for microwaves, refrigerators, freezers and kitchen counters. Provide shop drawings for review.

6. Receptacles of one manufacturer throughout project. Minimum of specification grade.

7. Acceptable materials: Hubbell, Bryant, Leviton, Legrand, Pass & Seymour.

2.4. OCCUPANCY SENSORS

1. Wall Mount, Line Voltage

Type 10

Wall mounted, line-voltage occupancy sensor to be passive infrared detection, c/w separate ON/OFF button. Detects small motion (hand movements) up to 20' radial coverage and large motion (walking) up to 36' radial coverage. Equal to the Sensorswitch WSX, c/w accessories to control loads as indicated on drawings.

Type 14

Wall mounted, line voltage occupancy sensor to be passive infrared detection, c/w 2-pole relay for independent lighting and fan control. Detects small motion (hand movements) up to 20' radial coverage and large motion (walking) up to 36' radial coverage. Equal to the Sensorswitch WSX 2P, c/w accessories to control loads as indicated on drawings.

2. Sensorswitch shall be standard of acceptance. Wavelinx Wired sensors by Cooper shall also be accepted.

3. Pre-terminated Cat5e cables required for all controls where applicable.

2.5. SPECIAL WIRING DEVICES

1. Feed through ground fault interrupters, Class A, trip level 4 to 6 milliamps. All receptacles within 1.5 meters of a sink, tub or shower to be GFI type.

2.6. COVER PLATES

1. Cover plates for wiring devices, complete with clear adhesive label with black lettering indicating source panel and circuit number.

2. Cover plates from one manufacturer throughout project.

3. Stainless steel, vertically brushed, 1 mm (1/16") thick cover plates for all wiring devices mounted in flush-mounted outlet box (including voice / data outlets).

4. Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes, or utility boxes.

5. Weatherproof gasketted, lockable decorative rain-tight while-in-use cover, expandable, suitable for GFCI outlet, shall be Hubbell TayMac ML500 series or Hubbell TayMac MX4280 series. Colour By Architect. Submit in shop drawing package for Engineers Approval.

PART 3- EXECUTION

3.1. INSTALLATION

1. Switches:

    1. Install single throw switches with handle in "UP" position when switch closed.

    2. Install switches in gang type outlet box when more than one switch is required in one location.

    3. Mount toggle switches at height specified in Section 16010 - Electrical General Requirements or as indicated.

    4. Where lighting controls are grouped, each control shall be labelled to indicate the area controlled.

2. Dimmers:

    1. Provide separate box for each dimmer, spaced to maintain full rating.

    2. Avoid locations below thermostats

3. Receptacles:

    1. Install receptacles in gang type outlet box when more than one receptacle is

required in one location.

2. Mount receptacles at height specified in Section 16010 - Electrical General Requirements or as indicated.

3. Where split receptacle has one portion switched, mount vertically and switch upper portion.

4. Cover plates:

1. Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

2. Install suitable common cover plates where wiring devices are grouped.

3. Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

5. Occupancy Sensors:

1. Install sensors and ancillary devices at location(s) shown on drawings, following sensor manufacturer's recommended installation methods.

2. Perform necessary field adjustments and settings of sensors as required for proper operation.

3. Time delay for all sensors to be set as per control schedule.

4. Passive infrared setting to be set at minimum.

5. Some occupancy sensors require the use of a neutral. Ensure a neutral is present for each lighting circuit being controlled by a sensor. Run additional wiring as required, coordinate all requirements on site.

6. Where one or more occupancy sensors control one or more switching circuits within a room, activation of any sensor within that room to turn on all lights. Provide power packs and slave packs as required. All wiring to be as per manufacturer's recommendation.

6. Occupancy Sensor Commissioning:

1. Manufacturer's representative to provide on-site commissioning and set-up of system and provide letter confirming:

1. Installation is as per manufacturer's recommendations.

2. Settings and time delay are as per specification.

3. Confirm devices are operating properly for installation and provide minor field modifications as required.

4. Identify which devices were adjusted in the field.

5. Provide completed Lighting Controls Commissioning Checklist appended to this

specification.

7. Grounding:

   1. Ground all wiring devices and respective outlet boxes in accordance with applicable sections of Ontario Electrical Safety Code. Ensure proper ground connections of isolated ground receptacle.

END OF SECTION 16141

PART 1 - GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. CSA C22.2 No. 65-13 Wire Connectors.
2. EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

PART 2 - PRODUCTS

2.1. MATERIALS

1. Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as required.
2. Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
3. Bushing stud connectors: to EEMAC 1Y-2 to consist of:
    1. Connector body and stud clamp for stranded copper conductors.
    2. Clamp for stranded copper conductors
    3. Stud clamp bolts.
    4. Bolts for copper conductors
    5. Sized for conductors as indicated.
4. Clamps or connectors for armoured cable, flexible conduit, as required.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Remove insulation carefully from ends of conductors and:
    1. Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

2. Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

3. Install fixture type connectors and tighten. Replace insulating cap.

4. Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION 16151

PART 1 - GENERAL

1.1. RELATED WORK

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

2. Fastenings and supports: Section 01600 Material and Equipment.

PART 2 - PRODUCTS

2.1. SUPPORT CHANNELS

1. U shape, size 41 x 41 x 2.5 mm thick, surface mounted or suspended.

2. Smaller sections subject to Consultant's approval.

PART 3 - EXECUTION

3.1. INSTALLATION

1. Secure equipment to tile and plaster surfaces with nylon anchors, with independent grip protrusions.

2. Secure equipment to poured concrete with expandable inserts.

3. Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

4. Secure equipment to Siporex ceiling with Aircrete anchors equal to Fischer p/n:GB14.

5. Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

6. Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

7. Fasten exposed conduit or cables to building construction or support system using straps.

    1. One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

    2. Two-hole steel straps for conduits and cables larger than 50 mm.

    3. Beam clamps to secure conduit to exposed steel work.

8. Suspended support systems.

    1. Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

    2. Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

9. For surface mounting of two or more conduits use channels at 3 m oc spacing.

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

11. Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

12. Do not use wire lashing or perforated strap to support or secure raceways or cables.

13. Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

14. Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

15. Provide minimum 2400 mm support channel on each suspended fixture in open areas, with rigid stem supports from structure to channel, and fixture secured to channel.

16. All fastenings and supports to be hot dipped galvanized. All cut ends exposing base material to be completely sealed with field applied coating to give equivalent protection prior to installation. Following complete installation, all damage to protective layer to be carefully and completely touched up with same field applied coating.

END OF SECTION 16191

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1.

PART 2- PRODUCTS

2.1. DISCONNECT SWITCHES

1. Enclosed manual air break switches in non-hazardous locations to CSA C22.2 No. 4-04 (2009).
2. Fuse holder assemblies to CSA C22.2 No. 39-13.
3. Fusible and non-fusible disconnect switch in CSA Enclosure size as indicated.
4. Provision for padlocking in on-off switch position by three locks.
5. Mechanically interlocked door to prevent opening when handle in ON position.
6. Fuses: size as indicated, to Section 16478 - Fuses - Low Voltage.
7. Fuse holders: suitable without adaptors, for type and size of fuse indicated.
8. Quick-make, quick-break action.
9. ON-OFF switch position indication on switch enclosure cover.
10. Main disconnect switch to be service entrance rated.

2.2. EQUIPMENT IDENTIFICATION

1. Provide equipment identification in accordance with Section 16010 - Electrical General Requirements.
2. Indicate name of load controlled on size 4 nameplate.

2.3. ACCEPTABLE MATERIALS

1. Square D

2. Cutler-Hammer

PART 3- EXECUTION

3.1. INSTALLATION

1. Install disconnect switches complete with fuses, if applicable.

2. For all disconnects where fuse and wire sizes have a lower rating then the disconnect, a lamacoid label is to be applied indicating “MAX FUSE SIZE TO BE ____ AMPS”. To be filled in with the value of the specific fuse size.

END OF SECTION 16440

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. OESC Section 10, Bonding and Grounding.

PART 2 - PRODUCTS

2.1. EQUIPMENT

1. Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.

2. Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, soft annealed, size as indicated.

3. Rod electrodes: copper clad steel 19 mm dia by 3 m long.

4. Plate electrodes: copper, minimum surface area 0.2 m^2 and 6 mm thick.

5. Grounding conductors: bare stranded copper, soft annealed, size as indicated.

6. Insulated grounding conductors: green, type TWH.

7. Ground bus: copper, 50 mm x 6 mm x 600 mm long, complete with insulated supports, fastenings, connectors.

8. Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

    1. Grounding and bonding bushings.

    2. Protective type clamps.

    3. Bolted type conductor connectors.

    4. Thermit welded type conductor connectors.

    5. Bonding jumpers, straps.

    6. Pressure wire connectors.

PART 3- EXECUTION

3.1. INSTALLATION GENERAL

1. Install complete permanent, continuous grounding system including electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Consultant, and Inspection Authority. Where EMT is used, run ground wire in conduit.

2. Install connectors in accordance with manufacturer's instructions.

3. Protect exposed grounding conductors from mechanical injury.

4. Make buried connections using Burndy compression connectors.

5. Use mechanical connectors for grounding connections to equipment provided with lugs, and to conductive water main using approved grounding device.

6. Soldered joints not permitted.

7. Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

8. Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

9. Install separate ground conductor to outdoor lighting standards.

10. Connect building structural steel and metal siding to ground by welding copper to steel.

11. Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

12. Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.

13. Install separate insulated ground conductor in all branch circuit conduit runs for receptacles. Conduit not to be used as a grounding system.

14. Ground secondary service pedestals.

3.2. ELECTRODES

1. Make ground connections to continuously conductive underground water pipe on street side of water meter.

2. Install water meter shunt.

3. Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.

4. Install grounding electrodes and make grounding connections.

5. Plate electrodes to be located a minimum 600mm below finished grade level.

6. Where ground rods are used, provide at least two ground rods, located at least 3 meters apart and buried to a minimum depth of 3 meters.

7. Bond separate, multiple electrodes together.

8. Use size #2/0 AWG copper conductors for connections to electrodes.

9. Make special provision for installing electrodes that will give [acceptable] resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3. SYSTEM AND CIRCUIT GROUNDING

1. Install system and circuit grounding connections to neutral of primary 600V system or secondary 208V system.

3.4. EQUIPMENT GROUNDING

1. Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels and outdoor lighting.

3.5. FIELD QUALITY CONTROL

1. Perform tests in accordance with Section 16010 - Electrical General Requirements.

2. Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Consultant and Inspection Authority.

    1. Ground continuity: Ensure, through ground loop resistance measurement, that the grounding for the new equipment is tied in satisfactorily to the existing ground grid. Continuity measurements should be made between new equipment and system grounds of existing 600V services.

    2. Perform tests before energizing electrical system.

3. Coordinate scheduling of tests with testing agency. Provide all test results to consultant.

END OF SECTION 16450

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.
2. This section defines dry-type transformers designed to meet the following regulations:
    1. NRCan (Natural Resources Canada), Energy Efficiency Act SOR/2016 - 311, amendment 14.
    2. Ontario Green Energy Act, revised by ON Reg.404-12 effective January 1st, 2018.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1.

PART 2- PRODUCTS

2.1. TRANSFORMERS

1. Use transformers of one manufacturer throughout project.
2. Energy Efficiency Levels to NRCan 2018/19 and ON Reg.404-12 – effective as of Jan. 1, 2018 (in Ontario).
3. Type 1: General Purpose
    1. Design
        1. Type: ANN, aluminum winding.
        2. Single or 3 phase, 60 Hz, size primary voltage, secondary voltage and kVA as indicated.
        3. Voltage taps on primary to be full capacity, two 2.5% above and two 2.5% below normal.
        4. Insulation: Class 220°C, 150°C temperature rise.
        5. Basic Impulse Level: 10kV
        6. Hipot: standard
        7. Average sound level: standard
        8. Impedance at 170°C: standard

9. Enclosure: ventilated NEMA 3R, front accessible.

10. Mounting: floor, unless indicated otherwise.

11. Finish: in accordance with Section 16010 - Electrical General Requirements.

12. Sprinkler Drip Shields

2.2. EQUIPMENT IDENTIFICATION

1. Provide equipment identification in accordance with Section 16010 - Electrical General Requirements.

2. Label size: 7

2.3. ACCEPTABLE MANUFACTURERS

1. Eaton, Hammond, Schneider, Rex Power Magnetics, Delta

PART 3- EXECUTION

3.1. INSTALLATION

1. Mount dry type transformers up to and including 75 kVA as indicated.

2. Mount dry type transformers above 75 kVA on floor.

3. Provide 100mm concrete housekeeping pad under equipment.

4. Ensure adequate clearance around transformer for ventilation and to meet Code requirements.

5. Install transformers in level upright position.

6. Remove shipping supports only after transformer is installed and just before putting into service.

7. For transformers installed on the floor slab, provide vibration isolation pads.

8. For transformers installed on brackets attached to the wall, provide spring vibration isolators, minimum static deflection of 6 mm.

9. Loosen isolation pad bolts until no compression is visible or as per manufacturer’s recommendations.

10. Make primary and secondary connections in accordance with wiring diagram.

11. Energize transformers immediately after installation is complete, where practical.

12. Provide ground wire from main service ground to neutral point of secondary windings, sized to Code. Run in primary feeder conduit, and bond to transformer case to satisfaction of Inspection Authority.

13. Provide flexible conduit connections for last one (1) meter in each conduit.

END OF SECTION 16461

PART 1 - GENERAL

1.1. RELATED REQUIREMENTS

1. Section 01300 - Submittals.

1.2. REFERENCES

1. American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
    1. ANSI/IEEE C62.41, Practice on Surge Voltages in Low-Voltage AC Power Circuits.
2. Underwriters' Laboratories of Canada (ULC)
    1. UL 1449 Latest Edition, Standard for Surge Protective Devices.

1.3. ACTION AND INFORMATIONAL SUBMITTALS

1. Submit in accordance with Section 01300 - Submittals.
2. Product Data:
    1. Submit manufacturer's instructions, printed product literature and data sheets for secondary lighting arresters and include product characteristics, performance criteria, physical size, finish and limitations.
3. Shop Drawings:
    1. Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
        1. Indicate on drawings:
            1. Per phase kA protection
            2. MCOV
            3. Protection Modes
            4. VPR
            5. Nominal Discharge Current (20kA minimum)
            6. Monitoring Diagnostics

1.4. CLOSEOUT SUBMITTALS

1. Submit in accordance with Section 01300 - Submittals.
2. Operation and Maintenance Data: submit operation and maintenance data for secondary lighting arresters for incorporation into manual.

1.5. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with manufacturer's written instructions.
2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

3. Storage and Handling Requirements:
    1. Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    2. Store and protect surge protective devices from nicks, scratches, and blemishes.
    3. Replace defective or damaged materials with new.

PART 2- PRODUCTS

2.1. EQUIPMENT

1. Arrester component parts: to ANSI/IEEE C62.41 and UL 1449 3rd.
2. Arrester characteristics:
    1. System voltage: 347/600V
    2. Rated voltage of arrester: suitable for panel board is it to be installed in.
    3. Integrated into panel board, mounted directly to bus bars.
    4. Indicated kA rating denotes the required per phase rating.
3. Manufacturers:
    1. Service Track ST200
    2. Alternates must be pre-approved by consultant prior to tender close.
4. Electrical Requirements
    1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.
    2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.
    3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
    4. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

	Protection Modes			
Configuration	L-N	L-G	L-L	N-G
Wye	•	•	•	•
Delta	N/A	•	•	N/A
Single Split Phase	•	•	•	•
High Leg Delta	•	•	•	•

5. Nominal Discharge Current (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.

6. ANSI/UL 1449 3rd Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

MODES	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	700	1200	1500
L-L	1200	2000	3000

5. SPD Design

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

2. Fully Integrated Component Design – All of the SPD's components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.

3. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.

4. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.

5. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

6. Monitoring Diagnostics:

1. Each SPD shall provide the following integral monitoring options:

1. Protection Status Indicators - Each unit shall have dual coloured solid-state indicator light that reports the status of the protection on each phase.
2. For wye configured units, the indicator lights must report the status of all protection elements and circuitry including the L-N, N-G and L-G modes. Wye configured units shall also contain an additional dual coloured solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes

shall not be accepted.

3. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
4. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
5. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.

7. Surge Counter:

1. The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location. The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of 50 ± 20A occurs. A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. In order to prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge count total.
2. The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge counter's display prior to the interruption shall be stored in non-volatile memory and displayed after power is restored. The surge counter's memory shall not require a backup battery in order to achieve this functionality.

8. Overcurrent Protection

1. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.

9. Safety Requirements

1. The SPD shall minimize potential arc flash hazards by containing no user serviceable / replaceable parts and shall be maintenance free. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

PART 3- EXECUTION

3.1. EXAMINATION

1. Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for secondary lighting arresters installation in accordance with manufacturer's written instructions.
    1. Visually inspect substrate.
    2. Inform Consultant of unacceptable conditions immediately upon discovery.
    3. Proceed with installation only after unacceptable conditions have been remedied.

3.2. CLEANING

1. Progress Cleaning: Leave Work area clean at end of each day.
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. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. SHOP DRAWINGS

1. Submit shop drawings in accordance with Division 1.

2. Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.3. PLANT ASSEMBLY

1. Install circuit breakers in panelboards before shipment.

2. In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

PART 2- PRODUCTS

2.1. PANELBOARDS

1. Panelboards: product of one manufacturer.

2. Bus and breaker rated for the following symmetrical interrupting capacity, unless otherwise indicated.

    1. 120 / 208 V Panelboards – 10 kA I.C.

    2. 277 / 480 V Panelboards – 10 kA I.C.

    3. 347 / 600 V Panelboards – 25 kA I.C.

    Refer to singleline diagram for other values.

3. Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

4. Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

5. Each panelboard to be equipped with integral lock and be complete with two keys. All

panelboards to be keyed alike.

6. Aluminum bus with neutral of same ampere rating as mains.

7. Mains: suitable for bolt-on breakers.

8. Trim and door finish: baked grey enamel

9. Panelboards on emergency power to be labeled in RED.

10. Panelboards to be equipped with sprinkler shields.

11. Provide 15% space for future breakers in all 120/208V panels and 25% space in all 600V panels, unless otherwise noted.

12. NEMA 1 enclosure.

2.2. BREAKERS

1. Breakers: to Section 16477 - Moulded Case Circuit Breakers.

2. Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

3. Main breaker: separately mounted on top or bottom to suit cable entry. When mounted vertically, down position should open breaker.

4. Lock-on devices for emergency and exit light circuits.

2.3. SURGE PROTECTIVE DEVICES (SPD)

1. Main 600V panelboard to have SPD

2. All surge protective devices to Section 16462 - Surge Protective Devices.

2.4. EQUIPMENT IDENTIFICATION

1. Provide equipment identification in accordance with Section 16010 - Electrical General Requirements.

2. Nameplate for each panelboard size 4 engraved, as indicated

3. Nameplate for each circuit in distribution panelboards size 2 engraved, as indicated.

4. Complete circuit directory with typewritten legend showing location and load of each circuit.

2.5. ACCEPTABLE MATERIALS

1. Eaton / Cutler-Hammer

2. Schneider

PART 3- EXECUTION

3.1. INSTALLATION

1. Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

2. Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

3. Plywood backboard to be painted with fire-retardant paint.

4. Plywood backboards installed in damp locations to be pressure treated type.

5. In non-combustible construction, provide one layer of 16 mm (5/8”) gypsum wall board behind each panel, full size of panel.

6. Mount panelboards to height specified in Section 16010 - Electrical General Requirements or as indicated.

7. Provide 100mm concrete housekeeping pad under floor mounted equipment.

8. Connect loads to circuits.

9. Connect neutral conductors to common neutral bus with respective neutral identified.

3.2. PANELBOARD LAYOUTS

1. Follow panelboard details attached or on drawings, for layout of circuit and breaker sizes wherever possible.

2. Record all changes to panelboard details and submit as part of As-Built drawing set for review at completion of the project. Insert copies in each maintenance manual.

END OF SECTION 16471

PANELBOARD SCHEDULE -- BP201

WIRE & COND	SERVICE	BRKR	Load kW	CCT. No.		CCT. No.	Load kW	BRKR	SERVICE	WIRE & COND
2#12-16mmC	OFFICE 102 REC.	15A	1.2	1		2	0.1	15A	EMERGENCY LIGHTING	2#12-16mmC
2#12-16mmC	LUNCH ROOM REC.	15A	1.2	3		4	1.5	20A	I.T. / TELECOM BACKBOARD REC.	2#12-16mmC
2#12-16mmC	LUNCH ROOM COUNTER REC.	20A	1.5	5		6	1.5	20A	HOUSE KEEPING REC	2#12-16mmC
2#12-16mmC	LUNCH ROOM COUNTER REC.	20A	1.5	7		8	1.2	15A	WASHROOM 105/106 REC.	2#12-16mmC
2#12-16mmC	OFFICE / LUNCHROOM HEATER	15A	2.0	9		10	0.3	20A	OFFICE, LUNCH RM, W/R'S, H/W, REST AREA LIGHTS	2#12-16mmC
				11		12	3.0	20A	W/R HEATERS	2#12-16mmC
2#12-16mmC	REST AREA HEATER	15A	1.3	13		14				
				15		16	1.0	15A	MECHANICAL ROOM HEATER	2#121-16mmC
2#12-16mmC	REST AREA REC.	15A	1.2	17		18				
2#12-16+mmC	OVERFLOW HEAT TRACE	15 A	0.3	19		20	---	20A	SPARE	---
2#12-16mmC	HALLWAY HEATER	20A	3.0	21		22	---	20A	SPARE	---
				23		24	---	20A	SPARE	---
---	SPARE	15 A		25		26	---	20A	space	---
---	SPARE	15 A	---	27		28	---	20A	space	---
---	SPARE	15 A	---	29		30				
---	SPARE	15 A	---	31		32				
---	SPARE	15 A	---	33		34				
				35		36				
				37		38				
				39		40				
				41		42				

****C/W Main Breaker As Per Diagram 1/E101**

NOTE: 120V Wire & Conduit sizes noted in this panel schedule are for branch circuit reference information only. Group wiring and derate wiring depending on wire length as per specification sections 16111 and 16122.

CONNECTED LOAD: 21.8 kW

MAX. CURRENT: 60.4 Amps

PANEL DESCRIPTION: Panel BP201

PANEL RATING: 100A, 120/208V, 3P 4W - 42 CCT

PANELBOARD SCHEDULE -- BP202

WIRE & COND	SERVICE	BRKR	Load kW	CCT. No.		CCT. No.	Load kW	BRKR	SERVICE	WIRE & COND
2#12-16mmC	EXTERIOR RECS	20A	1.9	1		2	0.1	15A	EMERGENCY LIGHTING	2#12-16mmC
2#12-16mmC	SHOP RECS NORTH WALL	20A	1.9	3		4	1.9	20A	SHOP STORAGE RECS	2#12-16mmC
2#12-16mmC	SHOP RECS SOUTH WALL	20A	1.9	5		6	1.9	20A	WASHING MACHINE	2#12-16mmC
2#12-16mmC	SHOP RECS BENCH NORTH	20A	1.9	7		8	8.6	30A	DRYER	3#10-16mmC
2#12-16mmC	OFFICE / LUNCHROOM HEATER	15A	2.0	9		10				
2#12-16mmC	SHOP RECS BENCH SOUTH	20A	1.9	11		12	1.5	15A	CO/NO2 CONTROLLER	2#12-16mmC
2#12-16mmC	EF#4	15A	1.3	13		14	0.8	15A	SHOP LIGHTS	2#12-16mmC
2#12-16mmC	UH#1	15A	0.1	15		16	1.0	20A	EXTERIOR LIGHTS	2#12-16mmC
2#12-16mmC	HRV#1	15A	0.3	17		18	0.1	15A	AC#1 / 2 / 3 / 4	2#12-16mmC
2#12-16mmC	EF#1 / 2 / 3	15A	0.2	19		20				
2#12-16mmC	HALLWAY HEATER	20A	3.0	21		22	15.2	60A	CU#1	2#6-21mmC
2#12-16mmC	SHOP RECS BENCH SOUTH	20A	1.9	23		24				
2#12-16mmC	JIB CRANE	20A	1.5	25		26			space	
2#12-16mmC	EF#5	15A	0.5	27		28			space	
2#12-16mmC	EF#5	15A	0.5	29		30			FUTURE EV CHARGER	
4#6-27mmC	OUTBUILDING PANEL	60A	21.6	31		32				
				33		34	6.0	30A	COMPRESSOR	3#12-16mmC
				35		36				
2#12-16mmC	IN-DUCT HEATER	15A	2.5	37		38				
				39		40	10.0	40A	FUEL STORAGE HEATER	3#8AWG TECK 90
2#12-16mmC	SHOPSTORAGE HEATER	15 A	1.0	41		42				
				43		44				
---	SPARE	15 A	---	45		46	---	20A	SPARE	---
---	SPARE	15 A	---	47		48	---	20A	SPARE	---
---	SPARE	15 A	---	49		50	---	20A	SPARE	---
---	SPARE	15 A	---	51		52	---	20A	SPARE	---
---	SPARE	15 A	---	53		54	---	20A	SPARE	---
---	SPARE	15 A	---	55		56	---	15 A	SPARE	---
				57		58				
	space			59		60			space	

****C/W Main Breaker As Per Diagram 1/E101**

NOTE: 120V Wire & Conduit sizes noted in this panel schedule are for branch circuit reference information only. Group wiring and derate wiring depending on wire length as per specification sections 16111 and 16122.

CONNECTED LOAD: 92.9 kW

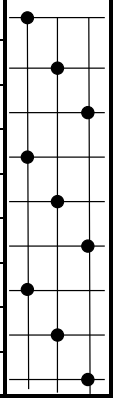
MAX. CURRENT: 258.1 Amps

PANEL DESCRIPTION: Panel BP202

PANEL RATING: 400A, 120/208V, 3P 4W - 60 CCT

PANELBOARD SCHEDULE -- BP401

WIRE & COND	SERVICE	BRKR	Load kW	CCT. No.		CCT. No.	Load kW	BRKR	SERVICE	WIRE & COND
3#3-27mmC	WELDER	90A	72.2	1		2	---		space	---
				3		4	---		space	---
				5		6	---		space	---
---	SPARE	15 A	---	7		8	---		space	---
				9		10	---		space	---
				11		12	---		space	---
---	SPARE	15 A	---	13		14	---		space	---
				15		16	---		space	---
				17		18	---		space	---



****C/W Main Breaker As Per Diagram 1/E101**

CONNECTED LOAD: 72.2 kW

MAX. CURRENT: 86.9 Amps

PANEL DESCRIPTION: Panel BP401

PANEL RATING: 225A, 277/480 V, 3P 4W - 18 CCT

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1.

2. Include time-current characteristic curves for breakers with ampacity of 400A and over or with interrupting capacity of 22,000A symmetrical (rms) and over at system voltage.

PART 2- PRODUCTS

2.1. BREAKERS - GENERAL

1. Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

2. Common-trip breakers: with single handle for multi-pole applications.

3. Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-10 times current rating.

2.2. THERMAL MAGNETIC BREAKERS

1. Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install circuit breakers as indicated.

END OF SECTION 16477

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. Canadian Standards Association (CSA)

    1. CSA C22.2 No. 248.12-11, Low Voltage Fuses Part 12: Class R (Tri-National Standard with, UL 248-12 and NMX-J-009/248/12-ANCE).

1.3. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings and product data in accordance with Division 1.

2. Submit fuse performance data characteristics for each fuse type and size above 200A. Performance data to include: average melting time-current characteristics, I2t (for fuse coordination), and peak let-through current.

1.4. MAINTENANCE MATERIALS

1. Three spare fuses of each type and size installed above 400 A.

2. Six spare fuses of each type and size installed up to and including 400 A.

3. A list of the spare parts, including fuse size, manufacturer’s part numbers and quantity to be included in operations and maintenance manuals.

1.5. DELIVERY AND STORAGE

1. Ship fuses in original containers.

2. Do not ship fuses installed in switchboard.

3. Store fuses in original containers in storage cabinet in the main electrical room.

4. Provide storage cabinet.

PART 2- PRODUCTS

2.1. FUSES - GENERAL

1. Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.

2. Fuses: product of one manufacturer.

3. HRC fuses to CSA C22.2 No. 106-05 (R2010).

2.2. FUSES - TYPES

1. Class L fuses (formerly HRC-L).

    1. Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

    2. Type L2, fast acting.

2. Class J fuses (formerly HRCI-J).

    1. Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

    2. Type J2, fast acting.

3. Class R fuses (formerly HRCI-R). For UL Class RK1 fuses, peak let-through current and I2t values not to exceed limits of UL 198E-1982, table 10.2.

    1. Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.

    2. Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.

    3. Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.

4. Class-C fuses (formerly HRCII-C).

PART 3- EXECUTION

3.1. INSTALLATION

1. Install fuses in mounting devices immediately before energizing circuit.

2. Ensure correct fuses fitted to physically matched mounting devices.

    1. Install Class R rejection clips for HRCI-R fuses.

3. Ensure correct fuses fitted to assigned electrical circuit.

4. Where UL Class RK5 fuses are specified, install warning label "Use Only UL Class RK-5

fuses for replacement" on equipment.

END OF SECTION 16478

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. REFERENCES

1. Atomic Energy Control Board Regulations.
2. Canadian Code for Preferred Packaging.
3. Canadian Standards Association (CSA)
    1. CSA C22.2 No. 141-10, Unit Equipment for Emergency Lighting.
    2. CSA C860-11, Performance of Internally-Lighted Exit Signs.
4. Natural Resources Canada (NRCan)
    1. NRCan C860 Registered.
5. National Fire Protection Association (NFPA) requirements.

1.3. PRODUCT DATA

1. Submit product data in accordance with Division 1. Include product characteristics, performance criteria, physical size, limitations and finish.

1.4. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Division 1, and with Waste Reduction Workplan.
2. Place materials defined as hazardous or toxic waste in designated containers.
3. Ensure emptied containers are sealed and stored safely for disposal away from children.
4. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
5. Fold up metal banding, flatten and place in designated area for recycling.

PART 2- PRODUCTS

2.1. PICTOGRAM EXIT LIGHTS - GENERAL

1. Pictogram Exit lights: to CSA C22.2 No. 141 and CSA C860.
2. Housing: one piece extruded aluminum, baked white enamel finish.
3. Face and back plates: extruded aluminum, baked white enamel finish.
4. Lamps: LED, non-protruding type, maximum 2 watts per face, to operate from 120V emergency lighting circuit.
5. Designed for 25 year life of continuous operation without relamping.
6. Interchangeable Pictogram Face Plate.
7. Face plate to remain captive for relamping.
8. CSA C860-11 listed and certified model with five year warranty.
9. NRCan Registered.

2.2. DESIGN

1. Universal type for wall, end to wall, or ceiling mounted as required.
2. Number of faces as per drawings.
3. Three faceplates to be provided with each Pictogram Exit, with final faceplate selection based on drawings and site conditions.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install pictogram exit lights as indicated, in accordance with OBC 2012.
2. Connect fixtures to exit light circuits as indicated.
3. Connect emergency circuit to universal DC backup power source as per installation instructions.
4. Ensure that exit light circuit breaker is locked in on position.
5. Provide T-bar grid support brackets for installations on T-bar ceiling.

END OF SECTION 16519

PART 1- GENERAL

1.1. GENERAL

1. Division 1, General Requirements is part of this Section and shall apply as if repeated here.

1.2. PRODUCT DATA

1. Submit product data in accordance with Division 1, including:
    1. Electrical data of components, including input and output voltages, operating time, phase, AC and DC ampere ratings.
    2. Mounting methods, dimensional outline and accessories.
    3. Lamp heads type, watt/ampere, lumen output, horizontal and vertical adjustments.
    4. Data for battery, charger and auxiliary instruments and devices.

1.3. DELIVERY

1. Deliver batteries in dry state, unless hermetically sealed.
2. Provide electrolyte in hazard-proof container.

1.4. WARRANTY

1. For batteries, the 12 months warranty period prescribed in subsection GC 32.1 of General Conditions “C” is extended to 120 months, with a no-charge replacement during the first 5 years and a pro-rate charge on the second 5 years.
2. Provide written copy of terms of battery guarantee in maintenance manual, and note date of acceptance for start of guarantee period.

PART 2- PRODUCTS

2.1. EQUIPMENT

1. Unit equipment for emergency lighting: to CSA C22.2 No. 141.
2. Supply voltage: Universal Voltage 120 VAC.
3. Output voltage: 12 VDC.
4. Battery: sealed, maintenance free, sized to 30 min. operation plus 20% spare capacity.

Battery capacity to be 360 W, unless otherwise noted.

5. Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variation.

6. Solid state transfer circuit.

7. Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

8. Signal lights: solid state, life expectancy 100,000 h minimum, for 'AC Power ON' and 'High Charge'.

9. Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

10. Finish: white baked enamel.

11. Auxiliary equipment:

    1. Lamp disconnect switch.

    2. Momentary test switch.

    3. Time delay relay.

    4. Battery disconnect device.

    5. Shelf.

    6. Cord and plug connection for ac.

    7. Self-diagnostics (auto-test).

2.2. WIRING OF REMOTE HEADS

1. Conduit: type EMT, to Section 16111.

2. Conductors: RW90 type to Section 16122, sized to limit voltage drop to 5%.

PART 3- EXECUTION

3.1. INSTALLATION

1. Install unit equipment for emergency lighting in accordance with CSA C22.1-12.

2. Install unit equipment and remote mounted fixtures as indicated.

3. Unit equipment shall be mounted with the bottom of the enclosure not less than 2 meters above the floor.

4. Receptacles to which unit equipment is to be connected shall be not less than 2.5 meters above the floor.

5. Connect exit lights to unit equipment as indicated.

6. Clean all heads and direct as indicated by Consultant at type of acceptance.

7. Test each unit and verify operation of all remote heads.

8. Unit equipment shall be installed in such a manner that it will be automatically actuated upon failure of the power supply to the normal lighting in the area covered by that unit equipment.

9. For all battery units that are equipped with self-diagnostics (auto-test), ensure that the system is connected as per manufacturer's instructions. Note that some battery packs with self-diagnostics have two circuits and the circuits should be balanced as close as possible for the system to work properly. Also, the DC side of the system must be connected first before the AC is initiated to prevent damage to the circuit board electronics.

10. Provide complete instruction for the operation and maintenance of the unit equipment for emergency lighting as per the OBC and the manufacturer's recommendations. Instructions to include testing unit equipment at least once a month to ensure proper operation. Installation instructions to be posted on the premises in a frame under glass.

END OF SECTION 16536

ONTARIO NORTHLAND

NEW MECHANICAL SHOP

HEARST ONTARIO

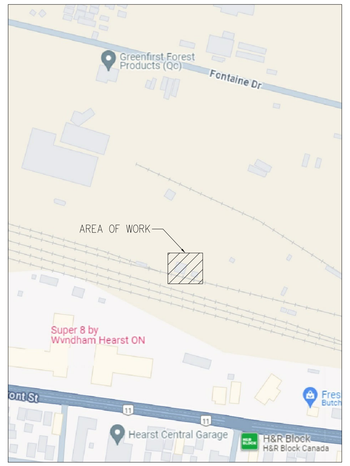
DRAWING INDEX

INSPECTION SCHEDULE

1.0 NOTIFY ENGINEER 72 HOURS (3 DAYS) PRIOR TO REQUIRED INSPECTIONS

1.1 INSPECTION REQUIRED AT THE FOLLOWING POINTS DURING CONSTRUCTION THE FOLLOWING IS A MINIMUM REQUIREMENT.

- BEFORE START OF PROJECT (PRE-CONSTRUCTION MEETING)
- AFTER EXCAVATION OF EX. SOILS FOR FOUNDATION
- AFTER INSTALLATION OF FORMWORK AND REBAR, PRIOR TO CONCRETE POURS
- AFTER INSTALLATION OF STRUCTURAL STEEL
- AFTER INSTALLATION OF METAL STUD FRAMING
- AFTER INSTALLATION OF GIRTS AND INSULATION
- AFTER INSTALLATION OF CLADDING, WINDOWS, DOORS
- PRIOR TO CONC. SLAB POUR (ONCE VP, WIRE MESH INSTALLED)
- AFTER INSTALLATION OF ALL INTERIOR FINISHES
- AT COMPLETION OF PROJECT



KEY PLAN – NTS

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LICENSED PROFESSIONAL ENGINEER
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Mar 25, 24
PROVINCE OF ONTARIO

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project: ONTARIO NORTHLAND HEARST MECHANICAL SHOP HEARST, ONTARIO

title: GENERAL NOTES

drawn by: BM	checked by: ..
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	
dwg no: GN00	

SEE DRAWINGS FOR ADDITIONAL NOTES

GENERAL NOTES

THIS IS A GENERAL SPECIFICATION. SOME STATED ITEMS MY NOT APPLY.

1.0 GENERAL
1.1 DESIGN AND CONSTRUCTION IS TO CONFORM TO THE 2012 ONTARIO BUILDING CODE. REFER ALSO TO TYPICAL DETAILS, NOTES UNDER PLANS & SCHEDULE ON THE STRUCTURAL DRAWINGS, AND TO THE SPECIFICATION. ALL CODES, MANUALS, STANDARDS AND SPECIFICATIONS REFERRED TO SHALL BE THE LATEST EDITIONS INCLUDING ALL REVISIONS AND ADDENDA. ALL DIMENSIONS, AND DETAILS OTHER THAN PURELY STRUCTURAL DIMENSIONS AND DETAILS SHOWN ON THE STRUCTURAL DRAWINGS MUST BE CHECKED AGAINST THE ARCHITECTURAL DRAWINGS AND ANY INCONSISTENCIES REPORTED TO THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK. STRUCTURAL DRAWINGS MUST NOT BE SCALED.
1.2 REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR LOCATIONS AND SIZES OF OPENINGS, TRENCHES, PITS, SUMPS, EQUIPMENT, SLEEVES, DEPRESSIONS, GROOVES AND CHAMFERS NOT INDICATED ON THE STRUCTURAL DRAWINGS. UNLESS SPECIFICALLY NOTED OTHERWISE, THE ABOVE ITEMS WHERE SHOWN ON THE STRUCTURAL DRAWINGS ARE INDICATED ONLY APPROXIMATELY AS TO SIZE AND LOCATION.
1.3 UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS, NO PROVISIONS HAS BEEN MADE IN THE DESIGN FOR CONDITIONS OCCURRING DURING CONSTRUCTION. THE CONTRACTOR IS TO PROVIDE ALL NECESSARY BRACINGS AND SHORING REQUIRED FOR STRESSES AND INSTABILITY OCCURRING FROM ANY CAUSE DURING CONSTRUCTION. THE CONTRACTOR SHALL ACCEPT FULL RESPONSIBILITY FOR ALL SUCH MEASURES. IT SHALL ALSO BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL NECESSARY BRACINGS, SHORINGS, SHEET PILING OR OTHER TEMPORARY SUPPORTS TO SAFEGUARD ALL EXISTING OR ADJACENT STRUCTURES AFFECTED BY THIS WORK.
1.4 ALL LOADS SHOWN ON THESE DRAWINGS ARE FACTORED LOADS UNLESS OTHERWISE NOTED.

2.0 SHOP DRAWINGS, PLACING DRAWINGS & BAR LISTS: –
2.1 FOR ALL STRUCTURAL COMPONENTS SHOWN ON THE STRUCTURAL DRAWINGS, SUBMIT COPIES OF SHOP DRAWINGS , FOR REVIEW BY THE STRUCTURAL CONSULTANT. SHOP DRAWINGS ARE REQUIRED FOR THE FOLLOWING ITEMS AND REQUIRE AN ENGINEERING SEAL OF AN ENGINEER LICENSED IN ONTARIO & RESPONSIBLE FOR THE WORK. ALL STRUCTURAL STEEL, OWSJ, PRE–ENGINEERED WOOD TRUSS, HEAVY WOOD TIMBER CONNECTIONS, CONCRETE PRECAST CORE SLAB, ,REBAR, METAL ROOF & FLOOR DECK, PRE–ENGINEERED BUILD FRAME. SHOP DRAWINGS TO SHOW COMPLETE INFORMATION FOR THE FABRICATION AND ERECTION OF THE STRUCTURAL COMPONENTS.
2.2 REVIEW BY THE STRUCTURAL CONSULTANT SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR SEEING THAT THE WORK IS COMPLETE, ACCURATE AND IN CONFORMITY WITH THE STRUCTURAL DRAWINGS AND SPECIFICATIONS.
3.0 INSPECTION AND TESTING: – TESTING ITEMS MAY BE DELETED WITH ENGINEER PERMISSION
3.1 A SOILS CONSULTANT AND AN INDEPENDENT INSPECTION AND TESTING COMPANY ARE TO BE ENGAGED TO CARRY OUT THE FOLLOWING SERVICES: –
.1 BEARING SOIL – REFER TO NOTES ON STRUCTURAL DRAWINGS AND ALSO TO THE SOIL REPORT.
.2 FILL UNDER SLABS–ON–GRADE – CONFIRM THAT FILL MATERIAL USED IS SATISFACTORY AND THAT THE REQUIRED DEGREE OF COMPACTION HAS BEEN ATTAINED.
.3 CAST–IN–PLACE & PRECAST CONCRETE – ROUTINE INSPECTION OF MATERIALS, INCLUDING SLUMP CYLINDER AND AIR ENTRAINMENT TESTS & REINFORCING ROD TESTS WHEN REQUIRED AS DIRECTED IN ACCORDANCE WITH CAN/CSA–A23.2–M.
.4 THE PROJECT SUPERINTENDENT IS TO ADVISE THE STRUCTURAL CONSULTANT A MINIMUM OF 24 HOURS IN ADVANCE OF A CONCRETE POURS FOR A REVIEW OF PREPARATIONS.
.5 STRUCTURAL STEEL AND OWSJ – ROUTINE SHOP AND FIELD INSPECTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF CAN/CSA–16.1–M
.6 MASONRY – WHEN REQUIRED OR DIRECTED, CONCRETE BLOCKS SHALL BE TESTED IN ACCORDANCE WITH CAN3–A165–M SERIES; BRICKS IN ACCORDANCE WITH CSA CAN3–A82M; AND MORTAR AND/OR GROUT IN ACCORDANCE WITH CSA A179M.
3.2 ALL INSPECTION AND TESTING SERVICES ARE TO BE PERFORMED BY COMPANIES CERTIFIED BY THE CANADIAN STANDARDS ASSOCIATION AND WELDING, INSPECTORS ARE TO BE CERTIFIED BY THE CANADIAN BUREAU.
4.0 FOUNDATIONS
4.0 REFER TO NOTES UNDER FOUNDATION PLANS. ALL EXTERIOR FOOTINGS OR OTHER FOOTINGS EXPOSED TO FREEZING IN THE FINISHED BUILDING SHALL BE FOUNDED AT A MINIMUM1700mm (5'–6") BELOW FINISHED GRADE, UNLESS OTHERWISE NOTED. ON THE THE DRAWINGS FOOTINGS EXPOSED TO FROST ACTION DURING CONSTRUCTING SHALL BE PROTECTED BY A MINIMUM OF 1200mm (4'–0") OF EARTH OR IT'S EQUIVALENT SUFFICIENT TO PREVENT FREEZING.
4.2 THE LINE OF SLOPE BETWEEN ADJACENT EXCAVATIONS FOR FOOTINGS OR ALONG STEPPED FOOTINGS SHALL NOT EXCEED A RISE OF 7 IN A RUN OF 10, MAXIMUM STEP APPROX. 600mm (2'–0").
4.3 CAP DEPTHS AND FOOTING ELEVATIONS SHOWN ON THE STRUCTURAL DRAWINGS ARE BASED UPON INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THE STRUCTURAL DRAWINGS.
4.4 IF ACTUAL JOB SITE OR SOIL CONDITIONS VARY FROM THOSE ASSUMED, THE WRITTEN DIRECTIONS MUST BE OBTAINED FROM THE STRUCTURAL CONSULTANT BEFORE PROCEEDING WITH THE WORK.
4.5 KEEP EXCAVATIONS CONTINUOUSLY DRY BEFORE CONCRETE IS PLACED. IF THE SOIL IS SOFTENED BY WATER, THE EXCAVATION SHALL EXTENDED BELOW THE SOFTENED MATERIAL AND THE BOTTOM OF THE FOOTINGS LOWERED TO SUIT.
5.0 BACKFILLING AND COMPACTION: –
5.1 SLABS–ON–GRADE AND ALL STRUCTURAL ELEMENTS FRAMING INTO WALLS WHICH RETAIN EARTH MUST BE IN BEFORE BACKFILLING.
5.2 AT FOUNDATION WALLS WITH GRADE BOTH SIDES, UNLESS ADEQUATELY SHORED, BACKFILL & COMPACT EACH SIDE OF WALL SIMULTANEOUSLY.
5.3 UNDER SLABS–ON–GRADE, REMOVE SOFT SPOTS, ORGANIC AND FOREIGN MATTER IN THE SUB–GRADE. (WHERE SUB–GRADE CONSISTS OF COMPACTED FILL, REFER TO SPECIFIC NOTES ON THE DRAWINGS).

GENERAL NOTES CONTINUED

5.4 BACKFILL UNDER SLAB–ON–GRADE, IN FOOTING EXCAVATIONS AND IN TRENCHES ONLY WITH APPROVED MATERIAL. UNLESS SPECIFICALLY NOTED OTHERWISE, BACKFILLING SHALL BE CARRIED OUT IN MAXIMUM OF 200mm (8") THICK LIFTS OF LOOSE FILL EACH COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.
5.5 UNLESS OTHERWISE NOTED, PROVIDE IMMEDIATELY UNDER SLABS–ON–GRADE A MINIMUM OF 150mm (8") OF COMPACTED GRANULAR "A" MATERIAL. COMPACTION TO ACHIEVE A MINIMUM OF 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.

STRUCTURAL STEEL

1.0 GENERAL
1.1 STRUCTURAL STEEL & CONNECTIONS SHALL CONFORM TO CAN/CSA–S16.1–M & SHALL BE DESIGNED BY A LICENSED PROFESSIONAL ENGINEER EXPERIENCED IN THIS TYPE OF WORK.
1.2 REFER ALSO TO GENERAL NOTES, NOTES UNDER PLANS & TO THE SPECIFICATION .
1.3 WELDING SHALL CONFORM TO CSA STANDARD W59 AND BE PERFORMED BY A FABRICATOR CERTIFIED TO CSA W47.1. DIV 1 OF 2.1
1.4 BEAM CONNECTIONS SHALL BE DESIGNED FOR A MINIMUM OF 50% OF THE BEAM SHEAR CAPACITY UNLESS OTHERWISE NOTED, & IN NO CASE BE LESS THAN THE LOADS SHOWN ON OR IMPLIED BY THE DRAWINGS. WHEN EVER POSSBLE USE STANDARD DOUBLE HEADED AND TYPE CONNECTIONS. ALL CONNECTION TO BE AT LEAST HALF THE DEPTH OF THE BEAMS. USE SAFE CONNECTIONS AS REQUIRED BY THE MINISTRY OF LABOUR.
2.0 PRODUCTS
2.1 ALL STRUCTURAL STEEL MEMBERS SHALL CONFORM TO CAN/CSA–G40.20/G20.21–M. PLATES, SAG RODS, STRAP ANCHORS & BARS SHALL BE TYPE 300W AND WIDE FLANGE SECTION AND HOLLOW STUCTURAL SECTIONS SHALL BE TYPE 350W, CLASS C FOR SQUARE HSS & CLASS C FOR ROUND HSS.
2.2 BOLTS, NUTS & WASHERS FOR CONNECTIONS TO CONFORM TO ASTM A325 UNLESS NOTED.
2.4 ANCHOR BOLTS, NUTS & WASHERS FOR BASE PLATES, BEARING PLATES & WELD PLATES TO CONFORM TO ASTM A307 UNLESS NOTED.
2.5 SHEAR STUDS WHERE REQUIRED TO CONFORM TO ASTM A108, WELDING TO CONFORM TO CSA W59.
2.6 WELDING MATERIALS TO CONFORM TO CSA W48–M (SERIES).
2.7 POWER TOOL CLEAN ALL STEEL BEFORE PRIMING TO REMOVE ALL LOOSE MILL SCALE.
2.8 PRIMER PAINT TO CONFORM TO CAN/CGSB–1.40–M OR CISC/CPMA 2–75. TOP COAT TO BE INDUSTRIAL GRADE ENAMEL PAINT (AS PER ONTC REQUEST)

3.0 EXECUTION
3.1 FABRICATION, HANDLING & ERECTION TO CONFORM TO CAN/CSA–S16.1–M.
3.2 PROVIDE A MINIMUM OF 2–12mm (1/2") DIAMETER BY 250 (10") LONG WALL ANCHORS FOR ALL BEAM & OWSJ WALL PLATES ON MASONRY, OR AN APPROVED EQUAL, UNLESS OTHERWISE NOTED. BEAMS & JOIST SHOES TO BE WELDED TO BEARING PLATES.
3.3 PROVIDE ADJUSTABLE ANCHORS TO ALL STEEL TO BE BUILT INTO, ABUTTED BY, OR FACED WITH MASONRY (REFER ALSO TO DETAILS IF SHOWN). SPACING OF ANCHORS TO BE
.1 FOR VERTICAL SPACING.....600 (24") MAX. CENTRES
.2 FOR HORIZONTAL SPACING.....5 TIMES WALL THICKNESS* MAX. 1500 (5'–0") CENTRES
(*NOTE, USE BACK–UP WYTHE ONLY FOR CAVITY WALLS).
.3 WHERE STEEL PROVIDES LATERAL BRACING ONLY TO MASONRY (I.E. DOES NOT SUPPORT MASONRY) ANCHORS SHALL PERMIT DIFFERENTIAL VERTICAL MOVEMENT BETWEEN STRUCTURAL MEMBER & MASONRY. MINIMUM CLEARANCE SPAN/180 (MINIMUM 25mm 1")
3.4 CLEAN, PREPARE SURFACES AND SHOP PRIME STRUCTURAL STEEL COAT OF SPECIFIED PRIMER PAINT IN ACCORDANCE WITH CAN/CSA–S16.1–M, EXECPT WHERE MEMBERS ARE TO BE ENCASED IN CONCRETE. FIELD "TOUCH–UP' BOLTS, WELDS, BURNED OR SCRAPED SURFACES AFTER ERECTION..
3.6 PROVIDE ALL NECESSARY TEMPORARY BRACING TO KEEP STRUCTURE SAFE AND PLUMB. BRACING SHOWN ON STRUCTURAL DRAWINGS IS PERMANENT FOR FINISHED BUILDING ONLY.
3.7 CO–ORDINATE WITH MECHANICAL & ELECTRICAL CONSULTANTS & SUB–TRADES WHOSE WORK MAY EFFECT DETAILING, FABRICATION & ERECTION OF THE STEEL STRUCTURE.
3.8 TOLERANCES: VARIATION FROM PLUMB & LEVEL EXTERIOR COLUMNS AT ELEVATOR SHAFTS, & SPANDREL BEAMS INCLUDING ANGLES.....1:1000 MAX. 25mm (1/8" IN 10'–0" MAX.1")
OTHER PIECES.....1:500 (1/4" IN 10'–0")
3.9 NO HOLES OTHER THAN THOSE SHOWN ON REVIEWED SHOP DRAWINGS SHALL BE MADE IN ANY STEEL MEMBER WITHOUT WRITTEN PERMISSION OF THE STRUCTURAL CONSULTANT.
4.0 QUALITY CONTROL
4.1 SEE GENERAL NOTES, NOTES UNDER PLANS, &/OR SPECIFICATION FOR INSPECTION AND TESTING REQUIREMENT.?PREFABRICATED WOOD TRUSS NOTES

CAST–IN–PLACE CONCRETE NOTES

1.0 GENERAL
1.1 PROVIDE ALL LABOUR MATERIAL, TOOLS AND EQUIPMENT REQUIRED TO CARRY OUT THE WORK.
1.2 REFER ALSO TO GENERAL NOTES, NOTES UNDER PLANS AND SCHEDULES, TYPICAL DETAILS AND SPECIFICATION.
2.0 PRODUCTS
2.1 PORTLAND CEMENT, WATER AND AGGREGATES SHALL CONFORM TO CSA STANDARD A23.1.
2.2 PROVIDE AN APPROVED WATER REDUCING ADDITIVE IN ALL CONCRETE. PROVIDE AN APPROVED AIR ENTRAINING ADDITIVE IN ALL CONCRETE WHICH WILL BE EXPOSED TO A FREEZE/THAW CYCLE AND/OR THE ACTION OF DE–ICING SALT. ADMIXTURES SHALL CONFORM TO CSA STANDARD A23.5.
2.3 FORM WORK SHALL CONFORM TO CSA STANDARD A23.1, CSA STANDARD S269.3 AND FALSE WORK SHALL CONFORM TO CSA S269.1.
2.4 IF SO INSTRUCTED, THE DESIGNS FOR THE FORM WORK SHALL BE SUBMITTED FOR REVIEW BEFORE CONSTRUCTION. FORM WORK DRAWINGS AND DESIGN SHALL BEAR THE STAMP OF A LICENSED PROFESSIONAL ENGINEER.
2.5 UNLESS OTHERWISE NOTED PROVIDE SLAB & BEAM FORMS WITH AN UPWARD CAMBER OF 2mm/1000mm (1/4" PER 10'–0") OF SPAN, AND UPLIFT ENDS OF CANTILEVERED SLAB & BEAM FORMS 3mm/1000mm (1/4" PER 8'–0") OF CANTILEVER LENGTH.
2.6 PROVIDE STANDARD ADJUSTABLE MASONRY ANCHOR SLOTS FOR ALL MASONRY FACING OR ABUTTING CONCRETE FACES.
2.7 PROVIDE AND/OR INSTALL STANDARD ADJUSTABLE INSERTS & ALL OTHER CAST–IN INSERTS AS REQUIRED BY THE ARCHITECTURAL, STRUCTURAL, MECHANICAL & ELECTRICAL DRAWINGS & SPECIFICATION.
2.8 REINFORCING STEEL UNLESS SPECIFICALLY NOTED, SHALL BE DEFORMED BARS CONFORMING TO CAN/CSA–G30.18–M GRADE 400 (58000 PSI).
2.9 WELDED WIRE FABRIC TO CONFORM TO CSA G30.5–M.
2.10 REINFORCING SHALL BE DETAILED, BENT, PLACED AND SUPPORTED TO CONFORM TO ACI STANDARD 315 AND THE MANUAL OF STANDARD PRACTICE PUBLISHED BY THE REINFORCING STEEL INSTITUTE OF CANADA.
2.11 DRY–PACK GROUT TO BE 1 PART PORTLAND CEMENT TO 11/2 PARTS SAND TO 2 PARTS OF 8mm PEA GRAVEL WITH ONLY SUFFICIENT WATER TO DAMPEN MIXTURE. COMPRESSIVE STRENGTH 50MPa AT 28 DAYS.
2.12 NON–SHRINK GROUT TO BE AN APPROVED PRE–MIXED PROPRIETARY PRODUCT .
2.13 PROVIDE APPROVED EXTRUDED PVC WATER STOPS OF SIZE & STYLES INDICATED, WITH PRE–WELDED CORNERS & INTERSECTIONS. SEE ALSO TYPICAL DETAILS.
2.14 CURING AND SEALING COMPOUNDS WHERE APPROVED FOR USE TO CONFORM TO ASTM STANDARD C309. GENERALLY, ALL CONCRETE SURFACES ARE TO BE SEALED UNLESS NOTED OTHERWISE. COMPOUNDS ARE TO BE COMPATIBLE WITH APPLIED FINISHES.
3.0 EXECUTION
3.1 MINIMUM COMPRESSIVE STRENGTH FOR CONCRETE @ 28 DAYS SHALL BE AS FOLLOWS –25MPa FOR FOOTINGS
–25MPa FOR WALL AND PIERS
–25MPa FLOOR SLAB
3.2 SLUMP AT THE POINT OF DISCHARGE SHALL BE CONSISTENT AT 80mm +/–30mm (3" +/– 11/8") UNLESS NOTED OTHERWISE. GREATER SLUMPS ARE NOT ACCEPTABLE.
3.3 CONCRETE MIXING, TRANSPORTATION, HANDLING AND PLACING SHALL CONFORM TO CSA STANDARD A23.1.
3.4 CONSTRUCTION JOINTS FOR WALLS ARE BASED UPON VERTICAL JOINTS AT A MAXIMUM SPACING OF 10000mm (30'–0").
3.5 CONSTRUCTION JOINTS FOR WALLS, SLABS, AND BEAMS NOT SHOWN ON THE DRAWINGS SHALL BE APPROVED BY THE STRUCTURAL CONSULTANT BEFORE CONSTRUCTION. GENERALLY JOINTS IN SLABS SHALL BE AT RIGHT ANGLES TO THE SPANS, AT MID–SPAN IF POSSIBLE AND BE CLEAR OF SUPPORTS AND POINT LOADS.
3.6 INSERTS, FRAME–OUTS, SLEEVES, BRACKETS, CONDUITS AND FASTENING DEVICES, SHALL BE INSTALLED AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS IN A MANNER THAT SHALL NOT IMPAIR THE STRUCTURAL STRENGTH OF THE SYSTEM, BE SO INSTALLED THAT THEY SHALL NOT REQUIRE THE CUTTING, BENDING, OR DISPLACEMENT OF THE REINFORCING OTHER THAN AS SHOWN ON THE TYPICAL DETAILS.
3.7 ELECTRICAL CONDUIT SHALL NOT PASS THROUGH A COLUMN, SHALL NOT BE LARGER IN OUTSIDE DIAMETER THAN 1/3 SLAB THICKNESS OR WALL OR BEAM IN WHICH IT IS EMBEDDED, SHALL NOT BE SPACED CLOSER THAN 3 DIAMETERS ON CENTRE UNLESS APPROVED AND HAVE A MINIMUM CONCRETE COVER OF 25mm (1") AND UNLESS SPECIFICALLY PERMITTED OTHERWISE, SHALL NOT RUN HORIZONTALLY IN A CONCRETE WALL.
3.8 OPENINGS AND DRIVEN FASTENERS REQUIRED IN THE CONCRETE AFTER THE CONCRETE IS PLACED SHALL BE APPROVED BY THE STRUCTURAL CONSULTANT BEFORE PROCEEDING.
3.9 FINISHING, REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR REQUIRED FINISH TO EXPOSED CONCRETE. ALL HONEYCOMBING SHALL BE CUT OUT AND FILLED. FLOOR FINISHES SHALL BE AS REQUIRED BY THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS AND SHALL CONFORM TO CSA STANDARD A23.1 (CLASS A CONVENTIONAL SMOOTH CLASSIFICATION).
3.10 TOLERANCES FOR PLACING STRUCTURAL CONCRETE, REINFORCING STEEL, CAST–IN HARDWARE AND FOR FLOOR & ROOF FINISHES SHALL BE AS SPECIFIED IN CSA STANDARD A23.1.
3.11 MINIMUM REINFORCING FOR ANY CONCRETE WALL TO BE AS SHOWN ON TYPICAL DETAIL FOR CONCRETE WALLS.
3.12 MINIMUM REINFORCING FOR ANY SUSPENDED SLAB SHALL BE TEMPERATURE BARS BOTTOM EACH WAY PLUS 10M @ 400 (16") DOWLES 600x600 (2'–0" x 2'–0") TOP AROUND PERIMETER, REFER TO TYPICAL DETAIL OF ONE WAY SLABS.
4.0 QUALITY CONTROL
4.1 FOR INSPECTION AND TESTING, SEE GENERAL NOTES.

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LICENCED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
GENERAL NOTES

drawn by: BM	checked by: ..
scale: NTS	project no: 231978
date plotted: MAR 25 24	
date: NOV 10 23	

dwg no:
GN01

WOOD CONSTRUCTION

1.0 GENERAL
1.1 TRUSSES, BRACING, BRIDGING AND CONNECTORS ARE TO BE DESIGNED AND FABRICATED BY THE TRUSS FABRICATOR TO THE REQUIREMENTS OOF CAN/CSA–086–M OR CAN/CSA–086.1–M UNLESS OTHERWISE NOTED, TO SAFELY CARRY THE LOADS, INCLUDING ACCUMULATED SNOW DRIFT LOADS AS INDICATED ON THE DRAWINGS, AND ALL WIND LOADS.
1.2 DEFLECTION UNDER LIVE LOAD ONLY SHALL NOT EXCEED 1/240TH OF THE SPAN, EXCEPT THAT WHERE PLASTER OR GYPSUM BOARD CEILINGS ARE HUNG DIRECTLY FROM THE TRUSSES, LIVE LOAD DEFLECTION SHALL NOT EXCEED 1/360TH OF THE SPAN.
1.3 IDENTIFY LUMBER BY OFFICIAL GRADE MARKS.
1.4 WOOD PRESERVATIVE (PRESSURE TREATED):– WHERE REQUIRED TO CONFORM TO CAN/CSA–080–M.
1.5 SHOP DRAWINGS
.1 SUBMIT SHOP DRAWINGS FOR REVIEW AS DIRECTED BEARING THE STAMP OF THE LICENCED PROFESSIONAL ENGINEER RESPONSIBLE FOR THE DESIGN.
.2 CLEARLY INDICATE ON THE SHOP DRAWINGS, THE SPECIES, SIZES AND STRESS GRADES OF LUMBER USED.
.3 SHOW PITCH, SPAN, CAMBER CONFIGURATION, AND SPACING.
.4 INDICATE CONNECTOR TYPES, THICKNESSES, SIZES, LOCATION, DESIGN VALUES AND BRIDGING REQUIREMENTS.
.5 SHOW BEARING & WIND UPLIFT ANCHORAGE DETAILS.
.6 REVIEW OF THE SHOP DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR SEEING THAT THE WORK IS COMPLETE, ACCURATE AND IN CONFORMITY WITH THE STRUCTURAL DRAWINGS.
2.0 MATERIALS
2.1 LUMBER:–UNLESS OTHERWISE NOTED, TO BE SPF SPECIES, GRADE NO. 2 CONFORMING TO CSA STANDARD 0141 WITH MAXIMUM MOISTURE CONTENT OF 19% AT THE TIME OF FABRICATION.
2.2 CONNECTOR PLATES: – GALVANIZED SHEET STEEL TO ASTM A446 GRADE "A" WITH g90 "WIPED COAT" DESIGNATION, AND WITH HOLES, PLUGS, TEETH OR PRONGS UNIFORMLY SPACED AND FORMED.
2.3 NAILS:–ZINC COATED STEEL TO CSA STANDARD B111.
2.4 SCREW & LAG SCREWS:–CADMIUM PLATED STEEL TO CSA STANDARD B35.(SERIES)
2.5 SPLIT RINGS:–HOT ROLLED CARBON STEEL TO CAN/CSA–G40.20/G40.21–M, TYPE 260W.
2.6 PLYWOOD GUSSETS: – PLYWOOD TO CSA STANDARD 0121–M OR 0151–M.
3.0 EXECUTION
3.1 HOIST TRUSSES INTO POSITION IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3.2 INSTALL ALL NECESSARY TEMPORARY BRACING REQUIRED TO HOLD TRUSSES PLUMB UNTIL PERMANENT BRACING IS INSTALLED.
3.3 INSTALL PERMANENT BRACING AND RELATED COMPONENTS PRIOR TO APPLICATION OF LOADS TO TRUSSES.
3.4 TIGHTEN LOOSE CONNECTORS.
3.5 DO NOT CUT OR REMOVE CHORDS OR OTHER TRUSS MEMBERS. DO NOT NOTCH OR DRILL MEMBERS UNLESS SUCH NOTCHING OR DRILLING IS ALLOWED FOR IN THE DESIGN OF THE TRUSS.

CLADDING/FLASHING & EXTERIOR PANEL NOTES

1.0 DESIGN REQUIREMENTS
1.1 DESIGN METAL SIDING SYSTEM IN ACCORDANCE WITH CSA S136, S136.1 AND TO WITHSTAND LIVE, DEAD, LATERAL, WIND, SEISMIC, HANDLING, TRANSPORTATION, AND ERECTION LOADS
1.2 DESIGN METAL SIDING SYSTEM IN ACCORDANCE WITH FOLLOWING CLIMATE DESIGN DATA FOR COCHRANE ONTARIO CONTAINED IN ONTARIO BUILDING CODE
a. DESIGN TEMPERATURE: JANUARY 1%, JULY 2 1/2%
b. WIND (HOURLY WIND PRESSURES): 0.35kPa 1 IN 50 YEAR OCCURRENCE
GUST FACTOR: 2
c. EARTHQUAKE: SEISMIC DATA AS LISTED
1.3 DESIGN METAL SIDING SYSTEM TO LIMIT DEFLECTION UNDER DESIGN LOADS, TO L/240.
1.4 DESIGN METAL SIDING SYSTEM TO PREVENT RESTRICTION OF THERMAL INDUCED MOVEMENT WHICH WOULD INDUCE DEFORMATION SUCH AS WARPING, BUCKLING, AND FAILURE OF JOINT SEALS AND FASTENERS. DESIGN METAL SIDING TO PREVENT VIBRATION WHEN SUBJECT TO THE EFFECTS OF WIND.
1.5 DESIGN MISCELLANEOUS, ADDITIONAL STRUCTURAL FRAMING MEMBERS AND SAG RODS, REQUIRED TO COMPLETE METAL SIDING SYSTEM, WHERE NOT INDICATED ON CONTRACT DRAWINGS.
2.0 SUBMITTALS
2.1 SHOP DRAWINGS: SUBMIT SHOP DRAWINGS INDICATING ELEVATIONS, DETAILS, PROFILES, DIMENSIONS, THICKNESS OF MATERIALS, FINISHES, METHODS OF JOINING, ARRANGEMENT OF SHEETS, JOINTS, AND SEAMS, SPECIAL SHAPES, METHODS OF ANCHORING, ANCHOR AND CLIP DETAILS, TYPES OF SEALANTS AND GASKETS, WATERPROOF CONNECTIONS TO ADJOINING WORK, DETAILS OF OTHER PERTINENT COMPONENTS OF THE WORK (I.E. WINDOWS, PENETRATIONS, MEMBRANES, ETC) AND COMPLIANCE WITH DESIGN CRITERIA AND REQUIREMENTS AS NOTED ON CONTRACT DRAWINGS.
3.0 EXECUTION
3.1 INSTALL METAL SIDING IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS AND MANUFACTURER'S WRITTEN INSTRUCTIONS.
3.2 INSTALL METAL SIDING IN ONE PIECE, FULL HEIGHT, EXCEPT AS INDICATED OTHERWISE.
3.3 MAINTAIN JOINTS IN EXTERIOR SIDING, PLUMB, TRUE TO LINE, TIGHT FITTING, HAIRLINE JOINTS.
3.4 ATTACH METAL SIDING SYSTEM COMPONENTS TO PREVENT WARPING, BUCKLING, AND DEFORMATION INDUCED BY RESTRICTION OF THERMAL INDUCED MOVEMENT.
3.5 INSTALL CORNER PIECES, CLOSURES, FLASHING, ETC, WHERE SHOWN AND WHERE REQUIRED.
3.6 BED FLASHING, CLOSURES, AND CORNER PIECES IN SEALANT TO PROVIDE A WEATHERTIGHT INSTALLATION
3.7 CAULK AND SEAL ALL JOINTS, CORNERS, AND CLOSURE AREAS AS REQ'D TO MAKE WORK COMPLETE

LOAD–BEARING METAL STUDS NOTES

1.0 DESIGN REQUIREMENTS
1.1 DESIGN LOAD–BEARING METAL STUDS TO WITHSTAND LIVE, DEAD, WIND, SEISMIC, HANDLING, TRANSPORTATION, AND ERECTION LOADS.
1.2 DESIGN LOAD–BEARING METAL STUDS BASED ON LIMIT STATES DESIGN PRINCIPLES USING FACTORED LOADS AND RESISTANCES. LOADS AND LOAD FACTORS TO BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE (NBC). RESISTANCE FACTORS TO BE DETERMINED IN ACCORDANCE WITH THE NBC AND CAN/CSA–S136–M.
1.3 DESIGN BRIDGING TO PREVENT MEMBER ROTATION AND MEMBER TRANSLATION PERPENDICULAR TO THE MINOR AXIS. PROVIDE FOR SECONDARY STRESS EFFECTS DUE TO TORSION BETWEEN LINES OF BRIDGING.
1.4 DESIGN LOAD–BEARING METAL STUDS IN ACCORDANCE WITH FOLLOWING CLIMATE DESIGN DATA FOR COCHRANE CONTAINED IN THE ONTARIO BUILDING CODE:
1. DESIGN TEMPERATURE: JANUARY 1%, JULY 2 1/2%
2. WIND (HOURLY WIND PRESSURES): 0.35kPa 1 IN 50 YEAR OCCURRENCE.
1.5 DESIGN LOAD–BEARING METAL STUDS FOR THE FULL SPECIFIED DESIGN WIND LOAD WITH A DEFLECTION LIMIT OF L/360.
1.6 DESIGN LOAD–BEARING METAL STUDS WITHOUT RELYING ON SHEATHING OR GYPSUM BOARD TO RESIST TORSION AND WEAK AXIS BUCKLING.
2.0 SUBMITTALS
2.1 SHOP DRAWINGS: SUBMIT SHOP DRAWINGS INDICATING: WALL CONSTRUCTION, LOAD BEARING METAL STUD WALL SYSTEM, DESIGN LOADS, MEMBER SIZES, MATERIALS, COMPONENT DETAILS, DEPTH AND GAUGE DESIGNATION EXCLUSIVE OF COATING, LOCATION, AND SPACINGS OF FRAMING MEMBERS, CONNECTION AND BRACING DETAILS, BEARING, ANCHORAGE, LOADINGS, TEMPORARY BRACING, TYPES AND LOCATIONS OF MECHANICAL FASTENERS, AND SHEATHING
3.0 EXECUTION
3.1 INSTALL LOAD–BEARING STUDS IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS AND MANUFACTURER'S WRITTEN INSTRUCTIONS.
3.2 ERECT STUDS PLUMB, ALIGNED AND SECURELY ATTACHED WITH 2 SCREWS MINIMUM AT EACH POINT OF ATTACHEMENT. ANCHOR TRACKS SECURELY @ 400 O.C
1. ALL SCREWS TO BE PANHEAD No 10 U.N.O
2. ALL BRIDGING SCREWS TO BE No. 10 HEXHEAD SELF TAPPING FRAMING SCREWS
3. USE HILTI 1/4" DIAMETER ZAMAC PIN BOLT TO FASTEN STUDS & TRACKS TO CONCRETE. MINIMUM EMBEDDMENT 32MM

SPRAYED INSULATION – POLYURETHANE FOAM NOTES

1.0 MATERIALS
1.1 ALL MATERIALS UNDER WORK OF THIS SECTION, INCLUDING BUT NOT LIMITED TO, PRIMERS SEALANTS ARE TO HAVE LOW 'VOC' CONTENT LIMITS
1.2 SPRAYED FOAM INSULATION: SPRAYED/FROTHED POLYURETHANE FOAM CONFORMING TO CAN/ULC S705.1 AND CONTAINING NO FLUROCARBONS AND CONFORMING TO THE FOLLOWING MINIMUM REQUIREMENTS:
a. AGED RSI FACTOR: 0.97 PER 25mm TO CAN/ULC S770.
b. CLOSED CELLS (ASTM D2856): 92%
c. COMPRESSIVE STRENGTH (ASTM D1621): 186 kPa (27.0 PSI).
d. WATER ABSORPTION (ASTM E96): 50mm SAMPLE 42 NG/Pa*s*M² (0.70 PERMS).
e. FLAME SPREAD: <500.
f. SMOKE DEVELOPED: <500.
g. BLOWING AGENT: PRODUCT TO UTILIZE ZERO ODS (OZONE DEPLETING SUBSTANCE) BLOWING.
h. RECYCLED CONTENT: >5% RECYCLED CONTENT BY MASS OF FINISHED PRODUCT.
i. SPRAYED URETHANE FOAM: 'WALLTITE ECO V.2' BY BASF OR 'HEATLOK SOYA' BY DEMILEC INC.
1.3 PRIMERS: AS RECOMMENDED BY SPRAYED FOAM INSULATION MANUFACTURER

2.0 PREPARATION
2.1 VERIFY SUBSTRATE SURFACES ARE SOLID, FREE FROM SURFACE WATER, FROZEN MATTER, DUST, OIL, GREASE, SCALING OR LAITANCE, PROJECTIONS AND ANY OTHER FOREIGN MATTER DETRIMENTAL TO PERFORMANCE.
–TO SUIT MANUFACTURER'S APPROVED SUBSTRATE
2.2 SUPPLY AND INSTALL TEMPORARY PROTECTION TO ADJACENT SURFACES TO PREVENT DAMAGE RESULTING FROM WORK OF THIS SECTION.
2.3 IF REQUIRED, APPLY PRIMER TO SUBSTRATE SURFACES IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTION.

3.0 EXECUTION
3.1 INSTALL INSULATION IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS
3.2 APPLY SPRAYED FOAM INSULATION TO THICKNESS INDICATED ON DRAWINGS. APPLY INSULATION TO WITHIN 6mm OF THICKNESS INDICATED ON DRAWINGS. PROVIDE ONE MEASURING PIN FOR EVERY 50M².
3.3 INSULATION THICKNESS GREATER THAN 50mm SHALL BE COMPLETED IN A MINIMUM OF 2 STEPS
3.4 INSULATION TO BE CONTINUOUS, LEVEL, PLUMB, AND UNIFORM THICKNESS THROUGHOUT. INSULATION SHALL BE FREE OF VOIDS AND IMBEDDED FOREIGN MATERIALS.

POLYVINYL–CHLORIDE ROOFING

1.0 GENERAL
1.1 THIS SECTION SHALL BE READ IN ITS ENTIRETY
1.2 EXAMINATION RESPONSIBILITIES
1.2a PRIOR TO COMMENCING, EXAMINE ALL SURFACES, SUBSTRATES, EXISTING AND AS–BUILT CONDITIONS RELATING TO THE WORK IN THIS SECTION, AS REQUIRED TO VERIFY CONDITIONS ARE ACCEPTABLE FOR EXECUTING THE WORK OF THIS SECTION.
1.2b REPORT IN WRITING TO THE CONTRACTOR ANY DEFECTS OR DEFICIENCIES THAT WILL ADVERSELY AFFECT THE WORK OF THIS SECTION. DO NOT COMMENCE WORK UNTIL ANY/ALL SUCH DEFECTS HAVE BEEN CORRECTED
1.2c COMMENCEMENT OF THE WORK OF THIS SECTION SHALL IMPLY ACCEPTANCE OF ALL SURFACES, SUBSTRATES, EXISTING AND AS–BUILT CONDITIONS RELATED TO THE WORK OF THIS SECTION
1.3 SECTION INCLUDES:
PROVISION OF ALL LABOUR, MATERIALS, EQUIPMENT AND INCIDENTAL SERVICES NECESSARY TO PROVIDE POLYVINYL–CHLORIDE ROOFING WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
1.4 REFERENCES
1.4a ASTM INTERNATIONAL
ASTM C 726–05e1, STANDARD SPECIFICATION FOR MINERAL FIBER ROOF INSULATION
ASTM C 728–05, STANDARD SPECIFICATION FOR PERLITE THERMAL INSULATION BOARD.
ASTM C 1002–07, STANDARD SPECIFICATION FOR STEEL SELF–PIECING TAPPING SCREWS FOR THE APPLICATION OF GYPSUM PANEL PRODUCTS OR METAL PLASTER BASES TO WOOD STUDS OR STEEL STUDS
ASTM C 1177/C 1177M–08, STANDARD SPECIFICATION FOR GLASS MAT GYPSUM SUBSTRATE FOR USE AS SHEATHING
ASTM C 1396/C 1396M–09, STANDARD SPECIFICATION FOR GYPSUM BOARD.
ASTM D 4434–09, STANDARD FOR POLYVINYL CHLORIDE SHEET ROOFING.
1.4b CSA INTERNATIONAL
CSA A123.21–04, STANDARD TEST METHOD FOR THE DYNAMIC WIND UPLIFT RESISTANCE OF MECHANICALLY ATTACHED MEMBRANE–ROOFING SYSTEMS
CSA A231.1–2006, PRECAST CONCRETE PAVING SLABS/PRECAST CONCRETE PAVERS.
CSA 0121–08, DOUGLAS FIR PLYWOOD
CSA 0151–09, CANADIAN SOFTWOOD PLYWOOD
1.4c GREEN SEAL ENVIRONMENTAL STANDARDS (GSES)
GS–36–00, COMMERCIAL ADHESIVES
1.4d UNDERWRITERS' LABORATORIES OF CANADA (ULC)
CAN/ULC–S701–05, STANDARD OF THERMAL INSULATION, POLYSTYRENE, BOARDS AND PIPE COVERING.
CAN/ULC–S702–09, STANDARD FOR THERMAL INSULATION MINERAL FIBRE FOR BUILDINGS.
CAN/ULC–S704–03, STANDARD FOR THERMAL INSULATION, POLYURETHANE AND POYLISOCYANURATE, BAORDS, FACED.
CAN/ULC–S706–09, STANDARD TEST METHOD FOR DETERMINATION OF LONG–TERM THERMAL RESISTANCE OF CLOSED–CELL THERMAL INSULATING FOAMS.
1.5 SUBMITTALS
1.5a PRODUCT DATA:
–TECHNICAL ROOFING COMPONENT DATASHEETS DESCRIBING MATERIALS' PHYSICAL PROPERTIES AND INCLUDE PRODUCT CHARACTERISTICS, PERFORMANCE CRITERIA, PHYSICAL SIZE, FINISH AND LIMITATIONS.
–MANUFACTURER'S INSTALLATION INSTRUCTIONS TO INDICATE SPECIAL HANDLING CRITERIA, INSTALLATION SEQUENCE, CLEANING PROCEDURES AND ANY SPECIAL PRECAUTIONS REQUIRED FOR SEAMING THE MEMBRANE
–WHMIS MSDS MAERIAL SAFETY DATA SHEETS.
1.5b SHOP DRAWINGS:
SUBMIT SHOP DRAWINGS INDICATING ROOF LAYOUT, SECTIONS, DETAILS, MATERIALS, FASTENERS LAYOUT, FLASHINGS AND MEMBRANE TERMINATIONS, PERIMETER SECUREMENT, VAPOUR RETARDER TERMINATIONS, SEAMS AND LAYOUT, INSULATION WRAPPING PROCEDURES, TAPERED INSULATION LAYOUT, MEMBRANE PENETRATIONS, SCUPPER AND ROOF ACCESSORIES
–SHOP DRAWING SUBMISSION TO IDENTIFY ANY SPECIFIC SYSTEM REQUIREMENTS, MATERIALS, COMPONENTS, FASTENING METHODS, ETC. AS REQUIRED TO ENSURE ALL PROVISIONS TO ADDRESS THE PROJECT DESIGN REQUIREMENTS RELATIVE TO THIS PROJECT.
1.5c CERTIFICATES AND REPORTS:
–SUBMIT COPY OF MEMBERSHIP IN GOOD STANDING OF CANADIAN ROOFING CONTRACTORS ASSOCIATION (CRCA) OR ONTARIO INDUSTRIAL ROOFING CONTRACTORS ASSOCIATION (OIRCA).
–MANUFACTURER'S CERTIFICATE CERTIFYING THAT PRODUCTS MEET OR EXCEED SPECIFIED REQUIREMENTS.
– LABORATORY TEST REPORTS CERTIFYING ROOFING MATERIAL AND MEMBRANE COMPLIANCE WITH SPECIFICATION REQUIREMENTS
1.6 QUALITY ASSURANCE
1.6a INSTALLER QUALIFICATIONS: COMPANY IN SPECIALIZING IN APPLICATION OF PVC ROOFING SYSTEMS WITH A MINIMUM OF FIVE (5) YEARS DOCUMENTED EXPERIENCE ON INSTALLATIONS OF SIMILAR COMPLEXITY AND SCOPE, APPROVED BY THE MANUFACTURER.
1.6b APPLY ROOFING MEMBRANES BY MECHANICS SKILLED IN ROOFING WORK IN ACCORDANCE WITH ROOF MEMBRANE MANUFACTURERS WRITTEN SPECIFICATIONS.
1.6c PERFORM HEAT WELDING OF ROOF MEMBRANES ONLY BY SKILLED WELDERS WHO HAVE SUCCESSFULLY COMPLETED A COURSE OF INSTRUCTION PROVIDED BY ROOF MEMBRANE MANUFACTURER.
1.6d CONTRACTOR TO NOTIFY NORTSHORE ENGINEERING PRIOR TO START OF ROOFING FOR INSPECTION SCHEDULE.
1.7 DELIVERY, STORAGE AND HANDLING
1.7a DELIVER ALL ROOFING MATERIALS IN ORIGINAL, UNOPENED CONTAINERS, COMPLETE WITH LABELS INDICATING BRAND NAME, CONTENT, USAGE INSTRUCTIONS AND SAFETY PRECAUTIONS. MEMBRANE ROLLS ARE TO BE LEFT IN THEIR UNOPENED PACKAGING UNTIL IMMEDIATELY PRIOR TO USE.
1.7b PROVIDE AND MAINTAIN DRY, OFF–GROUND IN WEATHERPROOF STORAGE.
1.7c STORE ROLLS OF PVC FLAT ON CROSS SUPPORTS.
1.7d REMOVE ONLY IN QUANTITIES REQUIRED FOR SAME DAY USE.
1.7e STORE INSULATION PROTECTED FROM SUNLIGHT AND WEATHER AND DELETERIOUS MATERIALS.
1.8 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS
1.8a TEMPERATURE, RELATIVE HUMIDITY, MOISTURE CONTENT:
–APPLY PVC MEMBRANE ONLY WHEN SUBSTRATE SURFACES AND AMBIENT TEMPERATURES ARE WITHIN MANUFACTURER'S PRESCRIBED LIMIT.
–DO NOT INSTALL PVC MEMBRANE WHEN TEMPERATURE REMAINS BELOW –5°C, OR WHEN WIND CHILL GIVES EQUIVALENT COOLING EFFECT.
–INSTALL PVC MEMBRANE ON DRY SUBSTRATE, FREE OF SNOW AND ICE. USE ONLY DRY MATERIALS AND APPLY ONLY DURING WEATHER THAT WILL NOT INTRODUCE MOISTURE INTO SYSTEM.
1.8b SAFETY:
COMPLY WITH REQUIREMENT OF WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) REGARDING USE, HANDLING, STORAGE, AND DISPOSAL OF ASPHALT, SEALING COMPOUNDS, PRIMERS AND CAULKING MATERIALS.
1.8c PROTECTION:
–PROTECT WORK OF OTHER SECTIONS FROM DAMAGE WHILE DOING THIS WORK. PROVIDE TARPAULINS AND OTHER COVERINGS, AS REQUIRED TO PROTECT ADJACENT WALL FINISHES AND SURFACES.
–ADEQUATE CARE SHOULD BE TAKEN BY ALL TRADES AND END USERS TO PROTECT COMPLETED MEMBRANES FROM MECHANICAL DAMAGE DURING AND AFTER CONSTRUCTION.
–PROTECT MEMBRANES FROM CONTACT WITH BITUMINOUS AND OTHER INCOMPATIBLE MATERIALS.
–SEAL EXPOSED EDGES OF MEMBRANE TO PREVENT WATER INFILTRATION INTO THE SYSTEM AT END OF EACH DAY'S WORK.
–PROTECT COMPLETED PORTIONS OF ROOFS FROM DAMAGE BY PLACING 19MM PLYWOOD ON 25MM EXTRUDED POLYSTYRENE TO SERVE AS RUNWAYS FOR MOVEMENT OF MATERIALS AND OTHER TRAFFIC.
–PROTECT PARTIALLY COMPLETED WORK OF THIS SECTION LEFT EXPOSED LONGER THAN EIGHT (8) HOURS.
1.9 EXTENDED WARRANTY
PROVIDE A MANUFACTURER'S SYSTEM WARRANTY COVERING DEFECTS IN MATERIALS OR INSTALLATION WORKMANSHIP, INCLUDING WATERTIGHTNESS FOR A PERIOD OF THIRTY (30) YEARS FROM THE DATE OF SUBSTANTIAL PERFORMANCE.
1.10 DESCRIPTION OF ROOF MEMBRANE SYSTEMS (TYPES)
PROVIDE ROOF MEMBRANE SYSTEMS (TYPES) AS INDICATED
ROOF TYPE 1 (FROM TOP DOWN)
–80 MILS (2MM) SINGLY PLY PVC MEMBRANE: MECHANICALLY FASTENED
–TAPERED INSULATION WHERE INDICATED ON DRAWINGS OR REQUIRED BY ROOF SYSTEM MANUFACTURER
–TWO LAYERS OF 50MM ROOF INSULATION
–VAPOUR RETARDER
–ROOF SHEATHING
–STEEL ROOF DECK

revision
0 MAR 25 24 FOR TENDER

LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

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project ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title GENERAL NOTES

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POLYVINYL-CHLORIDE ROOFING CONTINUED

PART 2 PRODUCTS

2.1 COMPATIBILITY
2.1a COMPATIBILITY BETWEEN COMPONENTS OF SYSTEM AND ADJACENT MATERIALS IS ESSENTIAL. PROVIDE CONFIRMATION TO CONSULTANT STATING THAT MATERIALS AND COMPONENTS, AS ASSEMBLED IN SYSTEM, MEET THIS REQUIREMENT.
2.2 ACCEPTABLE MANUFACTURERS
2.2a PRODUCTS SPECIFIED HEREIN ARE BY SIKA SARNAFIL CANADA INC.
2.2b ALTERNATE PRODUCTS BY ONE OF THE FOLLOWING MANUFACTURER'S, WHICH MEET OR EXCEED THE MATERIAL SPECIFICATIONS AND ARE ACCEPTABLE AS PART OF THE ROOF MANUFACTURER'S THIRTY (30) YEAR SYSTEMS WARRANTY AS SPECIFIED, WILL BE ACCEPTED
-CARLISLE SYNTECT CANADA
-JOHNS MANVILLE
-LEXSUCO CORPORATION
2.3 ROOFING SYSTEM MATERIALS
2.3a PVC MEMBRANE: FLEXIBLE POLYVINYL CHLORIDE PVC SHEET MEMBRANE TO ASTM D4434, MECHANICALLY FASTENED, CLASS B, TYPE III NON-WOVEN POLYESTER REINFORCED, UV RESISTANT C/W ACRYLIC DIRT REPELLANT COATING.
1) MINIMUM OVERALL THICKNESS OF PVC MEMBRANE: 80MILS (2mm) THICK.
2) MINIMUM THICKNESS ABOVE THE SCRIM: 40MILS (1mm)
3) MEMBRANE COLOUR: WHITE
4) SOLAR REFLECTIVE INDEX (SRI) ASTM E1980-01: MINIMUM 78
ACCEPTABLE MATERIAL: 'SARNAFIL S327.20 ENERGYSMART ROOF MEMBRANE' (OR APPROVED EQ.)
2.3b TAPERED INSULATION: TO CAN/ULC-S704, TYPE 2, CLASS 3, CLOSED-CELL POLYISOCYANURATE FOAM MANUFACTURED USING HCFC-FREE BLOWING AGENTS, AND WITH PROPRIETARY GLASS SCRIM, BOTH SIDES.
1) ACCEPTABLE MATERIAL: 'SARNATHERM TAPERED' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.3c ROOF INSULATION: TO CAN/ULC-S704, TYPE 2, CLASS 3, CLOSED-CELL POLYISOCYANURATE FOAM MANUFACTURED USING HCFC-FREE BLOWING AGENTS, AND WITH PROPRIETARY GLASS SCRIM, BOTH SIDES. 76MM (3") THICKNESS.
1) ACCEPTABLE MATERIAL: 'SARNATHERM III' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.3d VAPOUR RETARDER: LOOSE-LAID VAPOUR RETARDER TO CAN/CGSB-51.34
1) ACCEPTABLE MATERIAL: 'SARNAVAP 10', BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.3e ROOF SHEATHING: TO ASTM C1177/C117M, 13mm (1/2") THICK.
1) ACCEPTABLE MATERIAL: 'DENS DECK' BY GEORGIA-PACIFIC BUILDING PRODUCTS. (OR APPROVED EQ.)
2.4 ACCESSORIES
2.4a EDGE AND FASCIA FLASHING: PVC CLAD GALVANIZED STEEL, 0.76mm (0.030", 22 GAUGE) BASE METAL THICKNESS, COLOUR AS LATER SELECTED BY CONSULTANT TO MATCH CLADDING AS PER CONTRACT DOCUMENTS.
1) ACCEPTABLE MATERIALS: 'SARNACLAD' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4b STEEL TERMINATION STRIPS, "U" SHAPED STEEL CHANNELS, AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIALS; 'SARNABAR' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4c DRAIN: HINGED STRAINER TYPE, ALUMINUM C/W PVC COATED FLANGES AND ALUMINUM SUPER DOME AND MJ CLAMP.
1) ACCEPTABLE MATERIAL: 'RD-4A' VANDALPROOF ALUMINUM ROOF DRAIN', BY THALER (OR APPROVED EQ.)
2.4d FASTENERS: #15 STEEL, CLIMASEAL COATED, F.M LISTED, FASTENERS. MINIMUM STEEL DECK PENETRATION 19MM (3/4"), MAXIMUM DECK PENETRATION 32MM (1 1/4")
1) ACCEPTABLE MATERIAL: 'SARNAFASTENER XP' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4e MEMBRANE PLATES: 20 GAUGE AZ-50 GALVALUME COATED, ROUND STEEL PLANT, 60MM (2-3/8") DIAMETER, AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIAL: 'SARNADISC 2-3/8"' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4f INSULATION PLATE: 75MM (3") SQUARE OR ROUND, 26 GAUGE STAMPING OF SAE 1010 STEEL WITH AN AZ 55 GALVALUME COATING, AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIAL: 'SARNAPLATE XP"' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4g FASTENING BAR: AN FM-APPROVED HEAVY-DUTY, 14 GAUGE, GALVANIZED OR STAINLESS, ROLL-FORMED STEEL BAR USED TO ATTACH MEMBRANE TO ROOF DECKS. THE FORMED STEEL IS PRE-PUNCHED WITH HOLES EVERY 25MM (1") ON CENTRE TO ALLOW VARIOUS FASTENER SPACING OPTIONS AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIAL: 'SARNASTRIP"' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4h FOAM ROD TUBING: FOAM ROD TUBING, COMPATIBLE WITH ROOF SYSTEM, AND AS REQUIRED FOR EXPANSION JOINT WORK AT CURBS AND INTERFACE WITH EXISTING CONSTRUCTION.
2.4i ROOF SCUPPER: PRE-MANUFACTURED PVC COATED SCUPPER SIZE AND PROFILE AS INDICATED ON DRAWINGS.
2.5 WALKWAY MEMBRANE: POLYESTER REINFORCED, 2.4MM (0.096"), MEMBRANE WITH SURFACE EMBOSSMENT, 1000MM (39.3") WIDE, HEAT WELED TO FIELD MEMBRANE:
1) ACCEPTABLE MATERIALS: 'SARNATRED - V' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2) PROVIDE WALKWAY MEMBRANE AS INDICATED ON DRAWINGS AND TO ALL ROOF TOP UNITS.
2.6 ROOF ACCESS HATCH
ROOF ACCESS HATCH: PRE-ASSEMBLED 915mm x 762mm SINGLE LEAF POLYCARBONATE ROOF HATCH. EPDM RUBBER GASKET ADHERED TO COVER. COVER TO CONSIST OF ALUMINUM EXTRUSION CHANNEL WITH UV-RESISTANT POLYCARBONATE DOUBLE DOMES. 305MM HIGH CURB WITH INTEGRAL FLASHING, INSULATION AND FULL WELDED CORNERS. LIFTING MECHANISM WILL BE COMPRESSION SPRING OPERATORS ENCLOSED IN TELESCOPTIC TUBES. SLAM LATCH WITH INTERIOR AND EXTERIOR TURN HANDLES AND PADLOCK HASPS.

POLYVINYL-CHLORIDE ROOFING CONTINUED

PART 3 EXECUTION

3.1 PROTECTION
3.1a COVER WALLS AND ADJACENT WORK WHERE MATERIALS HOISTED OR USED.
3.1b USE WARNING SIGNS AND BARRIERS. MAINTAIN IN GOOD ORDER UNTIL COMPLETION OF WORK.
3.1c DISPOSE OF RAIN WATER AWAY FROM FACE OF BUILDING UNTIL DRAINS OR HOPPERS INSTALLED AND CONNECTED.
3.1d PROTECT FROM TRAFFIC AND DAMAGE. COMPLY WITH PRECAUTIONS DEEMED NECESSARY BY CONSULTANT.
3.1e PLACE PLYWOOD RUNWAYS OVER WORK TO ENABLE MOVEMENT OF MATERIAL AND OTHER TRAFFIC.
3.1f AT END OF EACH DAY'S WORK OR WHEN STOPPAGE OCCURS DUE TO INCLEMENT WEATHER, PROVIDE PROTECTION FOR COMPLETED WORK AND MATERIALS OUT OF STORAGE.
3.1g SEAL AND BALLAST EXPOSED EDGES.
3.2 SUBSTRATE EXAMINATION
3.2a EXAMINE AND IMMEDIATELY INFORM CONSULTANT IN WRITING OF DEFECTS.
3.2b PRIOR TO COMMENCEMENT OF WORK ENSURE:
-SUBSTRATES ARE FIRM, STRAIGHT, SMOOTH, DRY, FREE OF SNOW, ICE OR FROST, AND SWEPT CLEAN OF DUST AND DEBRIS.
-CURBS HAVE BEEN BUILT
-WORK IS READY TO RECEIVE ROOF PARAPET UPSTAND
-DRAINS HAVE BEEN INSTALLED AT PROPER ELEVATIONS RELATIVE TO FINISHED SURFACE
-PLYWOOD AND LUMBER NAILER PLATES HAVE BEEN INSTALLED TO WALLS AND PARAPETS AS INDICATED
3.3 ROOF SHEATHING
3.3a INSTALL ROOF SHEATHING PANELS WITH LONG SIDE PARALLEL TO DECK FLUTES
3.3b STAGGER END JOINTS
3.4 VAPOUR RETARDER
3.4a LOOSE-LAID VAPOUR RETARDER:
-INSTALL VAPOUR BARRIER LOOSELY LAID OVER SUBSTRATE.
-OVERLAP ALL EDGES 100mm (4") AND SEAL WITH ISOBUTYL TAPE
-EXTEND VAPOUR BARRIER TO PERIMETER AND DECK PROTRUSIONS. SEAL ALL ENDS WITH ISOBUTYL TAPE TO PROVIDE CONTINUITY OF BUILDING AIR/VAPOUR ENVELOPE.
3.5 INSULATION APPLICATION (MECHANICALLY FASTENED)
3.5a INSTALL ROOF INSULATION BOARDS, CUT AND TRIMMED TO PROVIDE PLAIN BUTT JOINTS AT PERIMETERS, PARAPETS, CURBS, ETC.
3.5b LAY INSULATION BOARDS IN PARALLEL COURSES, BUTTED TOGETHER TIGHTLY IN FIRM CONTRACT WITH ONE ANOTHER, WITHOUT GAPS, COMPLETE WITH STAGGERED END JOINTS.
3.5c INSTALL ADDITIONAL LAYERS WITH JOINTS OFFSET FROM UNDERLYING LAYER.
3.5d INSTALL TAPERED INSULATION IN LOCATIONS AS INDICATED ON ROOF PLAN
3.5e MECHANICALLY FASTEN INSULATION TO THE DECK WITH APPROVED FASTENERS AND PLATES AT A RATE OF 1/4 FT², OR AS PER THE RECOMMENDATIONS OF INSULATION MANUFACTURER AND AS REQUIRED TO MEET THE REQUIREMENTS OF THE ROOF SYSTEMS WARRENTY AS SPECIFIED UNDER THIS SECTION. THE QUANTITY AND LOCATIONS OF THE FASTENERS AND PLATES SHALL ALSO CAUSE THE INSULATION BOARDS TO REST EVENLY ON THE ROOF DECK/SUBSTRATE SO THAT THERE ARE NO SIGNIFICANT AND AVOIDABLE AIR SPACES BETWEEN THE BOARDS AND THE SUBSTRATE. EACH INSULATION BOARD SHALL BE INSTALLED TIGHTLY AGAINST THE ADJACENT BOARDS ON ALL SIDES.
3.6 MEMBRANE APPLICATION (MECHANICALLY FASTENED)
3.6a INSPECT SURFACE OF THE INSULATION OR SUBSTRATE PRIOR TO INSTALLATION OF THE ROOF MEMBRANE. THE SUBSTRATE SHALL BE CLEAN, DRY, FREE FROM DEBRIS AND SMOOTH WITH NO SURFACE ROUGHNESS OR CONTAMINATION. BROKEN, DELAMINATED, WET OR DAMAGED INSULATION BOARDS SHALL BE REMOVED AND REPLACED.
3.6b ATTACH MEMBRANE WITH FASTENERS AND DISCS ACCORDING TO MEMBRANE MANUFACTURER'S REQUIREMENTS
3.6c SHINGLE MEMBRANE OVERLAPS WITH THE FLOW OF WATER WHERE POSSIBLE.
3.6d USE FULL-WIDTH ROLLS AND FASTEN PERPENDICULAR TO THE DIRECTION OF THE STEEL DECK FLUTES, WOOD, PLANK, PRECAST OR CEMENTITIOUS WOOD FIBER PANEL WHERE POSSIBLE.
3.6e TACK WELDING OF FULL OR HALF-WIDTH ROLLS FOR PURPOSES OF TEMPORARY RESTRAINTS DURING INSTALLATION IS NOT PERMITTED. CONSULT MEMBRANE MANUFACTURER'S TECHNICAL DEPARTMENT FOR FURTHER INFORMATION.
3.6f PERIMETER AND CORNER AREAS: OVER THE PROPERLY INSTALLED AND PREPARED SUBSTRATE SURFACE, HALF-WIDTH ROLLS ARE TO BE INSTALLED PARALLEL WITH THE ENTIRE PERIMETER EDGE. THE NUMBER OF ADJACENT HALF-ROLLS WILL BE DETERMINED BY BUILDING HEIGHT AND WIDTH AND OTHER CONDITIONS ACCORDING TO MEMBRANE MANUFACTURER. INSTALL FASTENERS AND PLATES ALONG THE EDGE OF MEMBRANE ON THE FASTENING LINE AT A SPACING DETERMINED BY MEMBRANE MANUFACTURER AND OWNER'S REPRESENTATIVE/DESIGNER. HOLD BACK PLATES 25mm (1") FROM THE OUTER EDGE OF THE MEMBRANE. POSITION ADJACENT HALF-ROLL TO OVERLAP THE FASTENED EDGE OF THE FIRST HALF-ROLL BY 140mm (5-1/2") IN ACCORDANCE WITH THE OVERLAP LINES MARKED ON ITS EDGE. THE 140mm (5-1/2") OVERLAP WILL ALLOW THE TOP MEMBRANE TO EXTEND 63mm (2-1/2") PAST THE PLATES FOR HEAT-WELDING. FASTENERS SHALL CLAMP THE MEMBRANE TIGHTLY TO THE SUBSTRATE. IN CORNER AREAS WHERE PERIMETER HALF-ROLLS INTERSECT, ADD ROWS OF FASTENERS AND PLATES OVER THE TOP OF HALF-ROLLS AND WELD A COVERSTRIP ABOVE THEM FOR WATERTIGHTNESS. SEE DETAIL DRAWINGS.
1) PERIMETER AREA IS DEFINED AS OUTER BOUNDARY OF THE ROOF. IF THE ROOF IS BROKEN INTO DIFFERENT LEVELS, EACH ROOF AREA SHALL BE TREATED AS AN INDIVIDUAL ROOF WITH ITS OUTER BOUNDARY BEING TREATED AS A PERIMETER. TYPICALLY, INTERNAL EXPANSION JOINTS AND FIREWALLS ARE NOT CONSIDERED TO BE FULL PERIMETERS.
2) THE RIDGE AREA IS DEFINED AS THE HIGH POINT IN THE ROOF AREA FORMED BY TWO INTERSECTING PLANES. WHEN THE SUM OF THE SLOPES IS A MINIMUM OF 4" IN 12" (30 DEGREES) EACH SIDE OF THE RIDGE SHALL BE TREATED AS PERIMETER AREA.
3.6g HOT-AIR WELD OVERLAPS ACCORDING TO MEMBRANE MANUFACTURER'S REQUIREMENTS. SEAM TEST CUTS SHALL BE TAKEN AT LEAST THREE (3) TIMES PER DAY.
3.6h INTERIOR AREA OVER THE PROPERLY INSTALLED AND PREPARED SUBSTRATE SURFACE, S327 FULL WIDTH ROLLS ARE TO BE INSTALLED PERPENDICULAR TO THE STEEL DECK FLUTES, WOOD PLANK OR WOOD OR CONCRETE PANELS. FASTENERS AND DISCS ARE INSTALLED ALONG THE EDGE OF THE MEMBRANE ON THE FASTENING LINE AT A SPACING DETERMINED BY MEMBRANE MANUFACTURER AND OWNER'S REPRESENTATIVE/DESIGNER. HOLD BACK DISCS 25mm (1") FROM THE OUTER EDGE OF THE MEMBRANE. POSITION ADJACENT FULL-ROLL TO OVERLAP THE FASTENED EDGE OF THE FIRST FULL-ROLL BY 140mm (5-1/2") IN ACCORDANCE WITH THE OVERLAP LINES MARKED ON ITS EDGE. THE 140mm (5-1/2") OVERLAP WILL ALLOW THE TOP MEMBRANE TO EXTEND 63mm (2-1/2") PAST THE DISCS FOR HEAT-WELDING. FASTENERS SHALL CLAMP THE MEMBRANE TIGHTLY TO THE SUBSTRATE. SEE DETAIL DRAWINGS.
3.6i SECUREMENT AROUND ROOFTOP PENETRATIONS
1) AROUND ALL PERIMETERS, AT THE BASE OF WALLS, DRAINS, CURBS, VENT PIPES, OR ANY OTHER ROOF PENETRATIONS, FASTENERS AND DISCS SHALL BE INSTALLED ACCORDING TO PERIMETER RATE OF ATTACHMENT. FASTENERS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS. FASTENERS SHALL BE INSTALLED USING THE FASTENER MANUFACTURER'S RECOMMENDED TORQUE-SENSITIVE FASTENING TOOLS WITH DEPTH LOCATORS. FASTENERS SHALL CLAMP THE MEMBRANE TIGHTLY TO THE SUBSTRATE.
2) MEMBRANE FLASHINGS SHALL EXTEND 63mm (2-1/2") PAST THE DISCS AND BE HOT-AIR WELDED TO THE DECK MEMBRANE.
3.7 FLASHING
3.7a INSTALL PVC MEMBRANE FLASHINGS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
3.7b PENETRATIONS: INSTALL DRAINS PANS, VENT STACK COVERS AND OTHER PENETRATION FLASHINGS AND SEAL TO MEMBRANE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND DETAILS.
3.7c INSTALL ROOF MEMBRANE MANUFACTURER'S ATTACHMENT BAR WITH APPROVED FASTENERS INTO THE STRUCTURAL DECK AT THE BASE OF PARAPETS, WALLS AND CURBS.
3.7d INSTALL ROOF/PARAPET SCUPPER AS INDICATED ON DRAWINGS.
3.8 DRAIN INSTALLATION
3.8a ENSURE MJ CLAMP IS INSTALLED ON DRAIN STEM BEFORE FASTENING DRAIN TO DECK. REFER TO MECHANICAL SECTION FOR CONNECTION OF MJ CLAMP TO PLUMBING SYSTEM.
3.8b MECHANICALLY FASTEN DRAIN TO DECK WITH FOUR (4) FASTENERS. EXTEND PVC FLASHING MEMBRANE INTO DRAIN OPENING AND TRIM TO SUIT. INSTALL ISOBUTYL TAPE BETWEEN FLASHING MEMBRANE AND DRAIN HUB. INSTALL CAST ALUMINUM CLAMPING RING, AND TIGHTEN TO DRAIN HUB. SECURE VANDAL PROOF STRAINER TO CLAMPING RING.
3.9 WALKWAY MEMBRANE
INSTALL WALKWAY MEMBRANE ON ALL SIDES OF ROOFTOP MECHANICAL UNITS AS INDICATED ON ROOF PLAN.
3.10 FIELD QUALITY CONTROL
3.10a SUBMIT ALL MANUFACTURER'S ROOF INSPECTION REPORTS AS DESCRIBED IN ITEM 1.9 TO CONSULTANT.
3.10b AT THE REQUEST OF THE OWNER OF CONSULTANT, ADDITIONAL INSPECTION AND TESTING OF PVC ROOF MEMBRANE SYSTEM APPLICATION MAY BE CARRIED OUT BY A THIRD-PARTY AGENCY DESIGNATED BY THE CONSULTANT.
3.12 CLEANING
CLEAN TO CONSULTANT'S APPROVAL, SOILED SURFACES, SPATTERS, AND DAMAGE CAUSED BY WORK OF THIS SECTION.
CHECK DRAINS TO ENSURE CLEANLINESS AND PROPER FUNCTION, AND REMOVE DEBRIS, EQUIPMENT AND EXCESS MATERIAL FROM SITE.

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LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
GENERAL NOTES

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RIGID BOARD AND BATT INSULATION – NOTES

PART 1 – GENERAL
1.1 SECTION INCLUDES
.1 BOARD INSULATION AT PERIMETER FOUNDATION WALL AND WALL CONSTRUCTION.
.2 THERMAL BATT AND BLANKET INSULATION.
1.2 REFERENCES
.1 ASTM C208–12(2017)E2 – STANDARD SPECIFICATION FOR CELLULOSIC FIBER INSULATING BOARD.
.2 ASTM C552–21– STANDARD SPECIFICATION FOR CELLULAR GLASS THERMAL INSULATION.
.3 ASTM C578–19 – STANDARD SPECIFICATION FOR RIGID, CELLULAR POLYSTYRENE THERMAL INSULATION.
.4 ASTM C591–21 – STANDARD SPECIFICATION FOR UNFACED PREFORMED RIGID CELLULAR POLYISOCYANURATE THERMAL INSULATION.
.5 ASTM C612–14(2019) – STANDARD SPECIFICATION FOR MINERAL FIBER BLOCK AND BOARD INSULATION.
.6 ASTM C665–17 – STANDARD SPECIFICATION FOR MINERAL–FIBER BLANKET THERMAL INSULATION FOR LIGHT FRAME CONSTRUCTION AND MANUFACTURED HOUSING.
.7 ASTM C1126–19 – STANDARD SPECIFICATION FOR FACED OR UNFACED RIGID CELLULAR PHENOLIC THERMAL INSULATION.
.8 ASTM C1289–21 – STANDARD SPECIFICATION FOR FACED RIGID CELLULAR POLYISOCYANURATE THERMAL INSULATION BOARD.
.9 ASTM E84–21A – STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.
.10 ASTM E96/E96M–16 – STANDARD TEST METHODS FOR WATER VAPOR TRANSMISSION OF MATERIALS.
.11 CAN/ULC–S102–18 – STANDARD METHOD OF TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS AND ASSEMBLIES.
.12 CAN/ULC–S701–11 – STANDARD FOR THERMAL INSULATION, POLYSTYRENE, BOARDS AND PIPE COVERING.
.13 CAN/ULC–S702–14 – STANDARD FOR MINERAL FIBRE THERMAL INSULATION FOR BUILDINGS.
.14 CAN/ULC–S703–09 (R2020) – STANDARD FOR CELLULOSE FIBRE INSULATION (CFI) FOR BUILDINGS.
.15 CAN/ULC–S704.1–17 – STANDARD FOR THERMAL INSULATION, POLYURETHANE AND POLYISOCYANURATE BOARDS, FACED.
.16 CAN/ULC–S770–15 – STANDARD TEST METHOD FOR DETERMINATION OF LONG–TERM THERMAL RESISTANCE OF CLOSED–CELL THERMAL INSULATING FOAMS.
.17 NFPA 255 – STANDARD METHOD OF TEST OF SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS, LATEST EDITION.
.18 ULC UNDERWRITERS LABORATORIES OF CANADA, ONLINE DIRECTORY.
1.4 SYSTEM DESCRIPTION
.1 PROVIDE A CONTINUOUS THERMAL BARRIER AT THE BUILDING ENVELOPE, IN CONJUNCTION WITH THERMAL INSULATING MATERIALS IN ROOF SYSTEM ASSEMBLIES.
.2 PROVIDE THERMAL PROTECTION FOR VAPOUR RETARDERS, IN CONJUNCTION WITH VAPOUR RETARDER MATERIALS IN SECTION 072600.
.3 PROVIDE THERMAL PROTECTION FOR AIR BARRIER SEAL MATERIALS AT THE BUILDING ENVELOPE, IN CONJUNCTION WITH AIR BARRIER MATERIALS IN SECTION 072700.
1.5 ADMINISTRATIVE REQUIREMENTS
.1 DIVISION 01: PROJECT MANAGEMENT AND COORDINATION PROCEDURES.
.2 COORDINATE WITH OTHER WORK HAVING A DIRECT BEARING ON WORK OF THIS SECTION, INCLUDING SECTION 072600 FOR VAPOUR RETARDERS AND SECTION 072700 FOR AIR BARRIERS.
1.6 SUBMITTALS FOR REVIEW
.1 PRODUCT DATA: DESCRIBE PRODUCT CHARACTERISTICS, PERFORMANCE CRITERIA, LIMITATIONS, AND TESTING TO APPLICABLE CRITERIA.
1.7 SUBMITTALS FOR INFORMATION
.1 INSTALLATION DATA: INDICATE SPECIAL ENVIRONMENTAL CONDITIONS REQUIRED FOR INSTALLATION, INSTALLATION TECHNIQUES, AND FASTENING DETAILS.
.2 MANUFACTURER'S CERTIFICATE: CERTIFY THAT PRODUCTS MEET OR EXCEED SPECIFIED REQUIREMENTS.

PART 2 – PRODUCTS
2.1 MANUFACTURERS – INSULATION MATERIALS
.1 MANUFACTURER'S OF HIGH–STRENGTH EXPANDED POLYSTYRENE (EPS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 ATLAS ROOFING CORPORATION / ATLAS EPS.
.2 MANUFACTURER'S OF EXTRUDED POLYSTYRENE (XPS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 DUPONT DE NEMOURS, INC.
.2 OWENS CORNING CANADA INC.
.3 MANUFACTURER'S OF POLYISOCYANURATE (ISO) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 ATLAS ROOFING CORPORATION.
.2 FIRESTONE BUILDING PRODUCTS.
.3 GAF MATERIAL CORPORATION.
.4 HUNTER PANELS.
.5 IKO INDUSTRIES LTD.
.6 SOPREMA.
.7 TREMCO CANADA.
.4 MANUFACTURER'S OF MINERAL GLASS FIBRE BATT (BB–INS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 CERTAINTEED INSULATION CANADA INC.
.2 KNAUF INSULATION.
.3 JOHN MANSVILLE.
.4 OWENS–CORNING CANADA INC.
.5 ROXUL (ROCKWOOL) INC.
.5 MANUFACTURER'S OF SOUND ATTENUATION MINERAL GLASS FIBRE BATT (SB–INS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 CERTAINTEED INSULATION CANADA INC.
.2 KNAUF INSULATION.
.3 JOHN MANSVILLE.
.4 OWENS–CORNING CANADA INC.
.5 ROCKWOOL.
.6 SUBSTITUTIONS: REFER TO DIVISION 01.

2.2 RIGID BOARD INSULATION MATERIALS
.1 MOULDED POLYSTYRENE INSULATION (EPS) – FROST SLAB VOID FORM APPLICATION: CAN/ULC–S701, TYPE XIV; HIGH:STRENGTH EXPANDED POLYSTYRENE RIGID BOARD, WITH THE FOLLOWING CHARACTERISTICS:
.1 COMPRESSIVE STRENGTH: MINIMUM [275 KPA].
.2 AGED THERMAL RESISTANCE: CAN/ULC S770, [RSI–0.74] PER [25 MM] OF THICKNESS.
.3 WATER ABSORPTION: 2% BY VOLUME MAXIMUM.
.4 WATER VAPOUR PERMEANCE: ASTM E96, LESS THAN 130 NG/PA*S*M2

.5 BOARD THICKNESS: AS NOTED IN DRAWINGS.
.6 PRODUCT: THERMALSTAR X–GRADE 40 HIGH LOAD, MANUFACTURED BY ATLAS EPS.
.2 EXTRUDED POLYSTYRENE INSULATION (XPS) – CAVITY WALL, BELOW GRADE, UNDERSLAB APPLICATIONS: CAN/ULC–S701, TYPE 4; CLOSED CELLULAR TYPE, WITH INTEGRAL HIGH DENSITY SKIN CONFORMING TO THE FOLLOWING:
.1 COMPRESSIVE STRENGTH: [210 KPA].
.2 THERMAL RESISTANCE: [RSI–0.87].
.3 WATER ABSORPTION: 0.7% BY VOLUME MAXIMUM.
.4 WATER VAPOUR PERMEANCE: ASTM E96, LESS THAN 90 NG/PA*S*M2

2.2 RIGID BOARD INSULATION MATERIALS CONT'D
.5 BOARD SIZE: [600 X 2400 MM].
.6 BOARD THICKNESS: AS INDICATED ON DRAWINGS.
.7 BOARD EDGES: SHIPLAPPED.
.8 PRODUCT: STYROFOAM SM, MANUFACTURED BY DUPONT DE NEMOURS, INC.
.9 PRODUCT: FOAMULAR C–300, MANUFACTURED BY OWENS–CORNING CANADA INC.
.3 POLYISOCYANURATE INSULATION (ISO) – CAVITY WALL, ROOF APPLICATIONS: CAN/ULC–S704, TYPE 2 CLASS 3 OR TYPE 3 CLASS 3, GLASS FIBRE REINFORCED CORE, CLOSED CELL INSULATION CONFORMING TO THE FOLLOWING:
.1 COMPRESSIVE STRENGTH: [140 KPA].
.2 AGED THERMAL RESISTANCE: CAN/ULC S770, MINIMUM OF [RSI–0.98] PER [25 MM] OF THICKNESS.
.3 WATER ABSORPTION: 1.5% BY VOLUME MAXIMUM.
.4 WATER VAPOUR PERMEANCE: ASTM E96, LESS THAN 229 NG/PA*S*M2

.5 FACING: FACTORY APPLIED FACING OF GLASS REINFORCED MAT ON BOTH FACES.
.6 BOARD SIZE: [1220 X 1220 MM] OR [1220 X 2440 MM].
.7 BOARD THICKNESS: TO THICKNESS INDICATED ON DRAWINGS, BUT NOT LESS THAN [38 MM]; TOTAL THICKNESS AS INDICATED ON DRAWINGS USING A MINIMUM OF 2 LAYERS WITH OFFSET JOINTS.
.8 BOARD EDGES: SQUARE.
.9 FLAME/SMOKE PROPERTIES: MEETS CAN/ULC–S102, CAN/ULC–S107 AND CAN/ULC S126.
.10 PRODUCT: ACFOAM–III, MANUFACTURED BY ATLAS ROOFING CORPORATION.

2.3 BATT AND BLANKET INSULATION MATERIALS
.1 BATT INSULATION (BB–INS) – STUD WALL APPLICATION: CAN/ULC–S702, TYPE 1, NON–RIGID BOARD, FRICTION FIT, MANUFACTURED FROM GLASS ROCK OR SLAG FIBRES, WITH THE FOLLOWING CHARACTERISTICS:
.1 DENSITY: 32 KG/CU M WHEN TESTED TO ASTM C612.
.2 AGED THERMAL RESISTANCE: RSI–0.70 PER 25 MM OF THICKNESS.
.3 BATT SIZE: NOMINAL [415 X 1220 MM TO SUIT STUD SPACING AS INDICATED ON DRAWINGS.
.4 BATT THICKNESS: AS INDICATED ON DRAWINGS.
.5 FACING: UNFACED.
.6 BOARD EDGES: SQUARE.
.7 FLAME/SMOKE PROPERTIES: NON–COMBUSTIBLE TESTED TO CAN/ULC–S114.
.8 PRODUCT: COMFORTBATT AS MANUFACTURED BY ROCKWOOL.
.2 SOUND ATTENUATION BATT INSULATION (SB–INS) – SOUND SEPARATION APPLICATION: CAN/ULC–S702, TYPE 1, NON:RIGID BOARD, FRICTION FIT, MANUFACTURED FROM GLASS ROCK OR SLAG FIBRES, WITH THE FOLLOWING CHARACTERISTICS:
.1 NOISE REDUCTION COEFFICIENT: 1.10 AT 100MM THICKNESS, TO ASTM C423.
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THERMAL INSULATION
.2 DENSITY: MINIMUM OF 40 KG/CU M WHEN TESTED TO ASTM C612.
.3 AGED THERMAL RESISTANCE: RSI–0.70 PER 25 MM OF THICKNESS.
.4 BATT SIZE: NOMINAL 415 X 1220 MM TO SUIT STUD SPACING AS INDICATED ON DRAWINGS.
.5 BATT THICKNESS: AS INDICATED ON DRAWINGS.
.6 FACING: UNFACED.
.7 BOARD EDGES: SQUARE.
.8 FLAME/SMOKE PROPERTIES: NON–COMBUSTIBLE TESTED TO CAN/ULC–S114.
.9 PRODUCT: AFB (ACOUSTICAL FIRE BATT) AS MANUFACTURED BY ROCKWOOL.
.10 PRODUCT: QUIETZONE ACOUSTIC AS MANUFACTURED BY OWENS–CORNING CANADA INC.
2.4 ADHESIVE MATERIALS
.1 ADHESIVE TYPE 1: TYPE RECOMMENDED FOR INTENDED USE BY BOTH INSULATION MANUFACTURER AND APPROVED BY THE AIR/VAPOUR BARRIER MANUFACTURER FOR THE APPLICATION. ENSURE CHEMICAL COMPATIBILITY OF ALL MATERIALS WHICH MAKE CONTACT WITH THE ADHESIVE.

PART 3 – EXECUTION
3.1 EXAMINATION
.1 VERIFY THAT SUBSTRATE, ADJACENT MATERIALS, AND INSULATION BOARDS ARE DRY AND READY TO RECEIVE INSULATION AND ADHESIVE.
.2 ENSURE AIR BARRIER SEALS AND VAPOUR RETARDERS ARE IN PLACE PRIOR TO INSTALLATION.
.3 VERIFY SUBSTRATE SURFACE IS FLAT, FREE OF IRREGULARITIES, MATERIALS OR SUBSTANCES THAT MAY IMPEDE ADHESIVE BOND, HONEYCOMB, FINS.
.4 VERIFY THAT ALL WALL, FLOOR AND CEILING CAVITIES TO BE INSULATED ARE NOT OBSTRUCTED AND THAT OPENINGS ARE SEALED TO PREVENT ESCAPE OF LOOSE FILL INSULATION.

3.2 INSTALLATION – GENERAL
.1 ONLY USE BOARDS WHICH ARE FREE FROM BROKEN OR CHIPPED EDGES.
.2 USE LARGEST SHEETS POSSIBLE.
.3 INSTALL
.4 OFFSET VERTICAL JOINTS IN SINGLE LAYER APPLICATION. OFFSET BOTH VERTICAL AND HORIZONTAL JOINTS IN MULTI–LAYERED INSTALLATION.
.5 DO NOT ENCLOSE INSULATION UNTIL IT HAS BEEN INSPECTED AND APPROVED BY CONSULTANT.

3.3 FIELD QUALITY CONTROL
.1 NOTIFY CONSULTANTS AND SPECIALIZED INSPECTORS FROM RELATED SECTIONS BEFORE, DURING AND UPON COMPLETION OF INSTALLATION.
.2 OBTAIN CONSULTANT APPROVAL PRIOR TO COVERING INSULATION.
3.4 PROTECTION OF FINISHED WORK
.1 DO NOT PERMIT WORK TO BE DAMAGED PRIOR TO COVERING INSULATION.
.2 PROTECT BATT INSULATION FROM WETTING.
.3 PROTECT INSULATION REQUIRING A THERMAL BARRIER TO REQUIREMENTS OF LOCAL AND PROVINCIAL LEGISLATION.
END OF SECTION

VAPOUR BARRIER NOTES

PART 1 – PRODUCTS
1.1 MATERIALS
.1 SHEET VAPOUR RETARDER (ABOVE GRADE EXTERIOR WALL APPLICATION): CAN/CGSB 51.34, CLASS I, POLYETHYLENE FILM FOR ABOVE GRADE APPLICATION, [0.15 MM] THICK; A MAXIMUM PERM RATING OF [2.3 NG/(PA•S•SQ M)].
.2 SHEET VAPOUR RETARDER (AROUND FRAMED CONNECTIONS): CAN/CGSB 51.34, CLASS I, POLYETHYLENE FILM FOR ABOVE GRADE APPLICATION, [0.25 MM] THICK; A MAXIMUM PERM RATING OF [2.3 NG/(PA•S•SQ M)].

1.2 ACCESSORIES
.1 CLEANER: NON–CORROSIVE TYPE; RECOMMENDED BY SEALANT MANUFACTURER; COMPATIBLE WITH ADJACENT MATERIALS.
.2 ADHESIVE: COMPATIBLE WITH SHEET BARRIER AND SUBSTRATE, PERMANENTLY NON–CURING.
.3 TAPE: POLYPROPYLENE FILM, UV RESISTANT, SELF–ADHERING TYPE, 75 MM WIDE, COMPATIBLE WITH SHEET MATERIAL, FORMULATED FOR USE IN A VAPOUR BARRIER SYSTEM.
.4 ELECTRICAL VAPOUR BARRIER BOX: RIGID, MOULDED POLYETHYLENE BOX WITH REINFORCED FLANGES.
.5 JOINT SEALANT: AS SPECIFIED IN SECTION 079200.

PART 2 – EXECUTION
2.1 EXAMINATION
.1 VERIFY CONDITION OF SUBSTRATE AND ADJACENT MATERIALS.
2.2 PREPARATION
.1 REMOVE LOOSE OR FOREIGN MATTER WHICH MIGHT IMPAIR ADHESION.
.2 ENSURE SURFACES TO RECEIVE VAPOUR RETARDER ARE CLEAN, DRY, AND FREE OF OIL, GREASE, DIRT, EXCESS MORTAR OR OTHER CONTAMINANTS.
.3 INSPECT ALL SURFACES TO RECEIVE THE MEMBRANE TO ENSURE THAT THEY ARE CONTINUOUS AND FREE OF VOIDS AND EXCESSIVE GAPS. BLOCKWORK SHALL BE COMPLETE AND LAID UP TIGHT TO ALL FRAMED OPENINGS. REPORT AND HAVE CORRECTED ANY DEFICIENCIES.
.4 CONCRETE TO CURE FOR A MINIMUM OF TWO (2) WEEKS PRIOR TO APPLICATION. ALLOW ADEQUATE DRYING TIME FOLLOWING PRECIPITATION AS RECOMMENDED BY MANUFACTURER.
.5 CLEAN AND PRIME SUBSTRATE SURFACES TO RECEIVE MEMBRANES, ADHESIVE, SEALANTS IN ACCORDANCE WITH MANUFACTURERS' WRITTEN INSTRUCTIONS. TO AVOID EXCESS PICK UP OF AIR BORNE DUST ONCE PRIMING HAS BEEN COMPLETED, PRIME ONLY AS MUCH AREA AS CAN BE COVERED WITH MEMBRANE THE SAME WORKING DAY, IF NOT COVERED IN THE SAME WORKING DAY, RE–PRIME.
.6 THE MEMBRANES AND ACCESSORY MATERIALS SHALL BE APPLIED AT AMBIENT TEMPERATURES SATISFACTORY TO THE MANUFACTURER AND UNDER DRY CONDITIONS ONLY.
2.3 INSTALLATION – POLYETHYLENE VAPOUR RETARDER
.1 INSTALL PRODUCTS AND MATERIALS TO SWRI SEALANT AND CAULKING GUIDE SPECIFICATION AND TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
.2 POLYETHYLENE SHEETS:
.1 POSITION JOINTS OR LAPS OF SHEETS OVER FIRM BEARING TO ACHIEVE AN EFFECTIVE AND PERMANENT SEAL.
.2 SEAL LAPS, JOINTS AND TERMINATIONS WITH AN APPROVED SEALANT TO ENSURE COMPLETE AND CONTINUOUS SEAL OF THE BUILDING ENVELOPE.
.3 APPLY SEALANT WITHIN RECOMMENDED APPLICATION TEMPERATURE RANGES. CONSULT MANUFACTURER WHEN SEALANT CANNOT BE APPLIED WITHIN THESE TEMPERATURE RANGES OR WHERE COMPATIBILITY WITH ADJACENT MATERIALS MAY BE IN DOUBT.
.4 INSTALL SHEET VAPOUR BARRIER ON WARM SIDE OF EXTERIOR WALL, CEILING AND FLOOR ASSEMBLIES PRIOR TO INSTALLATION OF GYPSUM BOARD TO FORM CONTINUOUS BARRIER.
.5 USE SHEETS OF LARGEST PRACTICAL SIZE TO MINIMIZE JOINTS.
.6 INSPECT SHEETS FOR CONTINUITY. REPAIR PUNCTURES AND TEARS WITH SEALING TAPE BEFORE WORK IS CONCEALED.
.7 DURING FRAMING INSTALLATION, WRAP HEADER TRACKS, SLAB ENDS AND OTHER CONSTRUCTIONS REQUIRING INSTALLATION DURING FRAMING, USING 10 MIL POLYETHYLENE SHEETS FOR LATER SEALING TO LARGER SHEETS. ENSURE SHEET IS INSTALLED WITH SUFFICIENT LENGTH/WIDTH TO ALLOW LAPPING AND SEALING TO OTHER MEMBRANES. SEAL THESE CONNECTING PIECES TO MEMBRANE AIR AND VAPOUR BARRIER WHERE REQUIRED.
.8 FOR WINDOWS AND OTHER WALL OPENINGS:
.1 CUT SHEET VAPOUR RETARDER TO FORM OPENINGS AND ENSURE MATERIAL IS LAPPED AND SEALED TO WINDOW FRAME OR OTHER OPENING FRAME TO FORM CONTINUOUS SEAL.
.2 SEAL VAPOUR RETARDER TO AIR BARRIER AND/OR MEMBRANE AIR/VAPOUR BARRIER AT ALL OPENINGS.
.9 SEAL PERIMETER OF SHEET VAPOUR RETARDER AS FOLLOWS:
.1 APPLY CONTINUOUS BEAD OF SEALANT TO SUBSTRATE AT PERIMETER OF SHEETS.
.2 LAP SHEET OVER SEALANT AND PRESS INTO SEALANT BEAD.
.3 INSTALL STAPLES THROUGH LAPPED SHEETS AT SEALANT BEAD INTO WOOD SUBSTRATE.
.4 ENSURE THAT NO GAPS EXIST IN SEALANT BEAD. SMOOTH OUT FOLDS AND RIPPLES OCCURRING IN SHEET OVER SEALANT.
.10 SEAL LAP JOINTS OF SHEET VAPOUR RETARDER AS FOLLOWS:
.1 ATTACH FIRST SHEET TO SUBSTRATE.
.2 APPLY CONTINUOUS BEAD OF SEALANT OVER SOLID BACKING AT JOINT.
.3 LAP ADJOINING SHEET MINIMUM 150 MM AND PRESS INTO SEALANT BEAD.
.4 INSTALL STAPLES THROUGH LAPPED SHEETS AT SEALANT BEAD INTO WOOD SUBSTRATE.
.5 ENSURE THAT NO GAPS EXIST IN SEALANT BEAD. SMOOTH OUT FOLDS AND RIPPLES OCCURRING IN SHEET OVER SEALANT.
.11 SEAL ELECTRICAL SWITCH AND OUTLET DEVICE BOXES THAT PENETRATE VAPOUR RETARDER AS FOLLOWS:
.1 FOR SHEET–TYPE VAPOUR RETARDERS, INSTALL MOULDED BOX VAPOUR BARRIER.
.2 APPLY SEALANT TO SEAL EDGES OF FLANGE TO MAIN VAPOUR BARRIER AND SEAL WIRING PENETRATIONS THROUGH BOX COVER.
.12 VAPOUR RETARDER FOR WALL/ROOF JUNCTION:
.1 LAP SHEET VAPOUR RETARDER FROM WALL RETARDER ONTO ROOF VAPOUR RETARDER CONTINUOUSLY.
.2 SEAL EDGES AND ENDS WITH SEALANT.
.3 POSITION LAPS OVER FIRM BEARING.

2.4 FIELD QUALITY CONTROL
.1 INSPECT VAPOUR RETARDERS PRIOR TO CONCEALMENT AND IDENTIFY GAPS, HOLES, PUNCTURES, ETC.
.2 REVIEW WORK OF THIS SECTION WHILE IT PROGRESSES WITH A VIEW TO IDENTIFYING WEAKNESSES OR GAPS IN THE AIR/VAPOUR BARRIER SYSTEMS.
.3 COORDINATE THE TIMING AND INSTALLATION OF THE VARIOUS AIR/VAPOUR BARRIER SYSTEMS AND CLADDING SYSTEMS TO ENSURE A COMPLETE AND INTEGRAL SYSTEM OF VAPOUR RETARDERS.
.4 REVIEW AND ENSURE CONTINUITY OF AIR AND VAPOUR RETARDANT MEMBRANES AT JUNCTION OF CLADDING AND SUBSTRATE SYSTEMS AND OTHER CONSTRUCTION DETAILS.
.5 IF THE POSSIBILITY OF DISCONTINUITY IS DISCOVERED BRING TO THE ATTENTION OF THE CONSULTANT FOR FURTHER DIRECTION AND DO NOT CONCEAL.
.6 ALL MEMBRANES AND ACCESSORIES SHALL BE APPLIED BY A CONTRACTOR ACCEPTABLE TO THE MANUFACTURER. PROVIDE WRITTEN EVIDENCE OF SUCH ENDORSEMENT FROM THE MANUFACTURER WHEN REQUESTED.
.7 INSTALLATION OF MEMBRANE SYSTEMS SHALL BE INSPECTED PRIOR TO, PERIODICALLY DURING AND UPON COMPLETION BY A REPRESENTATIVE OF THE MANUFACTURER TO ENSURE COMPLIANCE WITH THE SPECIFICATIONS AND THE MANUFACTURERS PUBLISHED GUIDELINES. SUBMIT WRITTEN COPIES OF INSPECTION REPORTS PREPARED BY THE REPRESENTATIVE OF THE MANUFACTURER TO THE CONSULTANT PRIOR TO CONCEALING MEMBRANE.
.8 NOTIFY CONSULTANT OF TIMING OF THE WORK OF THIS SECTION AND DO NOT CONCEAL WORK OF THIS SECTION UNTIL WORK HAS BEEN REVIEWED BY CONSULTANT AND IDENTIFIED DEFECTS CORRECTED.
.9 REPAIR HOLES, PUNCTURES AND OTHER DEFICIENCIES.
.10 SEAL GAPS IN VAPOUR RETARDERS WITH JOINT SEALER AS SPECIFIED IN SECTION 079200.
.11 REQUEST CONSULTANT REVIEW OF VAPOUR RETARDERS PRIOR TO CONCEALMENT. WORK THAT HAS BEEN CONCEALED PRIOR TO CONSULTANT INSPECTION, SHALL BE EXPOSED WHILE CONSULTANT REMAINS AT THE PLACE OF WORK, REVIEWED, AND THEN CONCEALED UPON CONSULTANT'S ACCEPTANCE OF CONDITIONS. IDENTIFIED DEFECTS SHALL BE CORRECTED IMMEDIATELY AND PRIOR TO CONCEALMENT.
2.5 CLEANING
.1 CLEAN EXTRA MATERIALS FROM ADJACENT SURFACES.
.2 LEAVE SUITABLE SUBSTRATE FOR SUBSEQUENT INSTALLATIONS BY OTHER SECTIONS.

revision
0 FOR TENDER MAR 25 24

LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

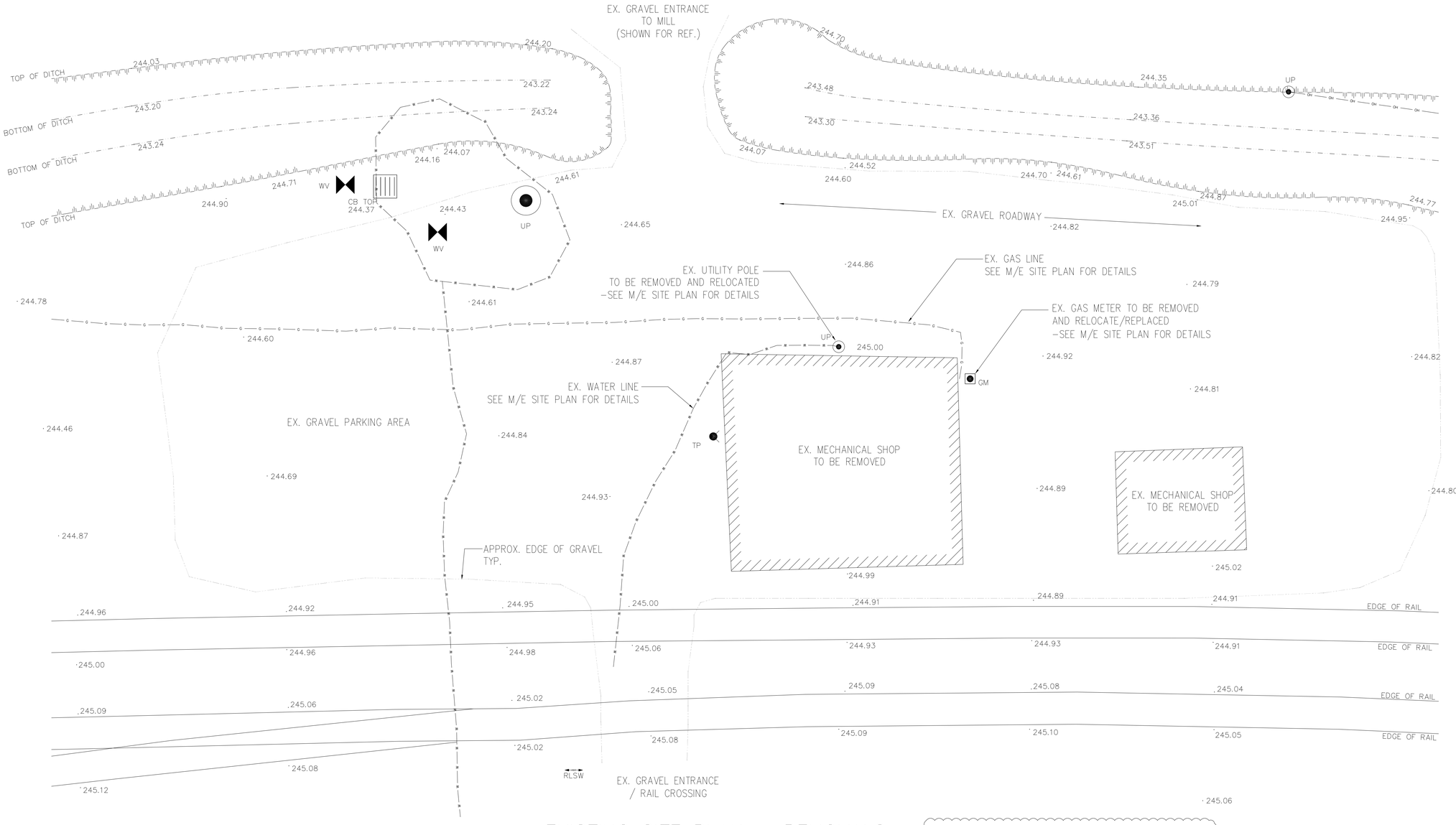
NORTHSHORE ENGINEERING & DRAFTING SERVICES
184 McNaughton Ave.
NORTH BAY ONT.
705–495–0981

project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
GENERAL NOTES

drawn by: BM
checked by: ..
scale: NTS
project no: 231978
date plotted: MAR 25 24
date: NOV 10 23

dwg no:
GN04



EXISTING SITE PLAN – REMOVALS

EXISTING/NEW UTILITIES SHOWN FOR REFERENCE ONLY
REFER TO MECHANICAL SITE SERVICING PLAN FOR DETAILS

LEGEND

GM	GAS METER
HM	HYDRO METER
RLSW	RAILWAY SWITCH
TP	TRAFFIC LIGHT
UP	UTILITY POLE
WV	WATER VALVE
–C–	UNDERGROUND CABLE LINE
–H–	UNDERGROUND HYDRO LINE
–G–	UNDERGROUND GAS LINE
–OH–	OVERHEAD UTILITY WIRES
–W–	UNDERGROUND WATER LINE
× 123.45	SPOT ELEVATION (METRES)

GENERAL NOTES

1) THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION AND PROTECTION OF ALL UTILITIES AND SERVICES. ALL UTILITIES NOT NECESSARILY SHOWN ON THE DRAWINGS.

2) LOCATION OF ALL EXISTING DETAILS SHOWN ON THE DRAWINGS IS APPROXIMATE AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR. FIELD LOCATE UTILITIES AND COORDINATE WITH THE LOCAL AUTHORITIES.

3) ALL MATERIAL, WORKS, AND CONSTRUCTION METHODS SHALL BE IN COMPLIANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS, AND THE ONTARIO PROVINCIAL STANDARDS DRAWINGS (OPSD) UNLESS OTHERWISE NOTED.

4) CONTRACTOR SHALL SUPPLY ALL THE MATERIALS OF NEW QUALITY AND IN QUANTITIES SUFFICIENT TO COMPLETE THE WORK SHOWN ON THE DRAWINGS.

5) THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REINSTATEMENT OF ALL AFFECTED AREAS TO A CONDITION EQUAL TO OR GREATER THAN EXISTING AND FOR THE REPAIR OF ANY DAMAGE CAUSED DURING THE CONSTRUCTION.

6) SURVEY INFORMATION SHOWN IS BASED ON DATA AS PROVIDED BY "SURVEYOR ON SITE INC."

SITE PREPARATION AND REMOVAL NOTES

1) REMOVAL OF OVERBURDEN WITHIN THE CONSTRUCTION AREA TO GRADES INDICATED SHALL BE AS PER OPSS 201. THIS INCLUDES ALL SOIL, GRANULAR, ORGANICS AND ROCK COBBLES.

2) REMOVALS SHALL BE IN ACCORDANCE WITH OPSS 510

3) EXCAVATION AND GENERAL SITE GRADING SHALL BE COMPLETED IN ACCORDANCE W/ OPSS.MUNI 206.

4) DISPOSE OF ALL CONSTRUCTION DEBRIS AT LEGALLY DESIGNATED SITES IN ACCORDANCE WITH APPLICABLE LAWS. COORDINATE WITH ONTC

5) BACKFILLING AND COMPACTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS.MUNI 401.

N

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0	FOR TENDER	MAR 25 24

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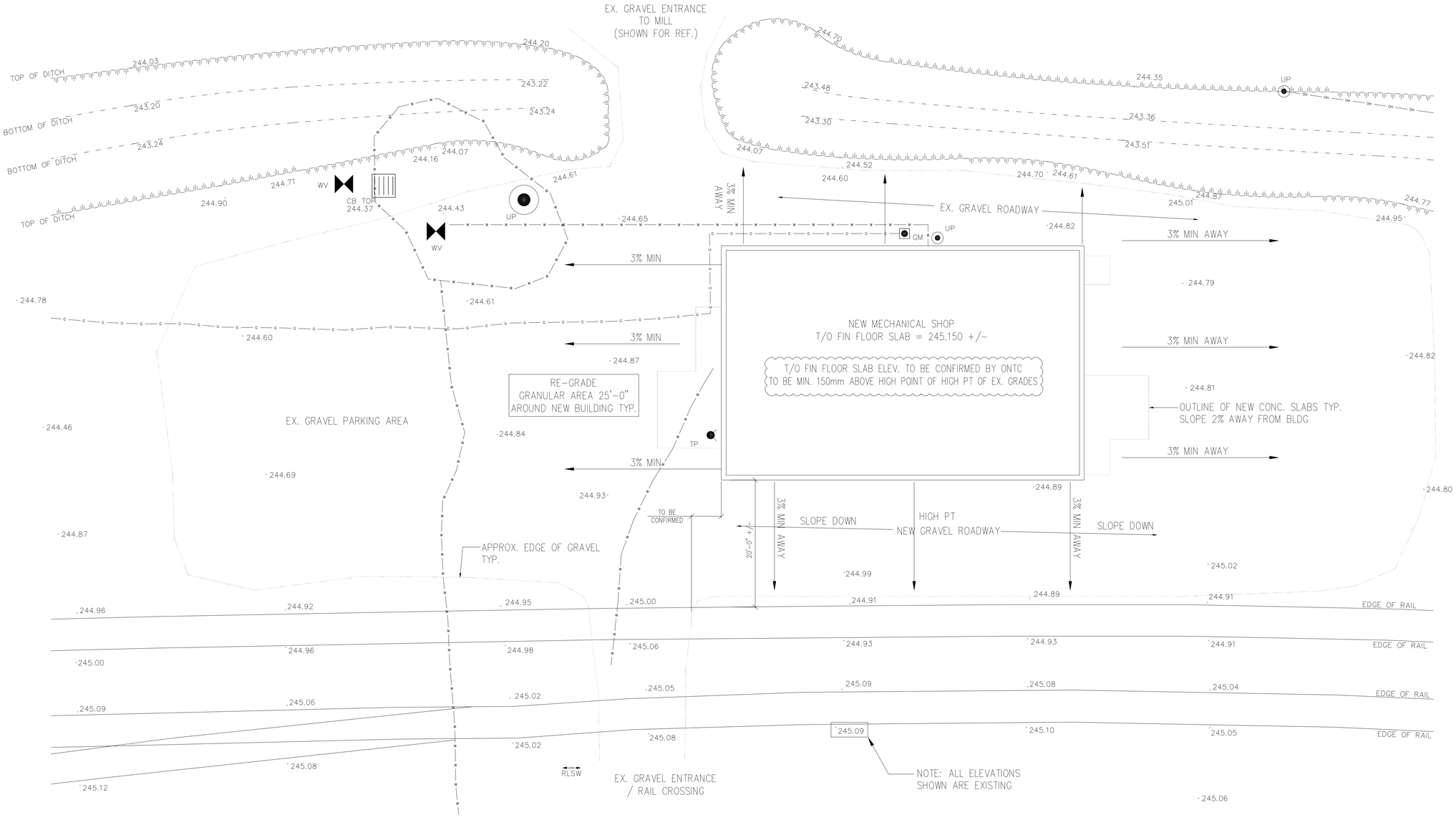
Mar 25, 24
PROVINCE OF ONTARIO

NORTHSHORE ENGINEERING & DRAFTING SERVICES
184 McNaughton Ave.
NORTH BAY ONT.
705-495-0981

project: ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title: SITE PLAN - EXISTING

drawn by: BM	checked by: TIM T
scale: NTS	project no: 231979
date plotted: MAR 25 2024	
date: MAR 11 2024	
dwg no: A0.0	



LEGEND

GM	GAS METER
HM	HYDRO METER
RLSW	RAILWAY SWITCH
TP	TRAFFIC LIGHT
UP	UTILITY POLE
WV	WATER VALVE
-C-	UNDERGROUND CABLE LINE
-H-	UNDERGROUND HYDRO LINE
-G-	UNDERGROUND GAS LINE
-OH-	OVERHEAD UTILITY WIRES
-W-	UNDERGROUND WATER LINE
x 123.45	EX. SPOT ELEVATION (METRES)

NEW SITE GRADING PLAN

REFER TO A0.0 FOR NOTES

EXISTING/NEW UTILITIES SHOWN FOR REFERENCE ONLY
REFER TO MECHANICAL SITE SERVICING PLAN FOR DETAILS

N

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0	FOR TENDER	MAR 25 24

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project: ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title: SITE PLAN - NEW GRADING

drawn by: BM	checked by: TIM T
scale: NTS	project no: 231979
date plotted: MAR 25 2024	
date: MAR 11 2024	
dwg no: A0.1	

1	ONTARIO BUILDING CODE DATA MATRIX PART 3 & 9		OBC REFERENCE	
2			☒ PART 3	☐ PART 9
3	PROJECT:	ONTC NEW MECHANICAL SHOP HEARST ONT		
4	DESCRIPTION:	☒ NEW ☐ ADDITION ☐ ALTERATION		
5	OCCUPANCY:	GROUP F2,	CL 3.1.2.1.(1)	
6	BLDG AREA: SQ m.	GROUP F2 REPAIR SHOP EXISTING 0 NEW 192 TOTAL 192 NEW 2073 SQ FT		
9	NO OF STOREYS	ABOVE GR. 1 BELOW GR. 0	CL 3.2.1.1	
10	NO OF STREETS/ACCESS ROUTES = 1		CL 3.2.2.10&3.2.5.5.	
11	BUILDING CLASSIFICATION F2 CL3.2.2.70		CL 3.2.2..70	
12	SPRINKLER PROPOSED	☐ ENTIRE BUILDING ☐ BASEMENT ONLY ☐ IN LIEU OF ROOF RATING ☒ NOT REQUIRED	CL 3.2.2.70	
13	STANDPIPE REQUIRED	☐ YES ☒ NO	CL 3.2.9	
14	FIRE ALARM REQUIRED	☐ YES ☒ NO	CL 3.2.4	
15	WATER SUPPLY IS ADEQUATE	☒ YES ☐ NO	CL 3.2.5.7	
16	HIGH BUILDING	☐ YES ☒ NO	CL 3.2.6	
17	PERMITTED CONSTRUCTION	☐ COMBUSTIBLE ☐ NON-COMBUSTIBLE ☒ BOTH	CL 3.2.2.70	
18	OCCUPANCE LOAD BASED ON OCCUPANCY F2	☐ SQ M/PERSON ☒ DESIGN OF BUILDING LOAD 12 PERSONS	CL 3.1.17.1	
19	BARRIER-FREE	☒ YES ☐ NO ☐ EXISTING	CL 3.8	
20	HAZARDOUS SUBSTANCE	☐ YES ☒ NO	CL 3.3.1.2&3.3.1.19	
21	REQUIRED FIRE RESISTANCE RATING (FRR)	HORIZ. ASSEMBLIES FRR (HOURS) / LISTED DESIGN No or DESCRIPTION (SG 2)	CL 3.3.1.2&3.3.1.19	
		FLOORS 0 / NONCOMBUSTIBLE	CL 3.2.2.70	
		ROOF 0 / NONCOMBUSTIBLE		
		FRR OF SUPPORTING MEMBERS		
		FLOORS 0 / NONCOMBUSTIBLE		
		ROOF 0 / NONCOMBUSTIBLE		
24	TRAVEL DIST. MAX DIST 25m (82')		CL 3.3.1.5(c) TABLE 3.3.1.5(A) CL 3.4.2.5.(a)	

NOTE: ONTC TO NOTIFY LOCAL MUNICIPALITY / BUILDING DEPARTMENT OF PROPOSED NEW BUILDING CONSTRUCTION.

LOADING DATA

ROOF LOADS

-SNOW Ss=(2.8 kPa)
-SNOW Sr=(0.3 kPa)
-ROOF DEAD LOAD = 1.0 kPa
-MECH LOAD 1.0 KPa
-NO ALLOWANCE FOR SPRINKLER
-SEE ROOF PLAN MECHANICAL UNIT LOADS LOCATIONS & WEIGHTS
-SEE ROOF PLAN FOR SNOW ACCUMULATION LOAD AT PARAPET & ROOF UNITS

FLOOR LOADS

-GROUND FLOOR INDUSTRIAL LOAD LL = 4.8 kPa

WIND LOADS

-MINIMUM DESIGN WIND LOAD 1/50 q= 0.30kPa

EARTHQUAKE LOADS

-SITE SOIL CLASSIFICATION D
-IMPORTANCE FACTOR 1

SEISMIC DATA

Sa (0.2) = 0.073
Sa (0.5) = 0.048
Sa (1.0) = 0.028
Sa (2.0) = 0.0031

revision
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HEARST MECHANICAL SHOP
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title
BUILDING CODE MATRIX AND LOADING DATA

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scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	
dwg no: A1.0	

N
W E
S

48X32
shower

VERTICAL BRACING

OFFICE 102
LUNCH ROOM 103
MECHANICAL ROOM 104
SHOWER
ACCESSIBLE WASHROOM 105
SHOWER
WASHROOM 106
REST AREA 107
101 CORRIDOR
SHOP STORAGE 108
109
MW OIL, FUEL AND STORAGE 110

CHEVRON BRACING
VERTICAL BRACING
VERTICAL BR EXPOSED
OUTLINE OF SLAB
SLOPE TO DRAIN
DRAIN SEE M&E

1 HR FIRE SEPARATION
P2a 1 HR FIRE SEPARATION
P2 1 HR FIRE SEPARATION
P2 1 HR FIRE SEPARATION
P2b 1 HR FIRE SEPARATION

10'X10' HIGH O/H
8'X10' HIGH O/H

W1 LOWER
W2 LOWER

17'-11 1/2"
18'-7"
1'-1"
35'-6 3/8"
19'-2 7/8"
36'-8"
20'-0"
56'-8" O/S FND
36'-7" FND

FLOOR PLAN

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - FLOOR PLAN

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date: NOV 10 23	
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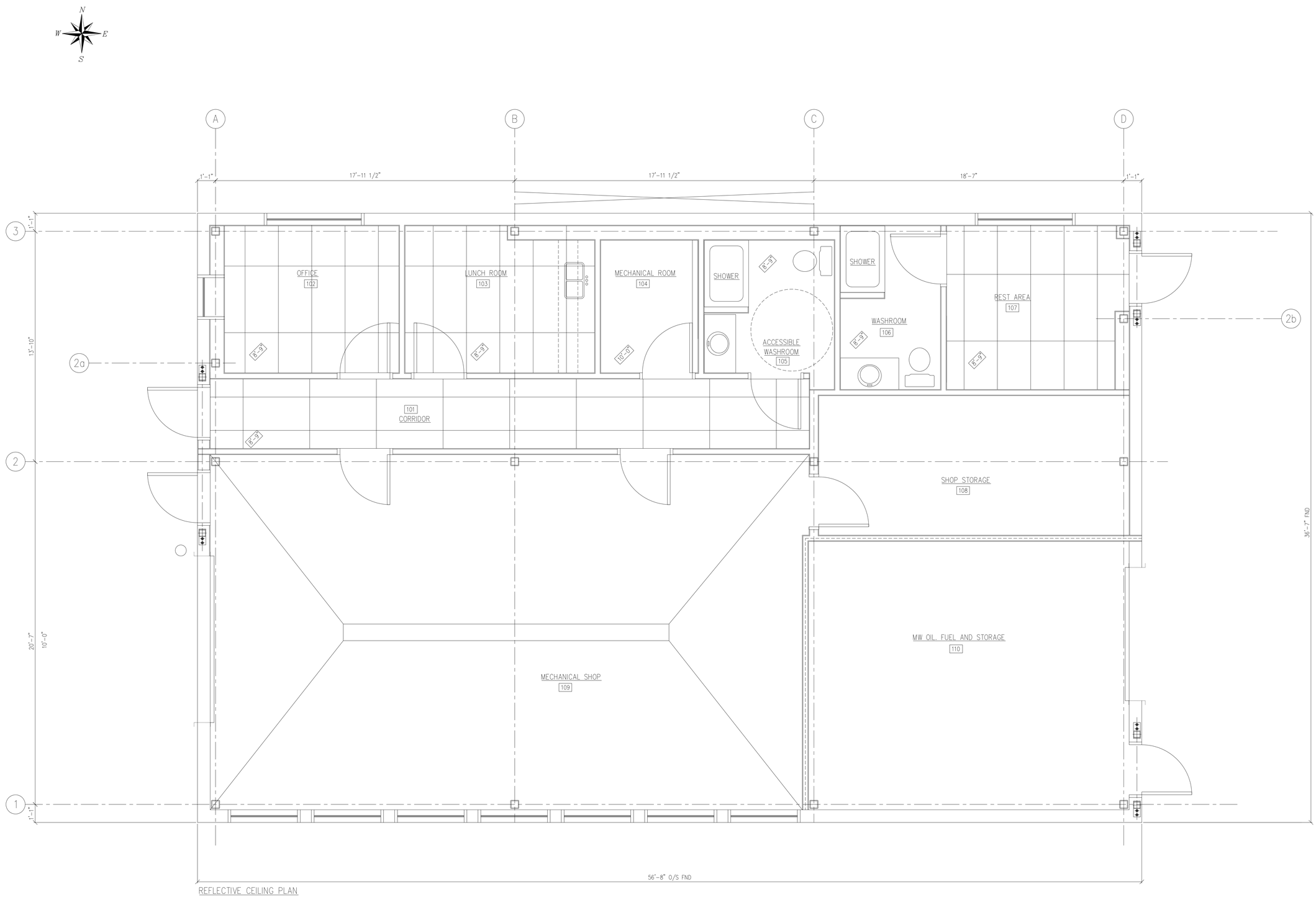

REFLECTIVE CEILING PLAN

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PROVINCE OF ONTARIO
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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
REFLECTIVE CEILING PLAN

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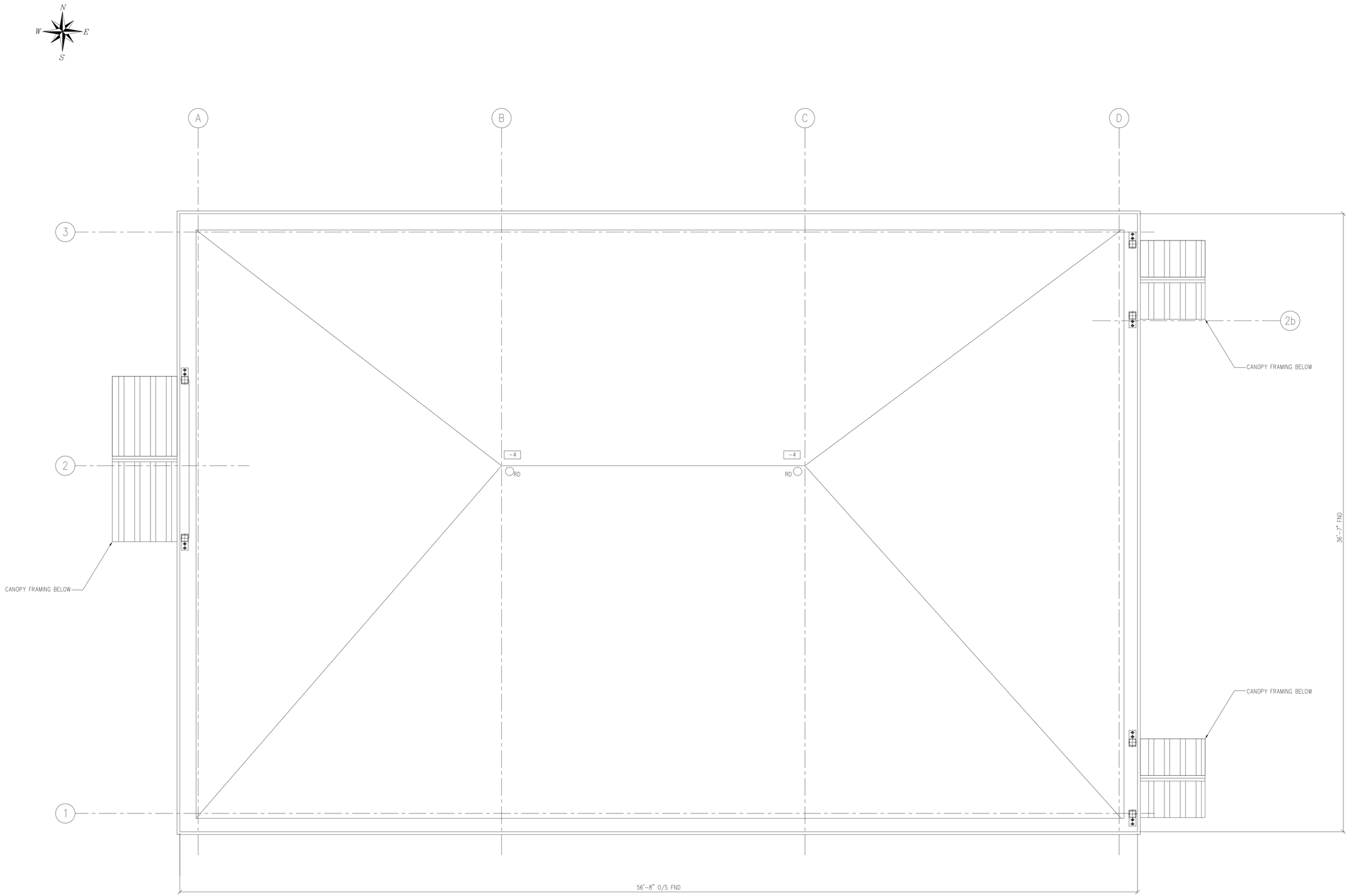

ROOF PLAN

SEE M&E FOR ROOF DRAIN AND VENT DETAILS

revision	FOR TENDER	0
	MAR 25 24	

LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO
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Mar 25, 24

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project
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HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - ROOF PLAN

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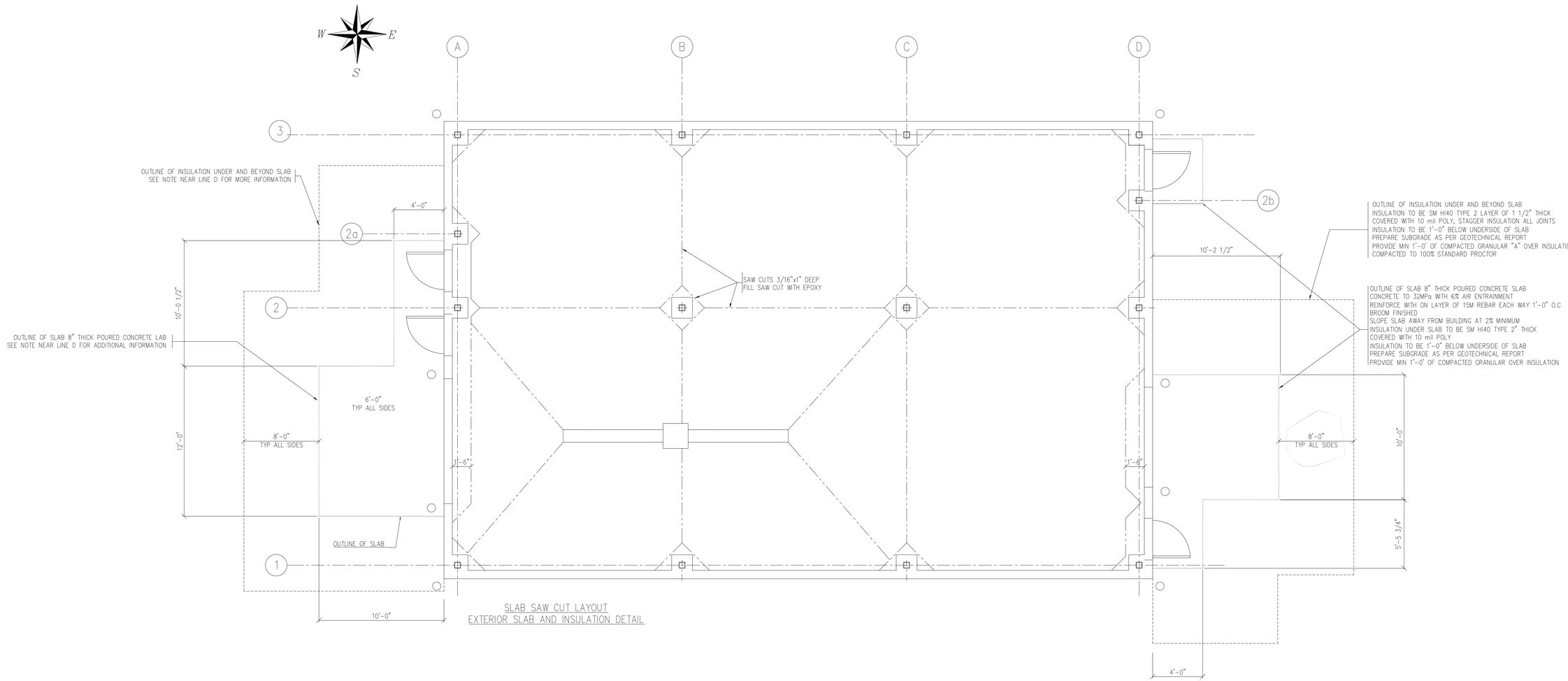
TIM T	BM
scale:	project no:
NTS	231979
date plotted:	
MAR 25 24	
date:	
NOV 10 23	

dwg no:
A2.2



SLAB SAW CUT LAYOUT
EXTERIOR SLAB AND INSULATION DETAIL

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MAR 25 24	

NORTHSHORE ENGINEERING
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project
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HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
PROPOSED SLAB SAW CUT LAYOUT
EXTERIOR SLAB DETAILS

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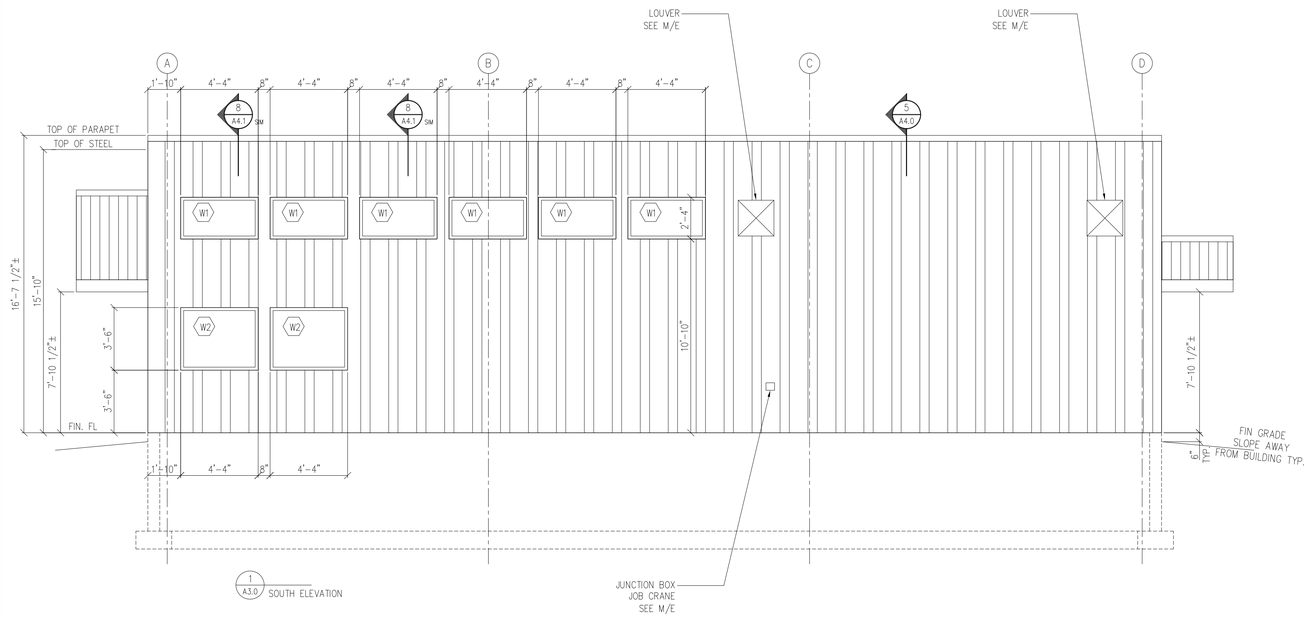
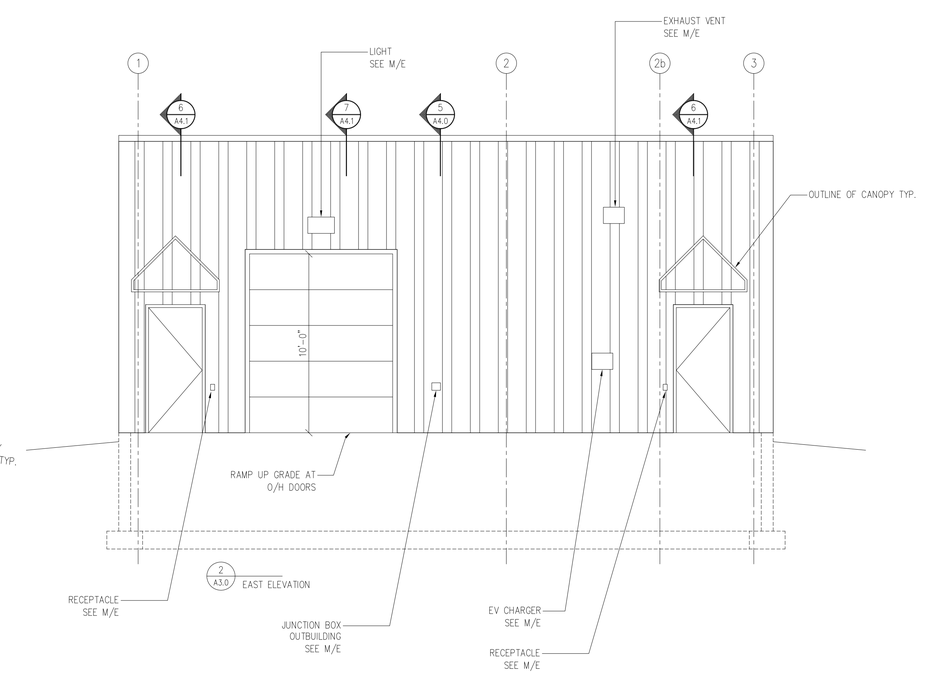
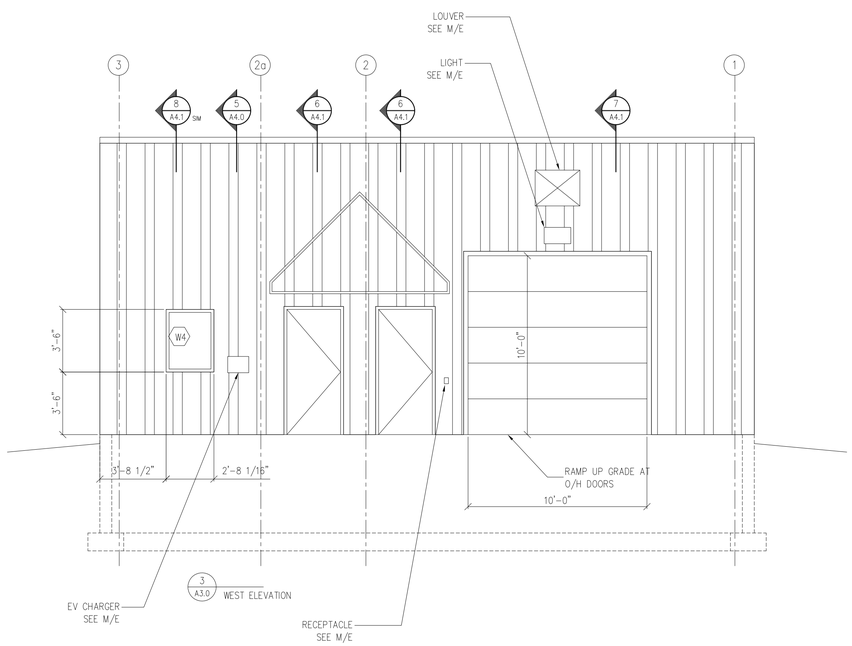
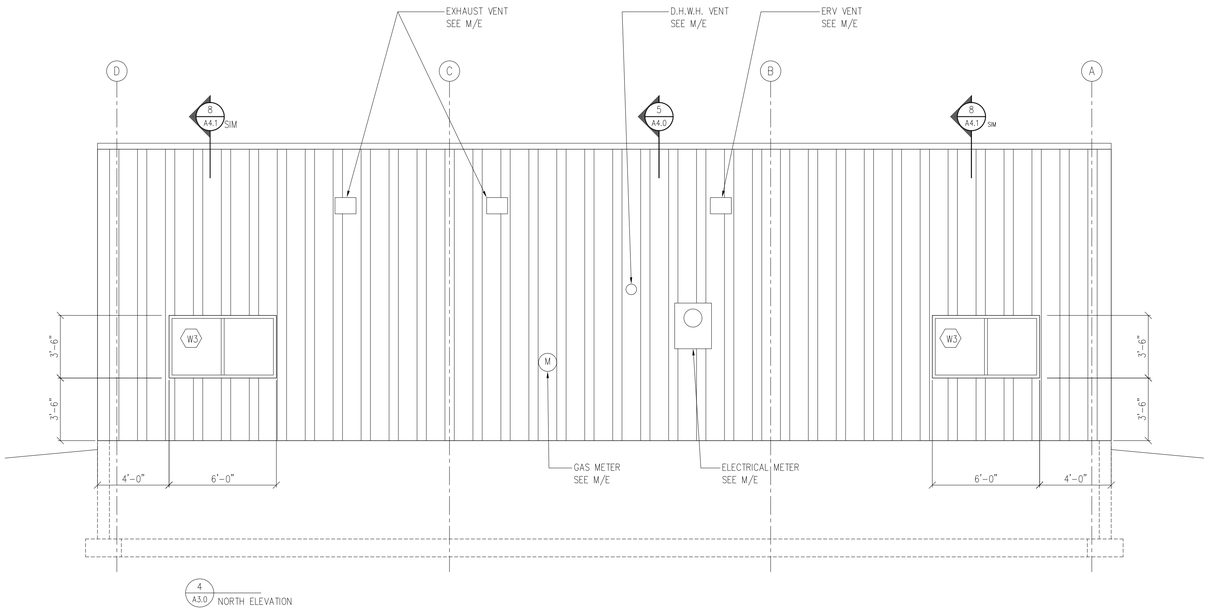
TIM T	BM
scale:	project no:
NTS	231979
date plotted:	
MAR 25 24	
date:	
NOV 10 23	

dwg no:
A2.3









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0	FOR TENDER
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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - EXTERIOR ELEVATION

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date: NOV 10 23	

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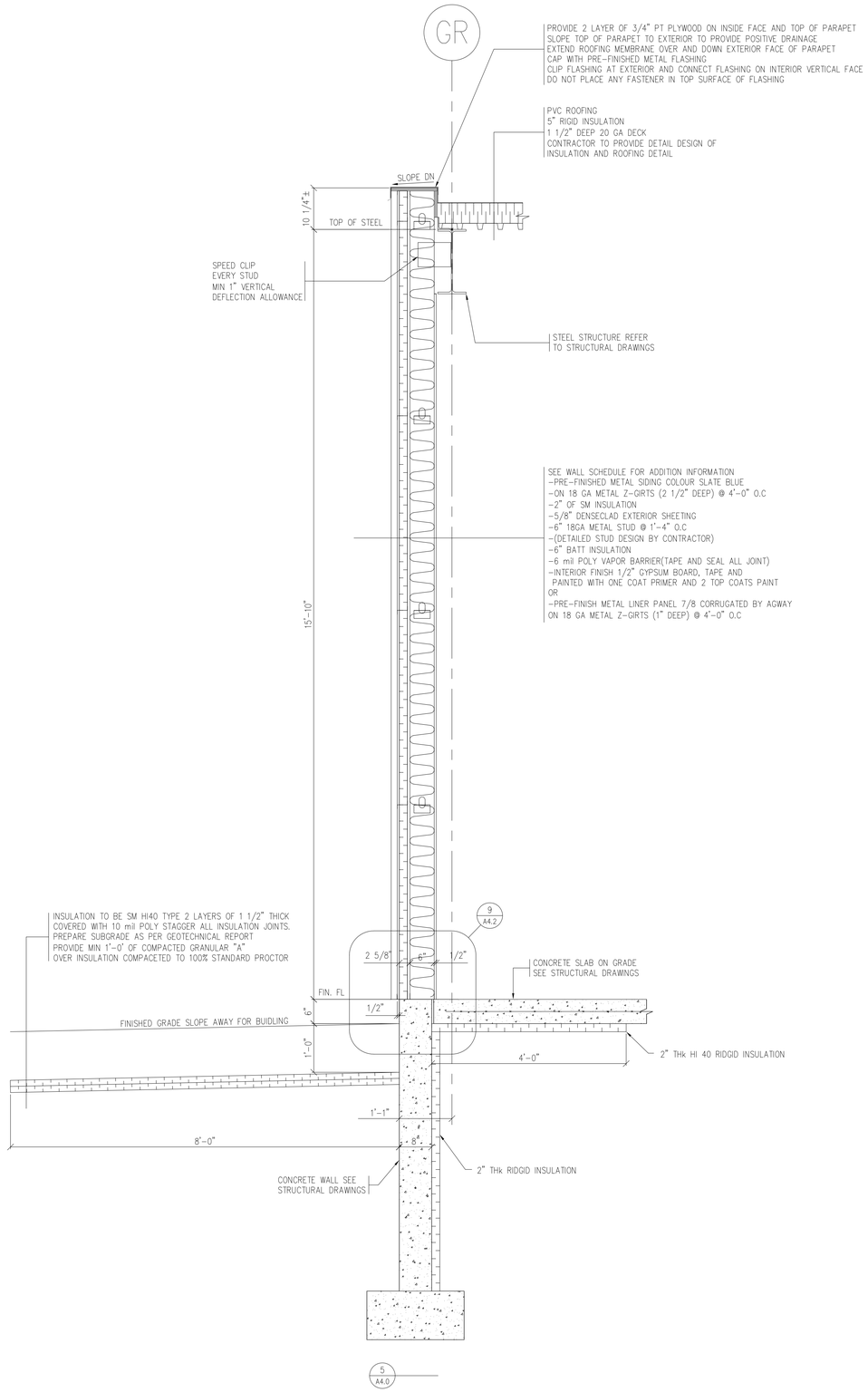

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0	FOR TENDER	MAR 25 24

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - EXTERIOR WALL SECTIONS

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	
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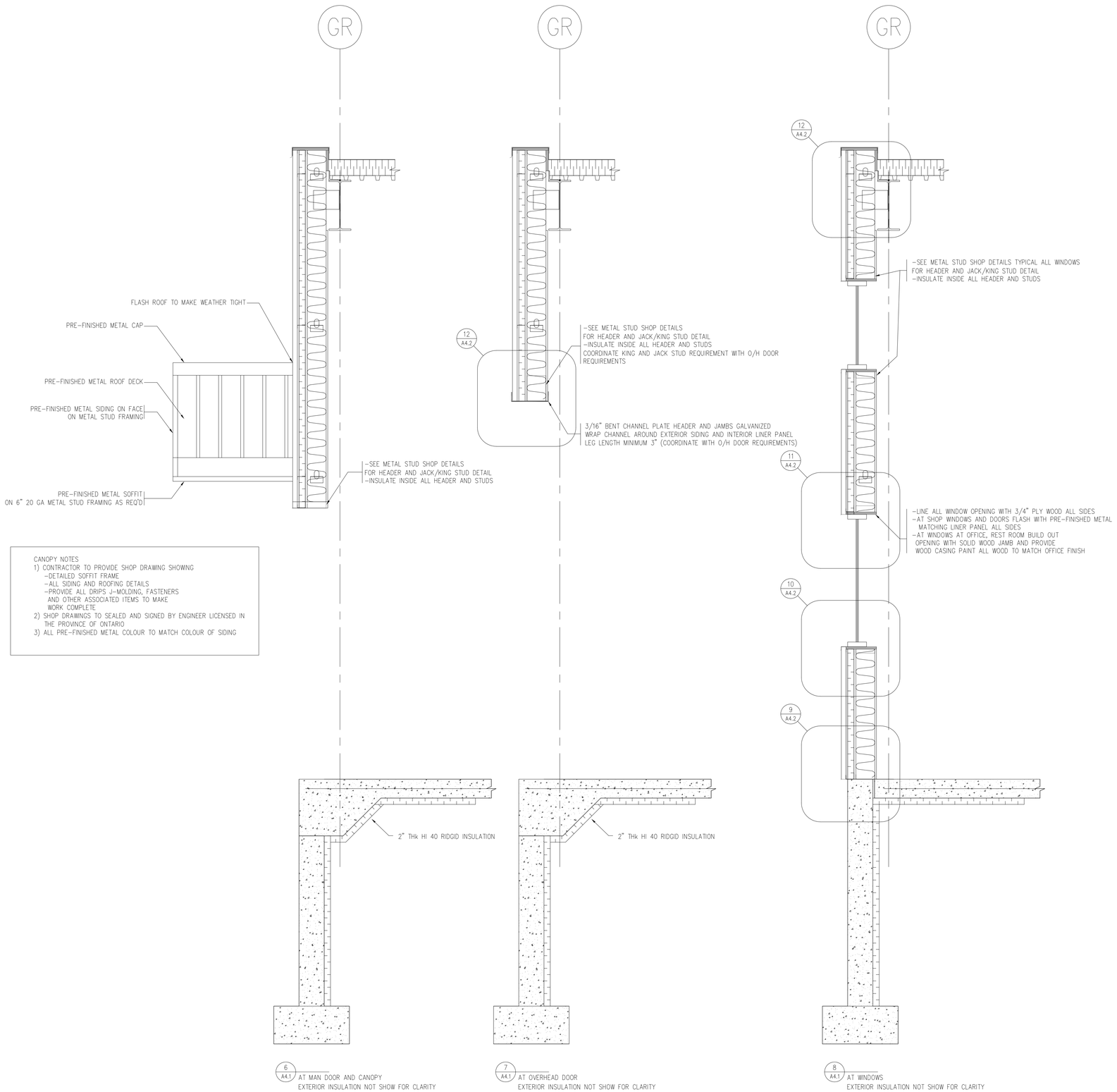

CANOPY NOTES
1) CONTRACTOR TO PROVIDE SHOP DRAWING SHOWING
   -DETAILED SOFFIT FRAME
   -ALL SIDING AND ROOFING DETAILS
   -PROVIDE ALL DRIPS J-MOLDING, FASTENERS AND OTHER ASSOCIATED ITEMS TO MAKE WORK COMPLETE
2) SHOP DRAWINGS TO SEALED AND SIGNED BY ENGINEER LICENSED IN THE PROVINCE OF ONTARIO
3) ALL PRE-FINISHED METAL COLOUR TO MATCH COLOUR OF SIDING

6 / A4.1 AT MAN DOOR AND CANOPY
EXTERIOR INSULATION NOT SHOW FOR CLARITY

7 / A4.1 AT OVERHEAD DOOR
EXTERIOR INSULATION NOT SHOW FOR CLARITY

8 / A4.1 AT WINDOWS
EXTERIOR INSULATION NOT SHOW FOR CLARITY

revision		
0	FOR TENDER	MAR 25 24

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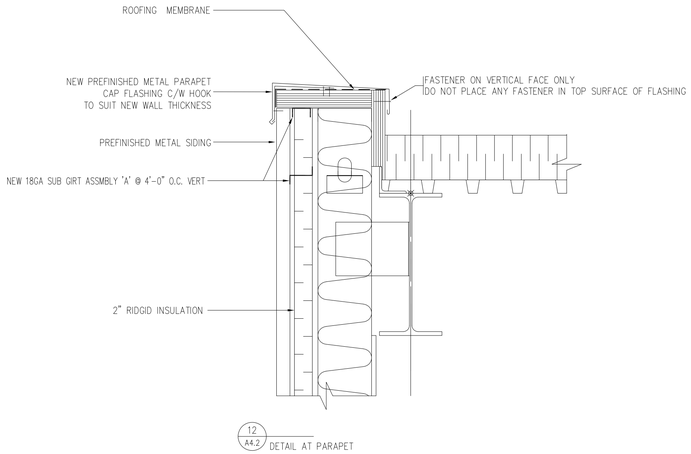
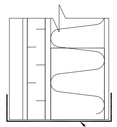
project: ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title: ARCH - DETAIL AT DOORS AND WINDOWS

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	
dwg no: A4.1	

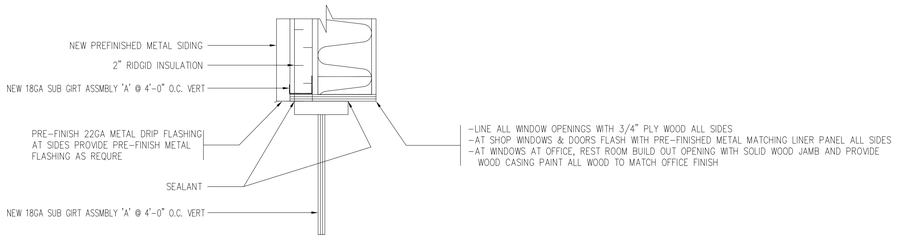


12 / A4.2 DETAIL AT PARAPET

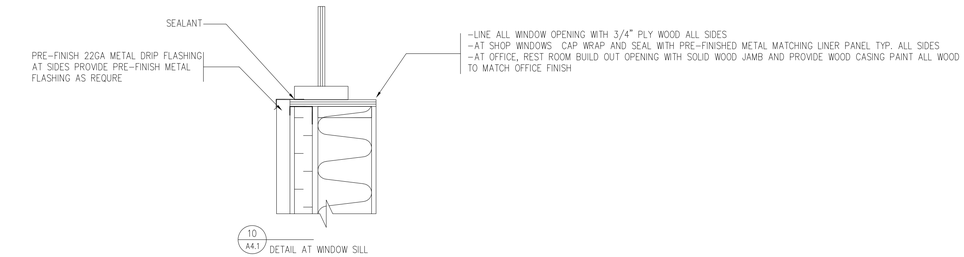


3/16" BENT CHANNEL PLATE HEADER AND JAMBS GALVANIZED
WRAP CHANNEL AROUND EXTERIOR SIDING AND INTERIOR LINER PANEL
LEG LENGTH MINIMUM 3" (COORDINATE WITH O/H DOOR REQUIREMENTS)

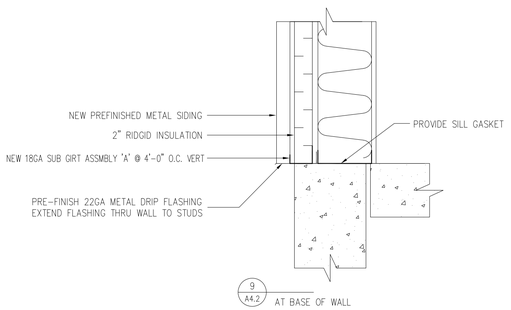
12 / A4.2 DETAIL AT WINDOW HEADER AND SIDES
SIMILAR AT MANDOORS



11 / A4.2 DETAIL AT WINDOW HEADER AND SIDES
SIMILAR AT MANDOORS



10 / A4.1 DETAIL AT WINDOW SILL



9 / A4.2 AT BASE OF WALL

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MAR 25 24	

LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

NORTHSHORE ENGINEERING & DRAFTING SERVICES
184 McNaughton Ave.
NORTH BAY ONT.
705-495-0981

project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - DETIAL AT DOORS AND WINDOWS

drawn by:	checked by:
TIM T	BM
scale: NTS	project no: 231979
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dwg no:
A4.2

DOOR & FRAME SCHEDULE

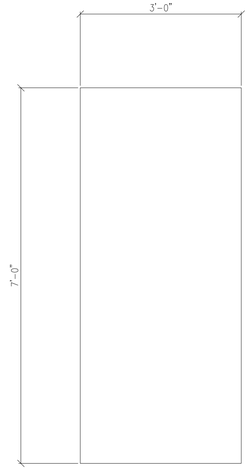
DOOR								FRAME				REMARKS
QTY.	MARK	TYPE	MAT	FIN	WIDTH	HEIGHT	FIRE RATING	TYPE	FIN	MAT	WALL THK.	DOOR & FRAME
1	D1	1	HM	PT	3'-0"	7'-0"		F1	PT	METAL	4 5/8"	DOOR & FRAME
1	D2	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D3	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D4	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D5	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D6	1	HM	PT	3'-0"	7'-0"	45 MIN	F1	PT	HM	4 5/8"	DOOR & FRAME, AND CLOSER
1	D7	1	HM	PT	3'-0"	7'-0"	45 MIN	F1	PT	HM	4 5/8"	DOOR & FRAME, AND CLOSER
1	D8	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D9	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D10	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D11	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D12	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D13	3	HMI	PRE-F	10'-0"	10'-0"		GALV	PT	3/16" PL	TO SUIT	COMPLETE WITH ELECTRIC POWER DOOR OPENER
1	D14	2	HMI	PRE-F	8'-0"	10'-0"		GALV	PT	3/16" PL	TO SUIT	COMPLETE WITH MANUAL OPENER

DOOR & FRAME NOTES

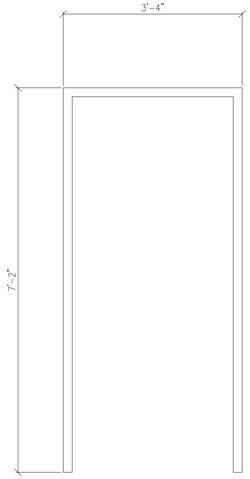
1) SITE CONFIRM ALL WALL THICKNESSES AND OPENING SIZES WITH FRAMES BEFORE ORDERING
2) ALL FRAMES HOLLOW METAL U.N.O.
3) PROVIDE 3/4" PLYWOOD FRAMING AROUND ALL ROUGH OPENINGS, CLAD OPENINGS WITH PRE-FINISH GA METAL MATCHING EXTERIOR SIDING AND LINER PANEL IN COLOUR.
4) HARDWARE STANDARD COMMERCIAL GRADE
5) HM FRAMES TO BE STANDARD 6" DEPTH AT ALL LOCATIONS U.N.O.
6) HARDWARE TO INCLUDE:
   A) 3 HINGES (BALL BEARING TYPE)
   B) DOOR CLOSURE FOR EXTERIOR DOORS
   C) KEY PAD ENTRY SYSTEM FOR EXTERIOR DOORS AT HALL WAY AND REST ROOM DOORS ALL OTHER EXTERIOR DOORS LOCK SET (KEYED TO ONTC STANDARDS)
   D) PANIC BAR HARDWARE FOR ALL EXTERIOR EXIT DOORS
   E) LOCK SET (KEYED TO ONTC STANDARDS) FOR OFFICE, MECHANICAL ROOM, & SHOP STORAGE
   F) PRIVACY SET FOR WASHROOMS
   G) PASSAGE SET FOR ALL OTHER DOORS
7) DOOR AND HARDWARE TO MATCH ONTC STANDARD FOR SHOP DOORS
8) PROVIDE FOAM INSULATE, CAULK AND SEAL AS REQUIRED TO MAKE ALL WORK COMPLETE

LEGEND

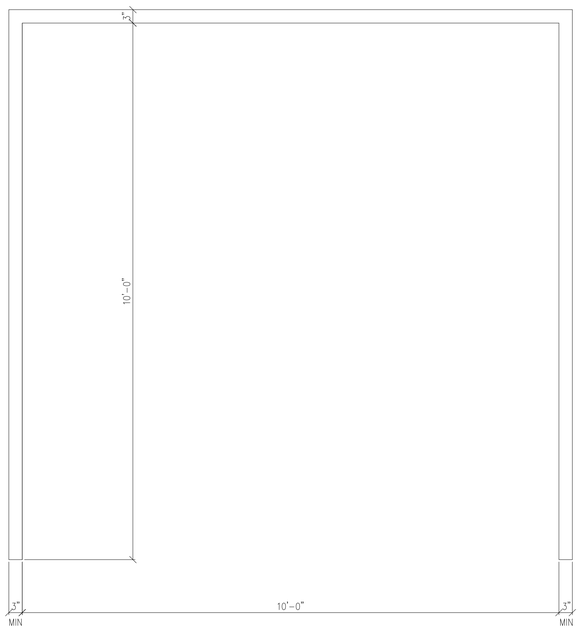
HM – HOLLOW METAL
HMI – HOLLOW METAL INSULATED
WD – WOOD
FR – FIRE RATED
PT – PAINT
ST – STAINED
AL – ALUMINUM
AL/G – ALUMINUM w/ GLASS
TBAL – THERAMLLY BROKEN ALUMINUM (OR APPROVED EQUAL.)



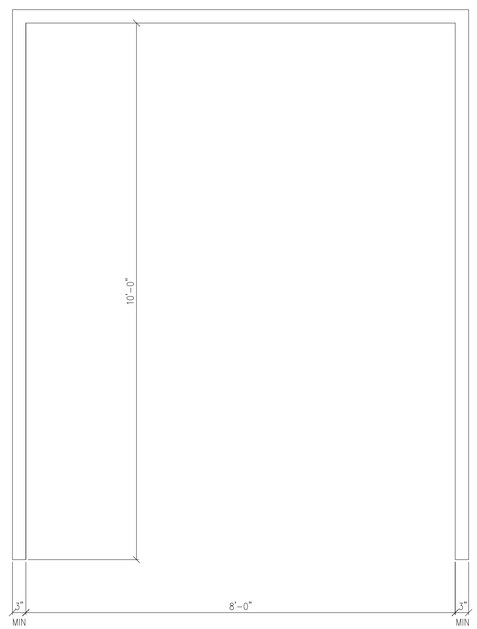
DOOR TYPE 1 & 2



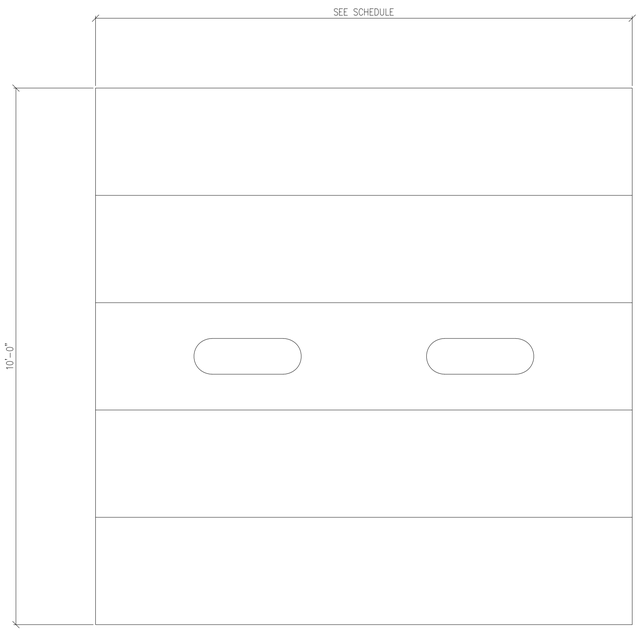
FRAME F1



FRAME F3



FRAME F2



DOOR TYPE 13, 14

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ARCH - DOOR SCHEDULE AND DETAILS

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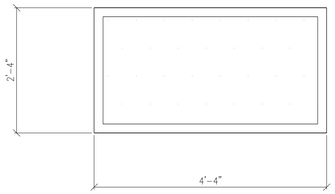
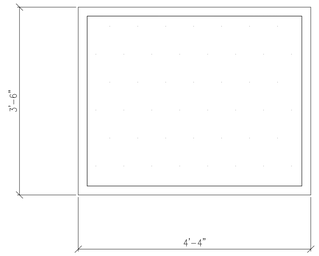
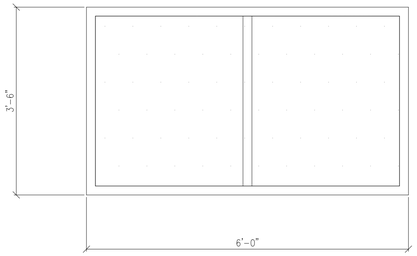


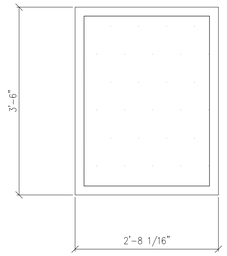
W1 FIXED THERMAL PANE GLASS
ALUM. FRAME (ALUM. ANODIZED COLOUR)



W2 FIXED THERMAL PANE GLASS
ALUM. FRAME (ALUM. ANODIZED COLOUR)

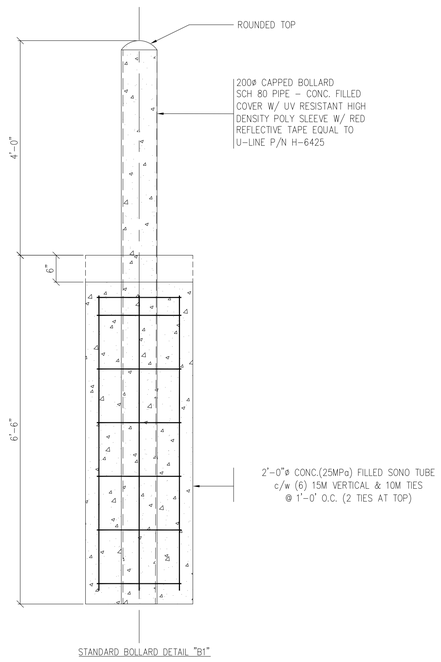


W3 SLIDING GLASS
THERMAL PANE GLASS (OFFICE AND REST ROOM
FRAME (ALUM. ANODIZED COLOUR)
C/W SCREEN

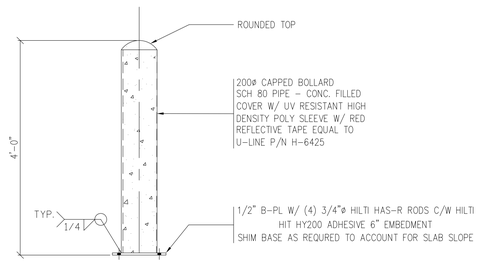


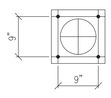
W4 FIXED THERMAL PANE GLASS
ALUM. FRAME (ALUM. ANODIZED COLOUR)

WINDOW NOTE:
1) ALL FIXED WINDOWS TO BE "ALUMICOR 230 FIXED" OR EQUIV.
2) ALL SLIDER WINDOWS TO BE "ALUMICOR 250 SLIDERS" OR EQUIV.
3) ALL WINDOW SILLS ARE TO HAVE A 3" JAM DEFLECTOR BOTH SIDES
4) ALL SLIDER WINDOWS ARE TO COME C/W FULL SCREENS AS NOTED
5) ALL WINDOWS ARE TO BE SUPPORTED WITH 3/4" PRESSURE TREATED PLYWOOD ALL AROUND
6) NO BLOCK OR CONNECTION @ TOP OF WINDOW (ALLOW FOR 1/2" DEFLECTION AT TOP)
7) PROVIDE FOAM INSULATE, CAULK AND SEAL AS REQ'D TO MAKE WORK COMPLETE



STANDARD BOLLARD DETAIL "B1"

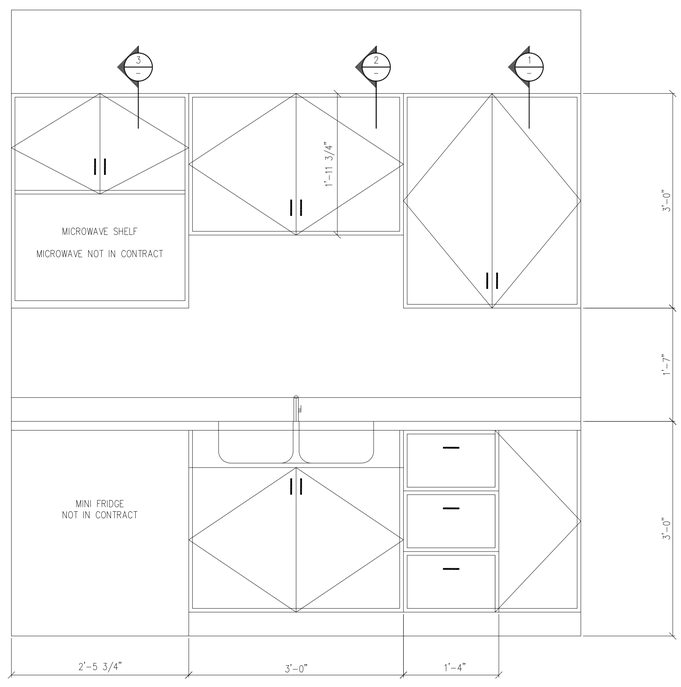




SURFACE MOUNTED BOLLARD DETAIL "B2"

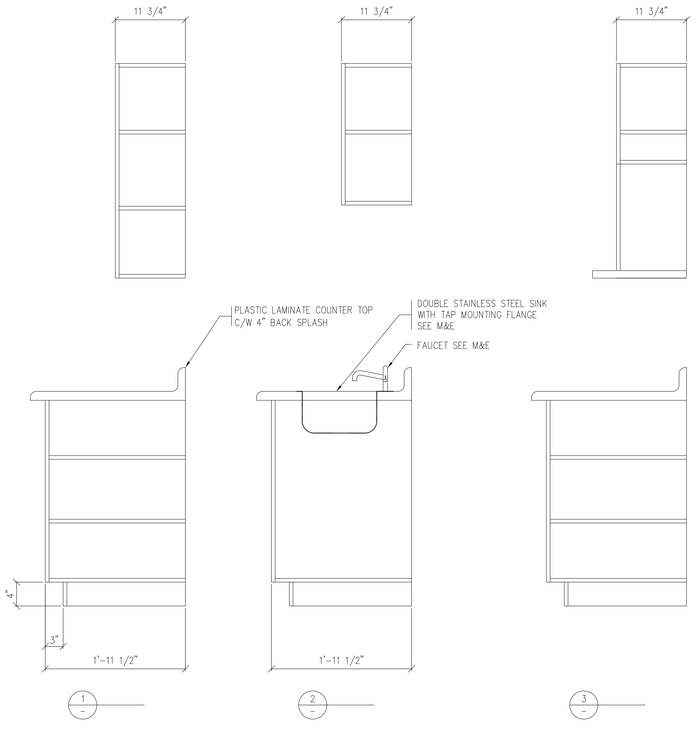
BOLLARD GENERAL NOTES:
1) ALL WELDING TO COMPLY w/ CSA CWB W47.1 & W59
2) PRIME PAINT ALL STEEL (U.N.O.)
3) CONTRACTOR TO FIELD CONFIRM ALL QUANTITIES

MATERIAL NOTES:
1) HSS TO BE CAN/CSA G40.21, 350W
2) CHANNELS, ANGLES = 300W (CAN/CSA G40.21)
2) PLATES, BARS = 300W (CAN/CSA G40.21)



CASE WORK KITCHEN ELEVATION

NOTES
1) CASE WORK TO BE COMMERCIAL GRADE
2) DIMENSIONS AS APPROXIMATE SITE CONFIRM ALL DIMENSIONS
3) CASE WORK TO BE BE PROVIDE COMPLETE WITH ALL HARDWARE
4) PROVIDE COMPLETE SHOP DRAWINGS FOR ALL ITEMS
5) COORDINATE CASEWORK WITH M&E REQUIREMENTS
6) ALL CABINETS TO HAVE ADJUSTABLE SHELVES ON RECESSED METAL PILASTERS
7) DRAWERS TO HAVE HEAVY DUTY DRAW SLIDES
8) PROVIDE SOLID BLOCKING IN WALLS AS REQUIRED TO SUPPORT AND SECURE CASE WORK



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HEARST MECHANICAL SHOP
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title
ARCH - WINDOW SCHEDULE AND DETAILS

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date:	
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dwg no:	
A5.1	

ROOM FINISH SCHEDULE

ROOM No	ROOM NAME	FLOORS		WALLS		CEILING		REMARKS
		MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	
101	ENTRANCE HALL	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB & R-GWB	PT	ACT	N/A	X
102	OFFICE	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	X
103	LUNCH ROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	X
104	MECHANICAL ROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	X
105	ACCESSIBLE WASHROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	PROVIDE TYPICAL WASHROOM ACCESSORIES INCLUDING MIRROR, TOILET PAPER DISPENSER, PAPER TOWEL DISPENSER, GRAB BARS ETC ALL ITEMS TO BE SUITABLE FOR ACCESSIBLE WASHROOM PROVIDE COMMERCIAL GRADE VANITY / SINK SUITABLE FOR ACCESSIBLE WASHROOM
106	WASHROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	GWB ON METAL STUD FRAMING DETAIL STUD DESIGN BY CONTRACTOR	PT	PROVIDE TYPICAL WASHROOM ACCESSORIES INCLUDING MIRROR, TOILET PAPER DISPENSER PAPER TOWEL DISPENSER ETC. PROVIDE COMMERCIAL GRADE VANITY / SINK
107	REST ROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	GWB ON METAL STUD FRAMING DETAIL STUD DESIGN BY CONTRACTOR	PT	X
108	SHOP STORAGE	FINISHED CONCRETE	MACHINE TROWEL C/W HARDENER AND SEALER	PRE-FINISHED LINER PANEL (SEE WALL SCHEDULE)	N/A	EXPOSED STRUCTURE PAINTED, EXPOSED ROOF DECK GALVANIZED	PT	X
109	MECHANICAL SHOP	FINISHED CONCRETE	MACHINE TROWEL C/W HARDENER AND SEALER	PRE-FINISHED LINER PANEL (SEE WALL SCHEDULE)	N/A	EXPOSED STRUCTURE PAINTED, EXPOSED ROOF DECK GALVANIZED	PT	X
110	MW OIL FUEL AND STORAGE	FINISHED CONCRETE	MACHINE TROWEL C/W HARDENER AND SEALER	PRE-FINISHED LINER PANEL (SEE WALL SCHEDULE)	N/A	EXPOSED STRUCTURE PAINTED, EXPOSED ROOF DECK GALVANIZED	PT	X

ROOM FINISH NOTE
1) CAULK AND SEAL ALL CORNERS AND EDGES AS REQUIRED
2) PROVIDE 4" RUBBER BASEBOARD IN OFFICE, HALL, WASHROOMS, LUNCH ROOM, REST ROOM AND MECHANICAL ROOM.

GWB - GYPSUM BOARD
R-GWB - RATED GYPSUM BOARD
PT - PAINT (1 PRIME, 2 TOP COATS)
ACT - ACOUSTICAL CEILING TILE ON METAL FRAMING COMMERCIAL GRADE

WALL SCHEDULE

INTERIOR PARTITIONS WALL

P1
1/2" GYPSUM BOARD
3 5/8" 22GA METAL STUDS @ 1'-4"O.C.
1/2" GYPSUM BOARD

P1a
AS PER P1 WITH SOUND PROOFING INSULATION

P2
5/8" TYPE X GYPSUM BOARD
3 5/8" 20 GA METAL STUDS @ 1'-4"O.C.
5/8" TYPE X GYPSUM BOARD
18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C
PRE-FINISHED METAL LINER PANEL
PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
FINISH: WHITE (QC 28317) BY AGWAY (SHOP/STORAGE ROOM SIDE)
1 HOUR FIRE RATED

P2a
AS PER P2 WITH SOUND PROOFING INSULATION

P2b
PRE-FINISHED METAL LINER PANEL
PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
FINISH: WHITE (QC 28317) BY AGWAY
18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C
5/8 TYPE X GYPSUM BOARD
3 5/8" 20 GA METAL STUDS @ 1'-4"O.C.
5/8 TYPE X GYPSUM BOARD
18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C
PRE-FINISHED METAL LINER PANEL 7/8" CORRIGATED BY AGWAY
1 HOUR FIRE RATED

P3
AS PER P2 WITH 6" 22 GA STUDS @ 1'-4"O.C.
1 HOUR FIRE RATED

EXTERIOR WALLS

W1
PRE-FINISHED METAL SIDING VICWEST CL435 OR APPROVED EQUAL
COLOUR SLATE BLUE
ON 18 GA METAL Z-GIRTS (2 1/2" DEEP) @ 4'-0" O.C
2" OF SM INSULATION
5/8" DENSECLAD EXTERIOR SHEETING
6" 18GA METAL STUD @ 1'-4" O.C
(DETAILED STUD DESIGN BY CONTRACTOR)
6" BATT INSULATION
6 mil POLY VAPOR BARRIER(TAPE AND SEAL ALL JOINT)
INTERIOR FINISH 1/2" GYPSUM BOARD, TAPE AND
PAINTED WITH ONE COAT PRIMER AND 2 TOP COATS PAINT
OFFICE, LUNCH ROOM WASHROOMS REST AREA, MECHANICAL ROOM.
OR
PRE-FINISH METAL LINER PANEL
PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
FINISH: WHITE (QC 28317) BY AGWAY (AT MECH SHOP AND STORAGE ROOMS)
ON 18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C

W1a
AT STRUCTURAL BRACING
AS PER W1 WITH ADDITION OF 3 5/8" METAL STUD @ 1'-4"
1/2" GYPSUM BOARD

WALL AND PARTITION NOTES

1) EXTEND ALL FRAMING UNDERSIDE OF ROOF DECK OR STRUCTURE
2) PROVIDE DEFLECTION TRACK AT TOP OF ALL PARTITIONS
3) PARTITIONS IN SHOP AND MW OIL FUEL STORAGE AREA TO BE CONSIDERED WIND LOADED (DETAILED DESIGN BY CONTRACTOR)
4) GYPSUM BOARD ON OFFICE, WASHROOMS, LUNCH ROOM, PARTITIONS TO MIN 6" ABOVE CEILING
   ALL OTHER PARTITION WALLS TO HAVE GYPSUM BOARD INSTALLED FULL HEIGHT
5) TAPE AND PAINT ALL GYPSUM BOARD WITH ONE COAT PRIMER AND 2 TOP COATS PAINT
6) CAULK AND FIRE STOP TOP AND END OF ALL FIRE RATED PARTITION WALLS
7) PROVIDE BLOCKING IS WALLS AS REQUIRED TO SUPPORT MISC ITEM INCLUDING MILL WORK, WASHROOM ACCESSORIES ETC.

CLADDING & COLOUR SPEC:

METAL WALL PANELS
VERTICAL PREFORMED METAL CLADDING
1. PRODUCT: VICWEST CL435 OR APPROVE EQUAL
2. COLOUR FINISH:SLATE BLUE

INTERIOR METAL CLADDING
1. PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
2. FINISH: WHITE (QC 28317) BY AGWAY

SHEET METAL FLASHINGS AND TRIMS
PREFINISHED SHEET STEEL
1. BASE METAL THICKNESS: 22 GAUGE
2. FINISH: TYPE 1 & TYPE 2 TRIMS TO BE SLATE BLUE
3. FINISH: TYPE 3 TRIMS TO BE BLUE

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ARCH - ROOM FINISH SCHEDULE AND WALL/PARTITION SCHEDULE

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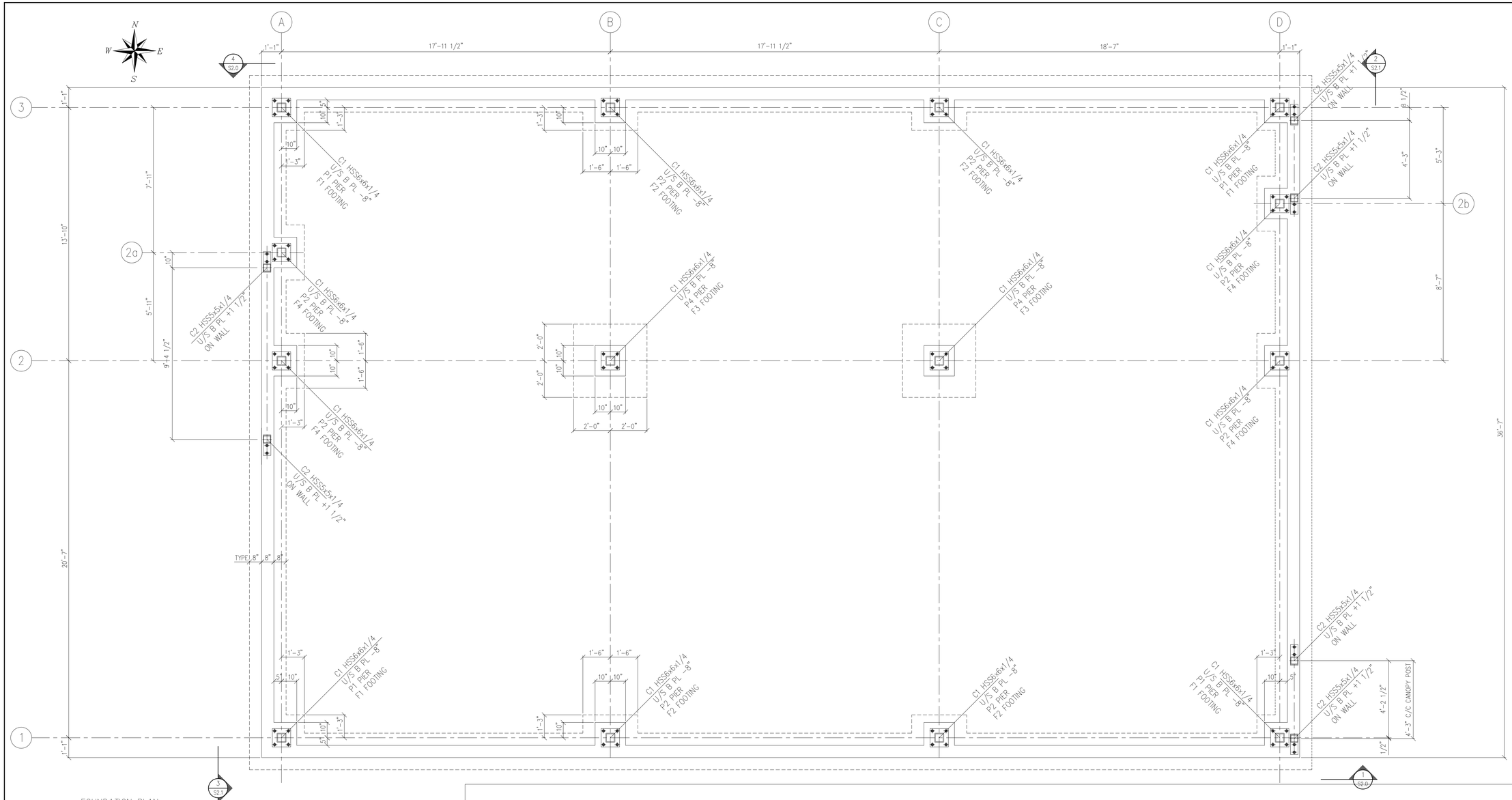
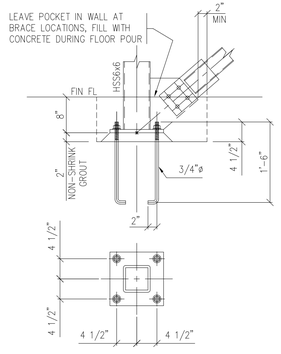
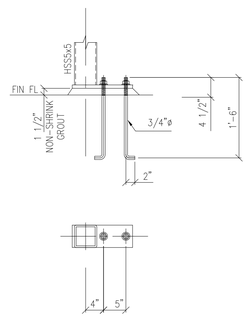


FOUNDATION PLAN

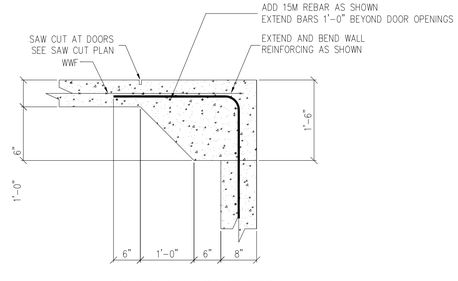
NOTE
1) U/S OF ALL FOOTING @ 6'-6" BELOW FINISHED FLOOR (REFER TO GEOTECHNICAL REPORT BY ENGLOBE)
2) U/S OF COLUMN BASE PLATE (BUILDING COLUMNS) -8" BELOW FINISHED FLOOR
3) U/S OF COLUMNS BASE PLATE FOR COLUMNS SUPPORTING CANOPIES + 1 1/2" FROM FINISHED FLOOR
4) SEE THIS DRAWING FOR BASE PLATE DETAILS
5) ALL COLUMNS TO HAVE 1/4" CAP PL.



COLUMN BASE FOR TYPE C1
BASE PL 1'-0"x1'-0"x3/4"



COLUMN BASE FOR TYPE C2(CANOPY COLUMNS)
BASE PL 5"x1'-1 1/2"x3/4"



SLAB DETAIL AT O/H AND MAN DOORS

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0	FOR TENDER	MAR 25 24

LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

NORTHSHORE ENGINEERING & DRAFTING SERVICES
184 McNaughton Ave.
NORTH BAY ONT.
705-495-0981

project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
FOUNDATION PLAN

drawn by:	checked by:
TIM T	BM
scale:	project no:
NTS	231979
date plotted:	
MAR 25 24	
date:	
NOV 10 23	

dwg no:
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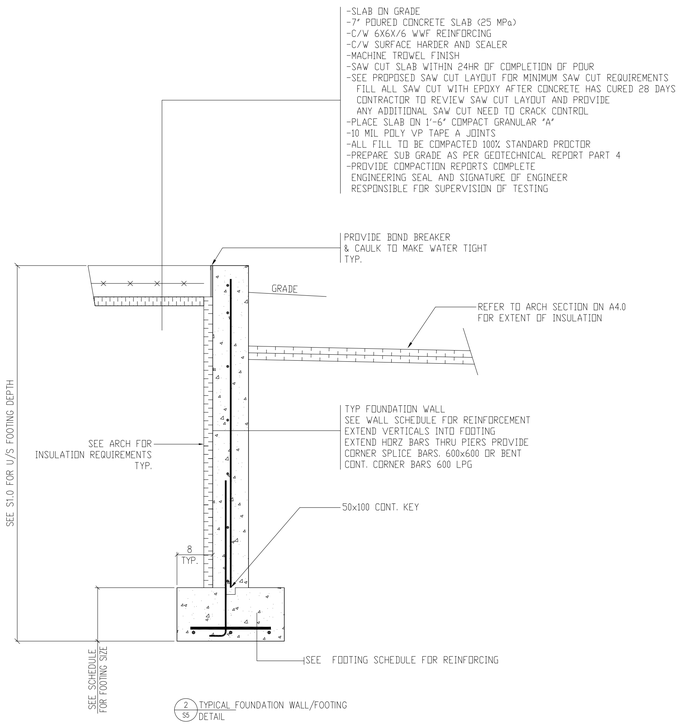
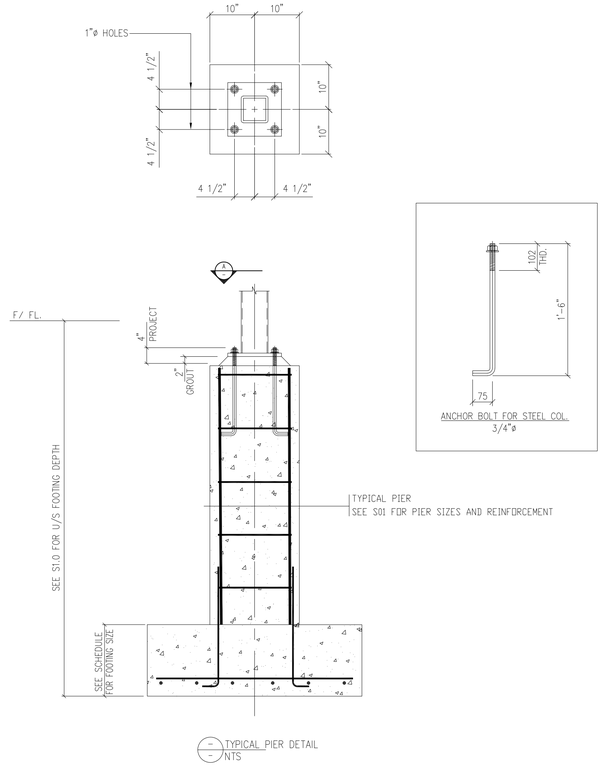


2/S5 TYPICAL FOUNDATION WALL/FOOTING DETAIL



TYPICAL PIER DETAIL
NTS

FOUNDATION INFORMATION

FOOTING SCHEDULE			
FOOTING	SIZE	REINFORCING	NOTES
F1	3'-0"x3'-0"x1'-0"	15M BOTH WAYS, 1 LAYER BTM (8" O.C.)	
F2	3'-0"x3'-0"x1'-0"	15M BOTH WAYS, 1 LAYER TM (8" O.C.)	
F3	4'-0"x4'-0"x1'-4"	15M BOTH WAYS, 1 LAYER TM (8" O.C.)	
F4	3'-0"x3'-0"x1'-0"	15M BOTH WAYS, 1 LAYER TM (8" O.C.)	
WALL	2'-0"Wx1'-0"H	(3) 15M CONT. BARS - 1 LAYER BTM	PROVIDE 15M TRANSVERSE BARS @ 1'-0" O.C.

WALL AND PIER SCHEDULE			
PIER	SIZE	REINFORCING	NOTES
P1	1'-8"x1'-11"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
P2	1'-8"x1'-11"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
P3	1'-8"x1'-11"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
P4	1'-8"x1'-8"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
WALL	8" THICK WALL	15M BARS VERT & HORIZ @ 1'-0" O.C. BOTH WAYS	15m BARS WITH 7" HOOK TO MATCH VERTICAL WALL BARS

FOUNDATION NOTES

NOTE ALL DIMENSIONS SHOWN FOR REFERENCE ONLY CONFIRM DIMENSIONS WITH ARCHITECTURAL DRAWINGS & EXISTING CONDITIONS
1) SEE GENERAL NOTES
2) SEE GEOTECHNICAL REPORT PART 4 FOR EXCAVATION, SITE PREPARATION, BACKFILL AND INSULATION
INCLUDING ADDITONAL EXCAVATION BELOW ENGINEERING FILL BELOW FOOTINGS
AND ENGLOBE TO REVIEW AND APPROVAL ALL SUBGRADE PREPARATION BEFORE INSTALLATION OF FOUNDATION SYSTEM.
3) ALL FOOTINGS TO BEAR ON ORIGINAL UNDISTURBED SOIL OR ENGINEERED FILL (CONFIRMED AND APPROVED BY GEOTECHNICAL SOILS CONSULTANT)
4) ALL EXISTING ORGANIC SOILS TO BE REMOVED, REFER TO ENGLOBE REPORT FOR DEPTHS
5) ALL FOUNDATION CONCRETE EXPOSED TO FREEZE THAW TO BE 32MPa.
6) ALL CONCRETE EXPOSED TO FREEZE THAW TO HAVE 6% ENTRAINMENT
7) REFERENCE STRUCTURAL STEEL SHOP DETAILS FOR ANCHOR BOLT AND INSERT PLACEMENT
8) ALL FOOTINGS TO BEAR 6'-0" BELOW GRADE (6'-6" BELOW T/O FIN FLOOR) ON 2'-0" OF COMPACT ENGINEERED FILL
(SEE GEOTECHNICAL REPORT FOR SOIL PREPARATION REQUIREMENTS)
9) WALL AND PIER FOOTINGS TO BE POURED MONOLITHIC
10) WALL FOOTING REINFORCING BARS TO PASS THRU PIER FOOTINGS
11) PLACE VERTICAL DOWEL IN FOOTING TO MATCH PIER AND WALL VERTICAL BARS SEE SECTION FOR HOOKS LENGTHS
12) COLD JOINTS IN WALL AND FOOTING TO BE STAGGERED MIN 1200mm AND PLACED NEAR MID SPAN BETWEEN PIERS
13) CENTER ALL FOOTINGS ON COLUMN & PIER CENTER LINES U.N.O ON PLANS
13) THICKEN FLOOR DRAIN AND CATCH BASIN AS REQUIRED
14) ALL PITS IN CONCRETE FLOOR SLAB TO BE REINFORCED WITH 10M BARS @ 300 BOTH WAYS (SEE SECTIONS)
15) SEE PLAN AND SECTION FOR DETAILS

SPECIAL NOTE
CONTRACTOR TO BACKFILL ALL WALLS FROM BOTH SIDES EQUALLY

BAR	LAP SPLICE	HOOK	BEND RADIUS
10M	1'-4"	5"	2 1/4"
15M	2'-0"	7"	3 1/2"
20M	2'-4"	9"	4 3/4"

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HEARST MECHANICAL SHOP
HEARST, ONTARIO

title FOUNDATION DETAILS

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scale: NTS	project no: 231979
date plotted: MAR 25 24	
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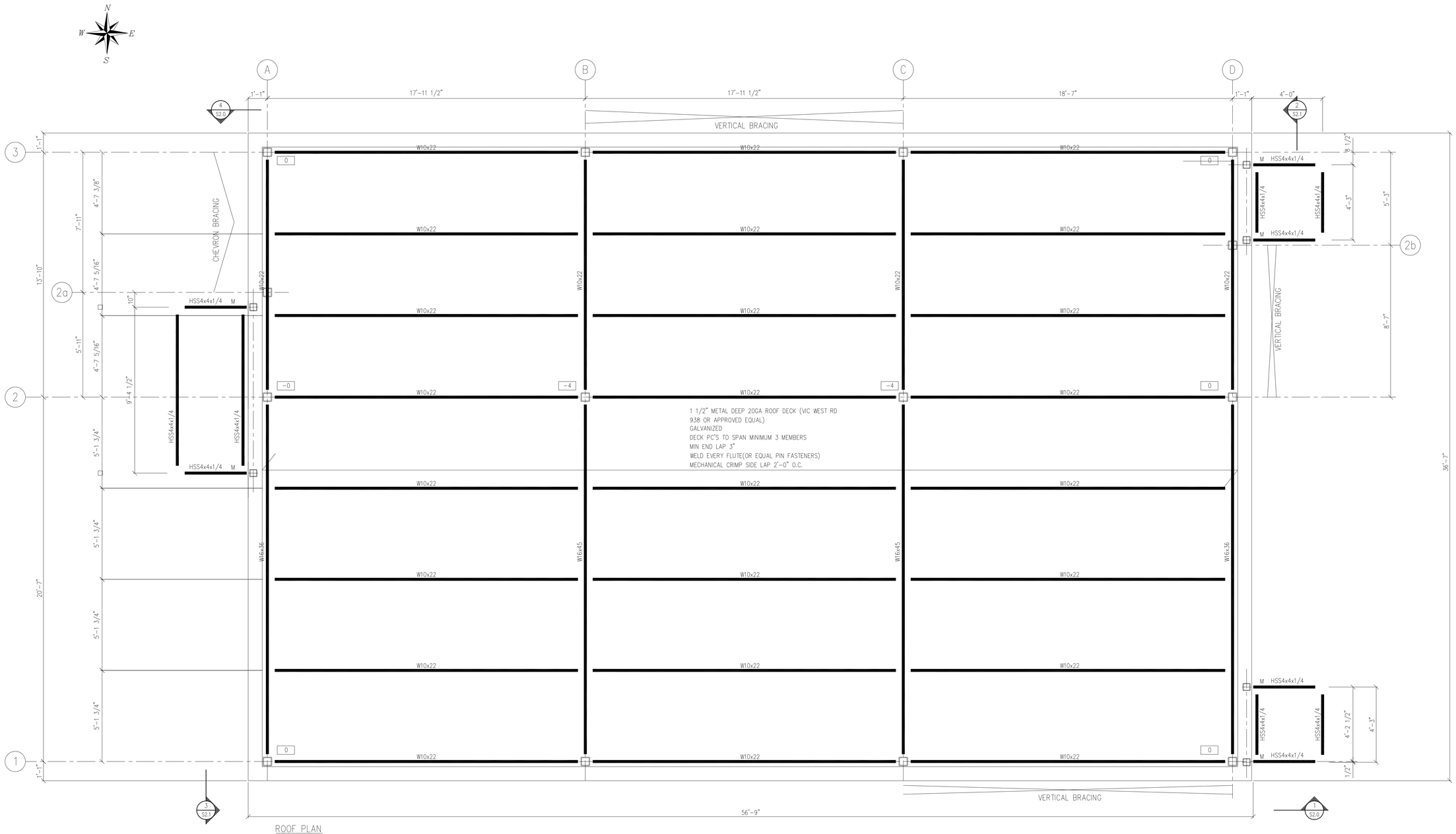

ROOF PLAN

1) TOP OF STEEL 15'-10" (PERIMETER)
2) SLOPE STEEL AS SHOWN -XXX
3) M=FULL MOMENT CONNECTION
4) PROVIDE CONTINUOUS EDGE ANGLE L3x3x1/4 AT PERIMETER

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STEEL ROOF PLAN

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date plotted: MAR 25 24	
date: NOV 10 23	
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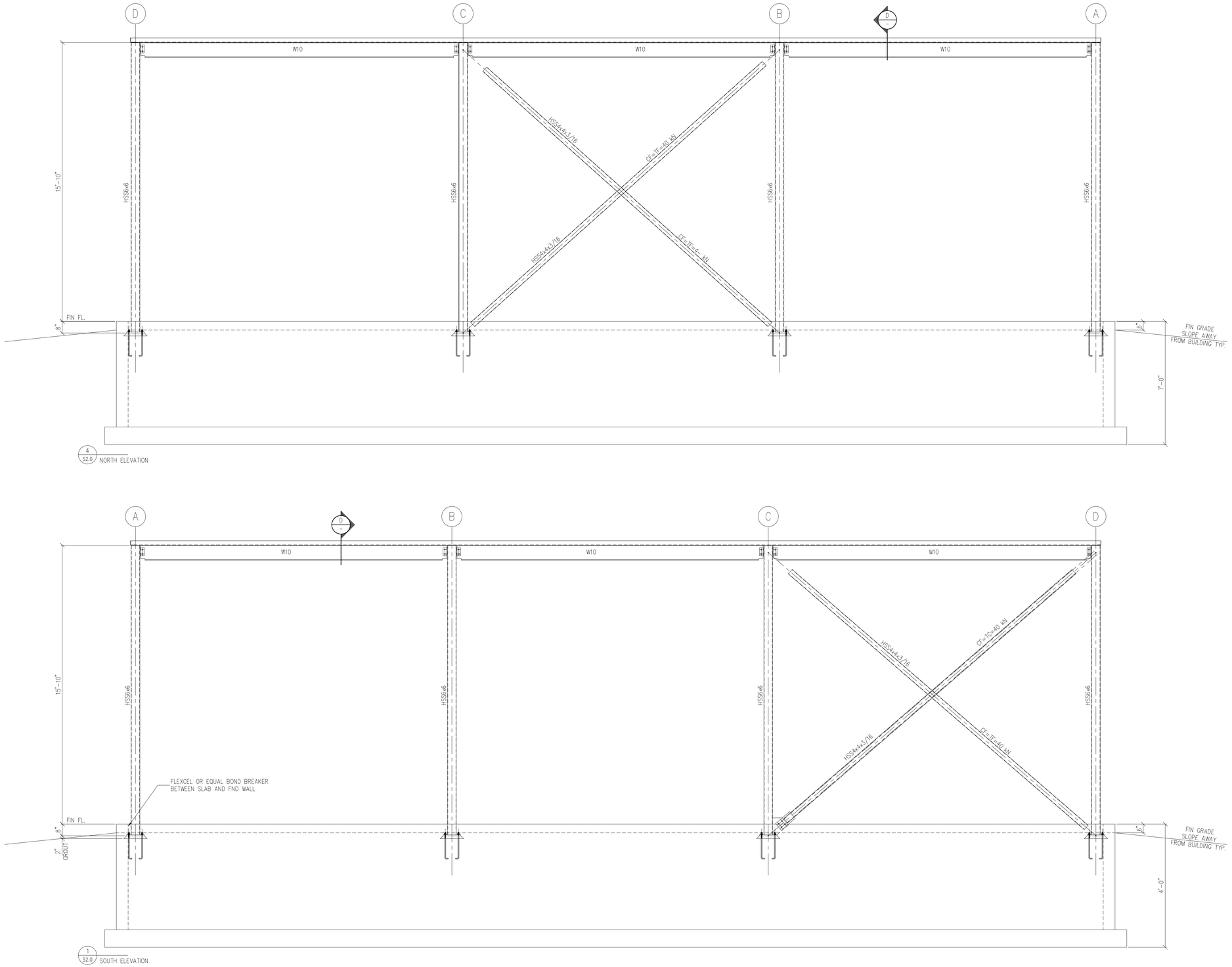

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STEEL ELEVATIONS

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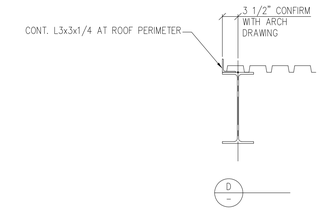
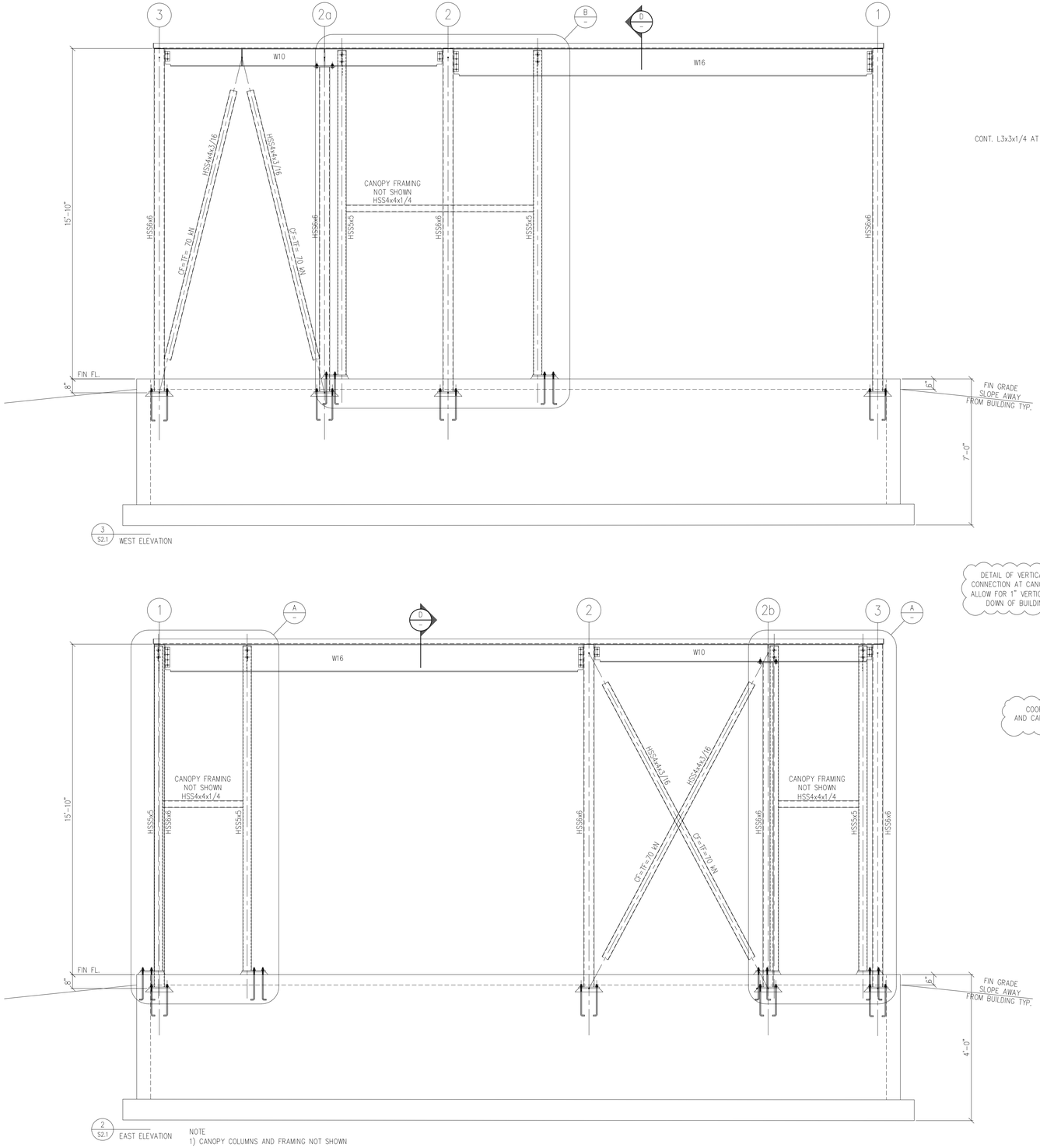
dwg no:
S2.0

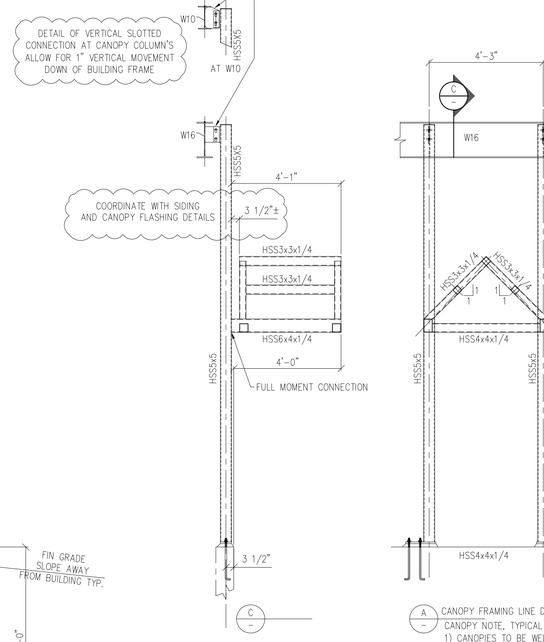
3
S2.1
WEST ELEVATION

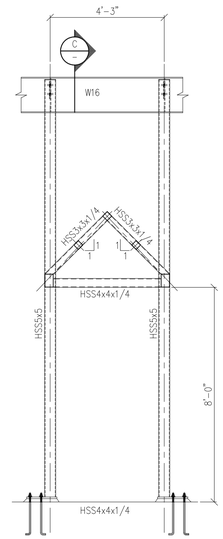


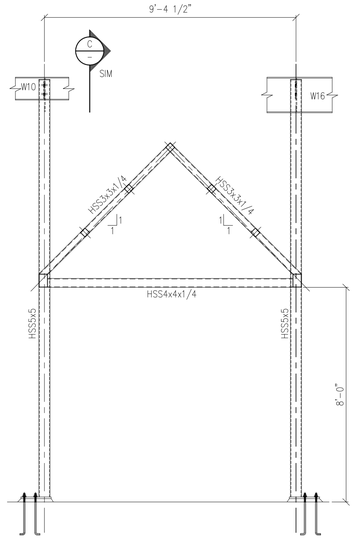


2
S2.1
EAST ELEVATION

NOTE
1) CANOPY COLUMNS AND FRAMING NOT SHOWN







A
CANOPY FRAMING LINE D

B
CANOPY FRAMING LINE A

CANOPY NOTE, TYPICAL ALL CANOPIES
1) CANOPIES TO BE WELDED CONSTRUCTION
2) PROVIDE 1/4" CAP PLATES AT END OF ALL PIECES AS REQUIRED

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HEARST, ONTARIO

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STEEL ELEVATIONS

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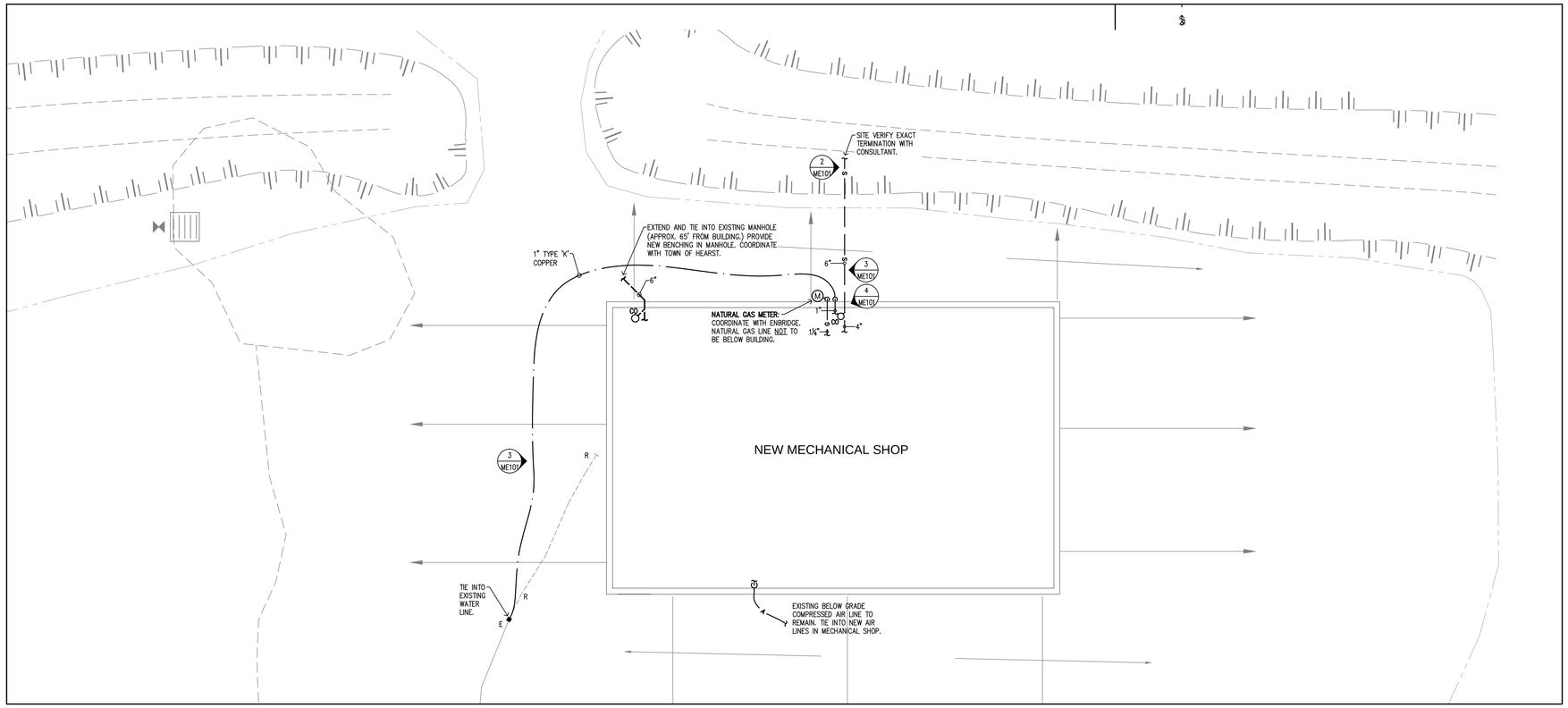
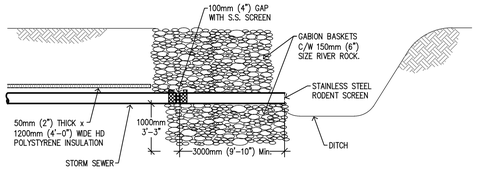


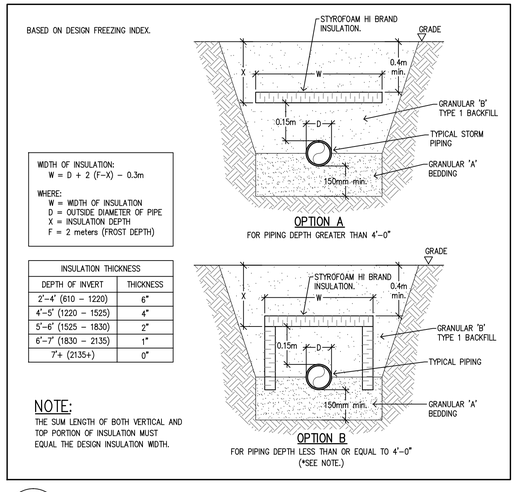
1 ME101 Plumbing and Gas - Site Plan
N.T.S.

MECHANICAL LEGEND

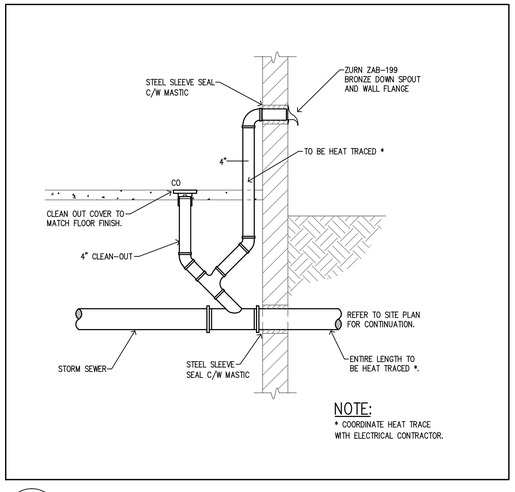
—— · ——	COLD WATER PIPING
— — —	SANITARY SEWER BELOW
— —S— —	STORM SEWER BELOW GRADE
——S——	STORM SEWER ABOVE GRADE
——G——	GAS LINE
	PIPE DROP
	COMBINATION PIPE RISE AND DROP
	CLEAN OUT AT FLOOR LEVEL
M	WATER OR GAS METER
	GATE VALVE
R	EXISTING DEVICE TO BE REMOVED



2 ME101 Storm Sewer Discharge Detail
NTS



3 ME101 Storm Sewer, Sanitary Sewer, and Water Line Insulation Detail
N.T.S.



4 ME101 Storm Emergency Overflow Detail
N.T.S.

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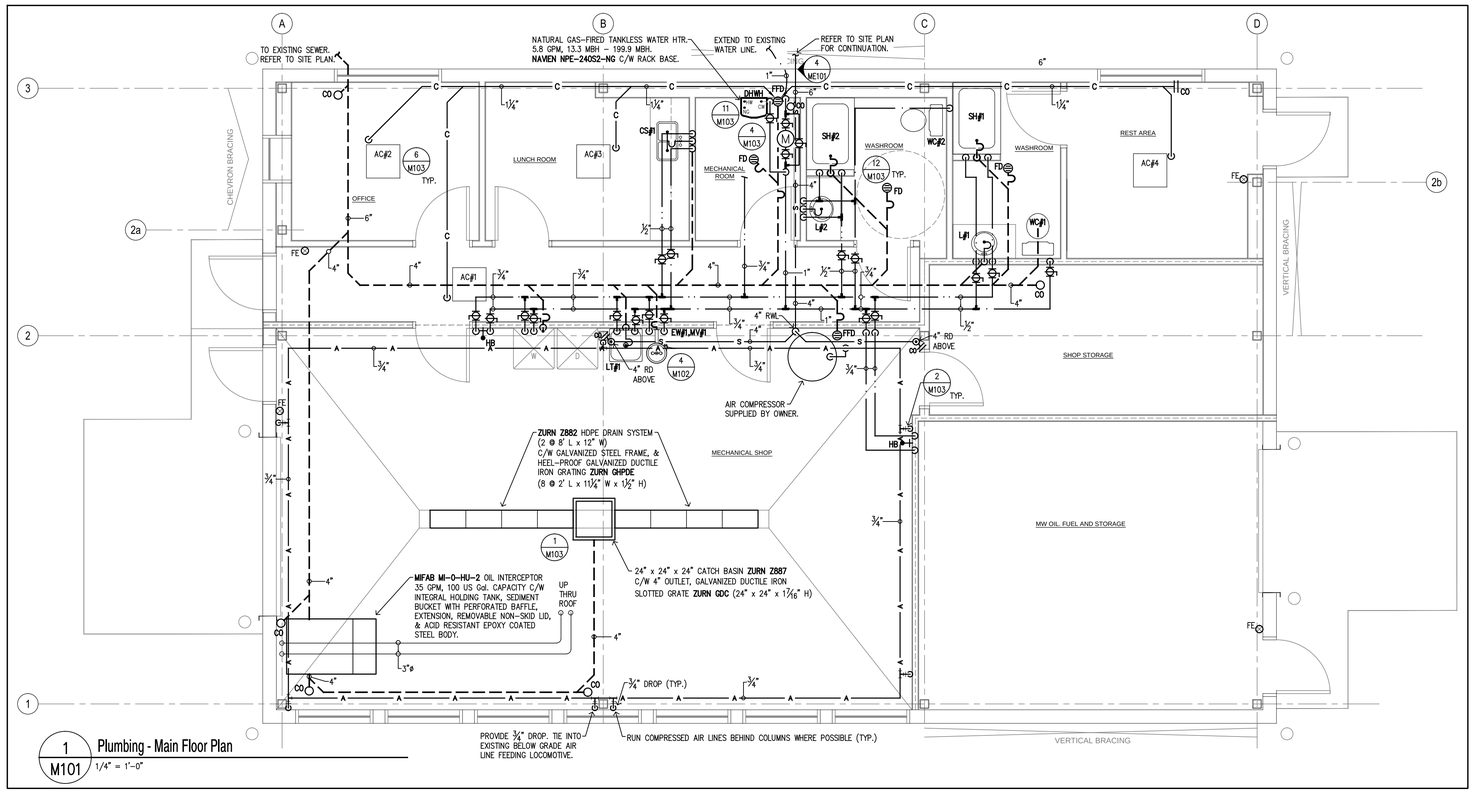
project
ONTC HEARST
MECHANICAL SHOP

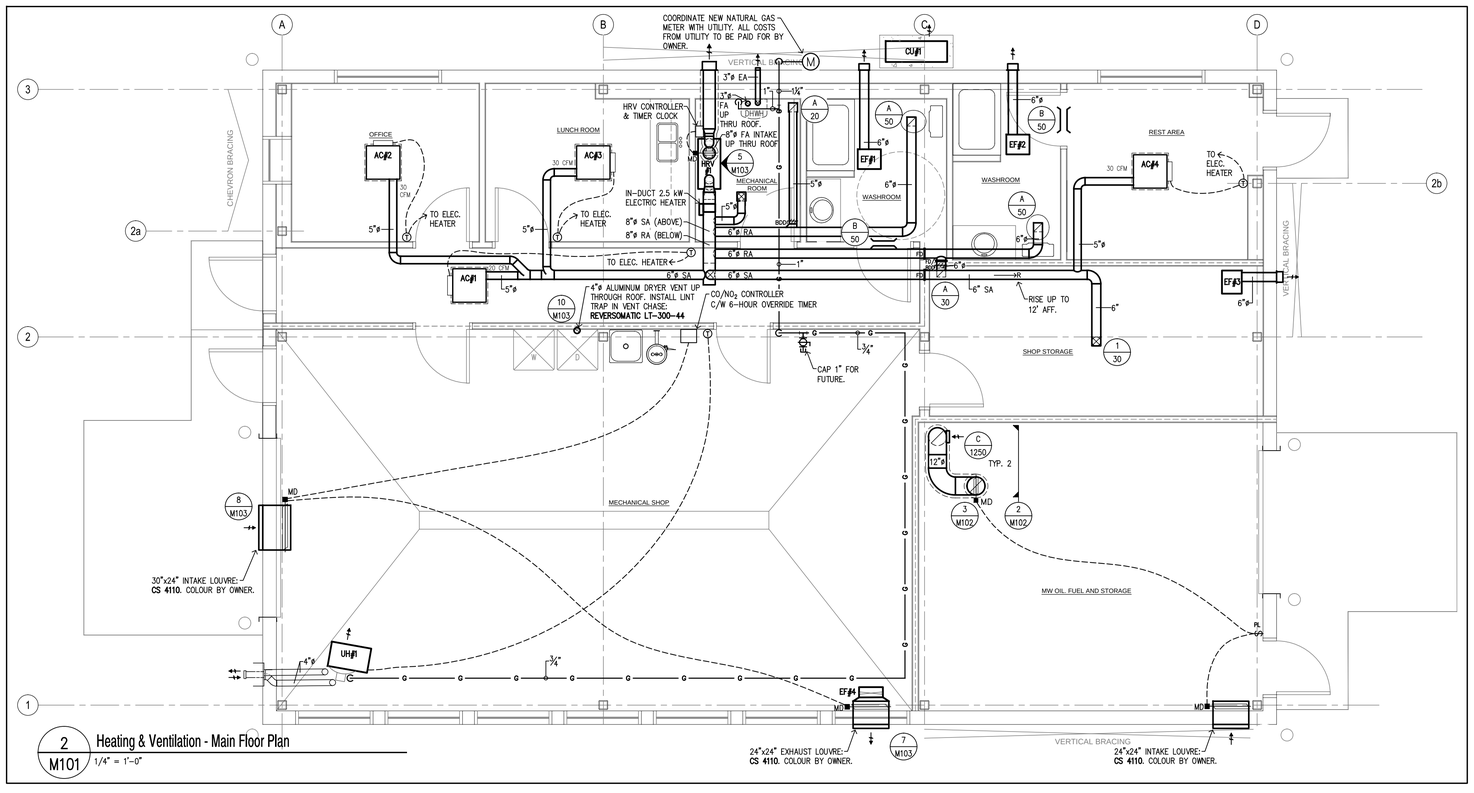
HEARST ONTARIO

title
MECHANICAL
PLUMBING & GAS
SITE PLAN, LEGEND, & DETAILS

drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: ME101
plotted: March 20, 2024	



1 M101 Plumbing - Main Floor Plan
1/4" = 1'-0"



2 M101 Heating & Ventilation - Main Floor Plan
1/4" = 1'-0"

PLUMBING GENERAL NOTES:

1. PROVIDE SYMMONS LAUNDRY MATE #W602 "WASHING MACHINE VALVE & DRAIN FIXTURE" AT WASHING MACHINE.
2. COORDINATE SANITARY AND STORM PIPING PENETRATIONS THROUGH STRUCTURAL FOUNDATION. PIPE SLEEVES THROUGH FOUNDATION WALLS TO BE 1.25x PIPE O.D. OR MIN. 50mm FILLED WITH SOFT FOAM INSULATION.
3. PRIME ALL FLOOR DRAINS TO COLD WATER PIPING AT NEAREST SINK OR TRAP PRIMER VALVE AS REQUIRED.
4. FIRE STOP ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES.
5. PENETRATIONS THROUGH MASONRY OR CONCRETE TO BE SLEEVED.
6. VERIFY ALL POINTS OF CONNECTION TO EXISTING PLUMBING SERVICES PRIOR TO ROUGH-IN.
7. EXTEND 1" CONDENSATE FROM HRV, AND EVAPORATORS, TO NEAREST DRAIN. PROVIDE FUNNEL FLOOR DRAIN C/W AIR GAP.
8. REFER TO SPECIFICATION FOR LEAD FREE FIXTURE, VALVES, SOLDER ETC.
9. DOUBLE CHECK VALVE ASSEMBLY SERVING FLUSHING SYSTEM TO BE MOUNTED 750mm TO 1500mm ABOVE FINISHED FLOOR. A CLEAR SPACE OF 750mm IN FRONT OF THE DOUBLE CHECK VALVE ASSEMBLY IS REQUIRED. PROVIDE 1¼" FUNNEL TYPE RELIEF DRAIN C/W 1" AIR GAP BELOW CHECK VALVE.
10. PVC MAY BE USED IN LIEU OF CAST AND COPPER FOR ABOVE GRADE DRAINAGE AND VENT. PVC-XFR, CAST OR COPPER MUST BE USED FOR DRAINAGE AND VENT LINES IN ALL CEILING SPACES.

MECHANICAL GENERAL NOTES:

1. FIRE STOP ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES.
2. NEW AND REUSED PENETRATIONS THROUGH MASONRY OR CONCRETE TO BE SLEEVED.
3. REMOVE ALL UNUSED EQUIPMENT, PIPING, DUCTWORK, ETC. CUT CAP AND MAKE SAFE.
4. PROVIDE CLEARANCE TO EQUIPMENT AS PER MANUFACTURERS RECOMMENDATIONS.
5. CO & NO2 CONTROLLERS TO BE FIELD VERIFIED. SUBMIT REPORT.
6. NEW THERMOSTATS, TEMPERATURE SENSORS, OPERATOR INTERFACE CONTROLLERS, ETC. TO BE INSTALLED AT MAXIMUM HEIGHT OF 47" (1200mm) ABOVE FINISHED FLOOR. COORDINATE ON SITE WITH ALL OTHER TRADES PRIOR TO ROUGH IN.
7. MOTORIZED DAMPER AT LOUVRES / EXTERIOR WALL / BUILDING PENETRATIONS TO BE LOW LEAK INSULATED TYPE EQUAL TO TAMCO 9000BF, PARALLEL BLADE. MOTORIZED DAMPERS IN INTERIOR SPACES AND/OR FLOW CONTROL APPLICATIONS TO BE LOW LEAK NON-INSULATED EQUAL TO TAMCO 1000, OPPOSED BLADE.

MECHANICAL LEGEND

- COLD WATER PIPING
- HOT WATER PIPING
- HOT WATER RECIRCULATION PIPING
- SANITARY SEWER BELOW
- SANITARY SEWER ABOVE
- STORM SEWER BELOW GRADE
- STORM SEWER ABOVE GRADE
- CONDENSER WATER SUPPLY
- COMPRESSED AIR PIPING
- GAS LINE
- CAPPED PIPING
- VENT THRU ROOF (SIZE AS INDICATED)
- UNIT HEATER
- PIPE DROP
- COMBINATION PIPE RISE AND DROP
- CLEAN OUT
- CLEAN OUT AT FLOOR LEVEL
- TRAP
- FLOOR DRAIN
- FUNNEL FLOOR DRAIN
- ROOF DRAIN
- HOSE BIB
- PUMP
- WATER OR GAS METER
- GATE VALVE
- THERMOSTAT, ELECTRIC
- BALANCING VALVE
- CHECK VALVE
- TRIPLE DUTY CHECK VALVE
- THERMOMETER
- BALL VALVE
- BACK FLOW PREVENTER
- DOOR GRILLE
- DUCT SECTION– POSITIVE PRESSURE
- DUCT SECTION– NEGATIVE PRESSURE
- DUCT WITH DIMENSIONS
- ACCOUSTICALLY LINED DUCT
- CHANGE OF ELEVATION– RISE(R), DROP(D)
- THERMALLY INSULATED DUCT
- DUCT TRANSITION
- TURNING VANES
- BACKDRAFT DAMPER– MULTI-BLADE WITH POSITION LOCKING
- MOTORIZED DAMPER
- FIRE DAMPER (PROVIDE ACCESS DOOR)
- EXHAUST/RETURN GRILLE OR REGISTER
- SUPPLY GRILLE OR REGISTER
- CEILING DIFFUSER, GRILLE OR REGISTER RECTANGULAR
- FIRE EXTINGUISHER
- AIR TERMINAL DESIGNATION X – TYPE, XX – AIR VOLUME (CFM)

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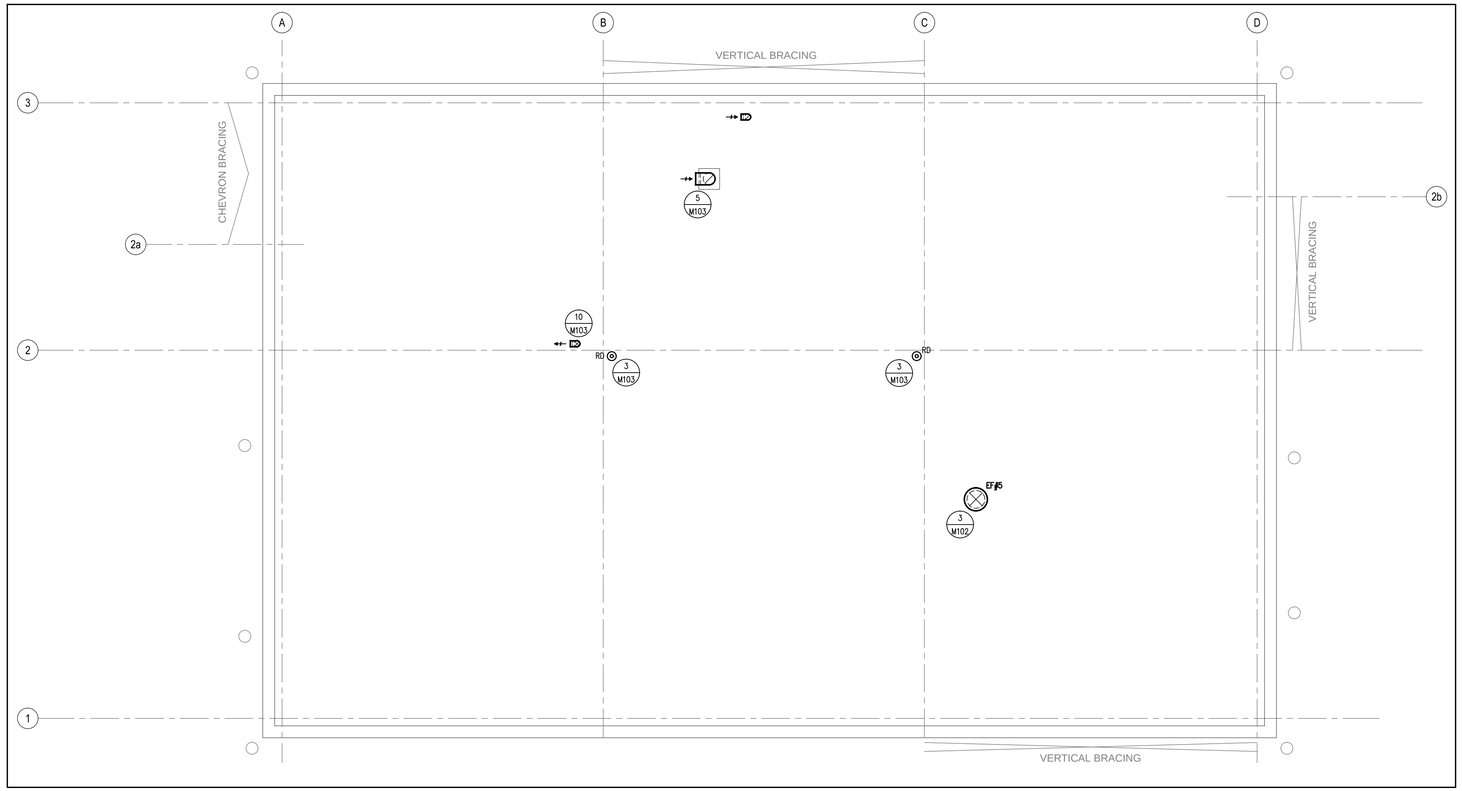
project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
MECHANICAL
PLUMBING & HVAC
FLOOR PLAN, LEGEND, & NOTES

drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: M101
plotted: March 20, 2024	



1 M102 Mechanical - Roof Plan
1/4" = 1'-0"

Unit Heater Schedule

No.	MODEL BY MODINE	AIR FLOW (CFM)	HEATING CAPACITY (IN / OUT)	MOTOR & POWER SUPPLY	NOTES
UH#1	HDS 75 AS0111FBAN	1160	75.0 MBH / 61.5 MBH	120V/SP/60Hz ½ HP	GAS-FIRED C/W REMOTE PROGRAMMABLE THERMOSTAT: **MODINE PRO1 T-715M**, 4"ø HORIZONTAL VENT KIT, VIBRATION ISOLATORS.

Heat Recovery Ventilator Schedule

No.	MODEL BY LIFEBREATH	ESP	SUPPLY AIR CFM	EXHAUST AIR CFM	FILTER	POWER SUPPLY	NOTES
HRV#1	267 MAX	0.5"	160	160	MERV 6 WASHABLE	120 V/SP/60Hz 2.1 A	C/W FAN (EXHAUST ONLY) DEFROST. WALL-MOUNT HRV CONTROLLER C/W 24/7 TIMER CLOCK IN MECHANICAL ROOM. **LIFEBREATH 99-DVPL03**. SET TIME CLOCK TO OPERATE FROM 7am TO 5pm. PROVIDE 2.5 kW - 208V/SP ELECTRIC REHEAT COIL C/W SCR CONTROLLER, DISCHARGE AIR TEMPERATURE SENSOR, AND REMOTE ADJUSTMENT MOUNTED IN CUSTODIAL ROOM.

Diffuser and Grille Schedule

NO.	DESCRIPTION	MODEL BY NAILOR	SIZE NECK/OVERALL	NOTES
1	ALUMINUM DOUBLE DEFLECTION GRILLE	51DH	6"x6"	C/W OBD
A	ALUMINUM RETURN GRILLE	5145H	6"x6	
B	ALUMINUM DOOR TRANSFER GRILLE	51DGD	12"x8"	
C	ALUMINUM CURVED SPIRAL DUCT GRILLE	51HC	8"x12" H	C/W OBD, ALUMINUM COLOUR

Exhaust Fan Schedule

No.	MODEL BY LOREN COOK	AIR FLOW (CFM)	ESP ("WC)	MOTOR & POWER SUPPLY	NOTES
EF#1	GC-148	100	0.25	120V/SP/60Hz 0.42 A	C/W FAN SPEED CONTROLLER (120V / 5A), **GEMINI** VIBRATION ISOLATION KIT, INTEGRAL BACKDRAFT DAMPER, & WHITE PLASTIC GRILLE. TERMINATE WITH WALL CAP C/W WIND GUARD AND DAMPER: **COOK WCR-6.**
EF#2	GC-148	100	0.25	120V/SP/60Hz 0.42 A	C/W FAN SPEED CONTROLLER (120V / 5A), **GEMINI** VIBRATION ISOLATION KIT, INTEGRAL BACKDRAFT DAMPER, & WHITE PLASTIC GRILLE. TERMINATE WITH WALL CAP C/W WIND GUARD AND DAMPER: **COOK WCR-6.**
EF#3	GC-148	100	0.25	120V/SP/60Hz 0.42 A	C/W FAN SPEED CONTROLLER (120V / 5A), **GEMINI** VIBRATION ISOLATION KIT, INTEGRAL BACKDRAFT DAMPER, & WHITE PLASTIC GRILLE. TERMINATE WITH WALL CAP C/W WIND GUARD AND DAMPER: **COOK WCR-6.**
EF#4	12XW40D17 (VF)	750	0.375	120V/SP/60Hz ¼ HP	DIRECT DRIVE ECM WALL FAN C/W FAN-MOUNTED SPEED CONTROL, MOTORIZED DAMPER, DISCONNECT, MOTOR-SIDE WIRE GUARD, WALL COLLAR, AND WEATHER HOOD.
EF#5	80C2B	400	0.375	120V/SP/60Hz ½ HP	ALL ALUMINUM SPARK-RESISTANT DOWNBLAST CENTRIFUGAL EXHAUST VENTILATOR C/W NEMA 3 DISCONNECT SWITCH, 24" HIGH ALUMINUM CURB WITH WELDED CAP CORNERS, ALUMINUM BIRDSCREEN, HINGED BASED KIT, & MOTORIZED DAMPER.

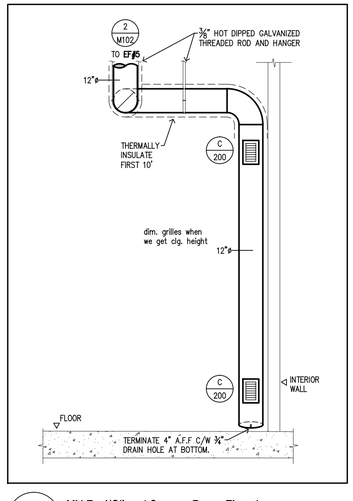
Plumbing Fixture Schedule

FIXTURE	MARKED	DRAIN	VENT	H.W.	C.W.	COMMENTS
WATER CLOSET	WC	4"	1-1/2"	----	1/2"	TO FLUSH TANK
COUNTER SINK	CS	1-1/2"	1-1/4"	1/2"	1/2"	
LAUNDRY TRAY	LT	1-1/4"	1-1/4"	1/2"	1/2"	
LAVATORY SINK	L	1-1/4"	1-1/4"	1/2"	1/2"	
FLOOR DRAIN	FD	3"	1-1/2"	----	1/2"	FROM PRIMER
HOSE BIBB	HB	----	----	3/4"	3/4"	

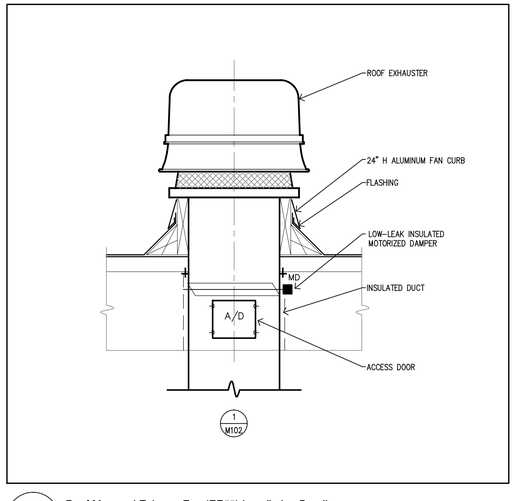
Air Conditioning Unit & Condensing Unit Schedule

No.	MODEL BY MITSUBISHI	COOLING CAPACITY (MBH)	HEATING CAPACITY (MBH)	POWER SUPPLY	WEIGHT (LBS)	DIMENSIONS (LxWxH)	NOTES
AC#1	SLZ-KF09NA1	9.00	11.0	208V/SP/60Hz MCA: 0.25A	31	24 13/32" x 24 13/32" x 9 27/32"	C/W CONDENSATE PUMP, & BACKLIT WALL-MOUNTED PROGRAMMABLE THERMOSTAT: **MITSUBISHI PAR-40MAAU.** LINK TO 2nd STAGE (BASEBOARD) HEAT VIA CONTROL INTERFACE: **MITSUBISHI MAC-334IF-E** C/W RELAY.
AC#2	SLZ-KF12NA1	12.0	13.0	208V/SP/60Hz MCA: 0.3A	31	24 13/32" x 24 13/32" x 9 27/32"	
AC#3	SLZ-KF12NA1	12.0	13.0	208V/SP/60Hz MCA: 0.3A	31	24 13/32" x 24 13/32" x 9 27/32"	
AC#4	SLZ-KF15NA1	14.1	18.0	208V/SP/60Hz MCA: 0.4A	31	24 13/32" x 24 13/32" x 9 27/32"	

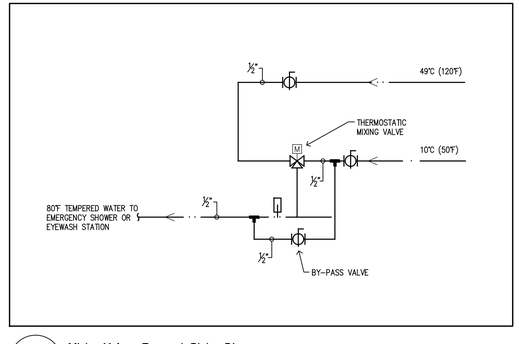
No.	MODEL BY MITSUBISHI	COOLING CAPACITY MBH	HEATING CAPACITY (@ -15°C)	SEER / EER	POWER SUPPLY	WEIGHT LBS	DIMENSIONS	NOTES
CU#1	MXZ-8C48NAHZ	48.0	54.0 MBH	20.0 / 12.2	208V/SP/60Hz/ MCA: 42	278	41 13/32" W x 14" D x 52 7/16" H	REFRIGERATION LINES SIZED BY UNIT MANUFACTURER. C/W DISCONNECT SWITCHES, STARTERS, CONTROL WIRING, AND R410A REFRIGERANT. HEATING OPERATION TO BE DOWN TO -25°C.



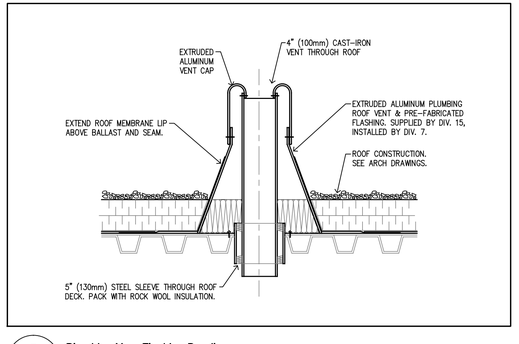
2 M102 MV Fuel/Oil and Storage Room Elevation
N.T.S.



3 M102 Roof Mounted Exhaust Fan (EF#5) Installation Detail
N.T.S.



4 M102 Mixing Valve - Eyewash Piping Diagram
N.T.S.



5 M102 Plumbing Vent Flashing Detail
N.T.S.

ISSUED FOR TENDER	2024.03.20
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

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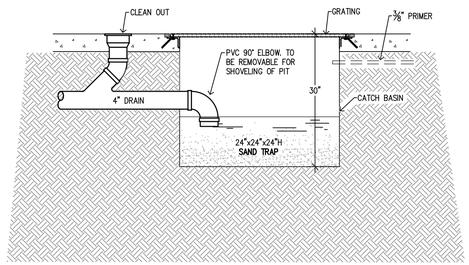
project
ONTC HEARST
MECHANICAL SHOP

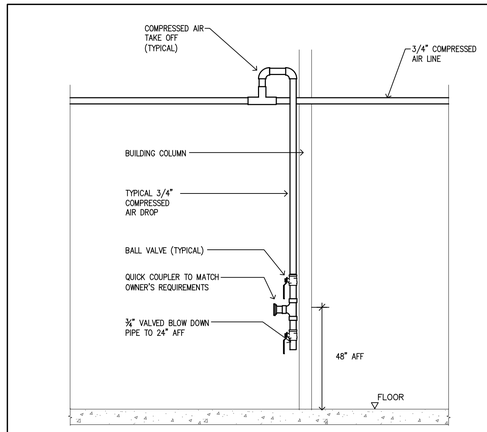
HEARST ONTARIO

title
MECHANICAL
PLUMBING & HVAC
ROOF PLAN, SCHEDULES & DETAILS

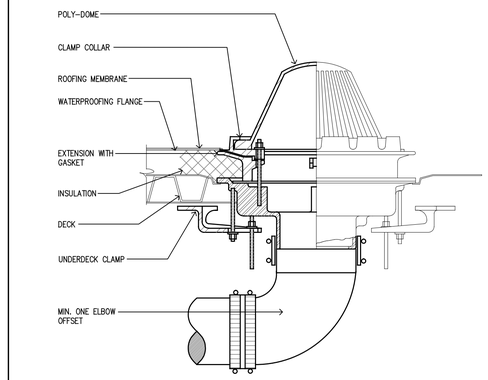
drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: M102
plotted: March 20, 2024	



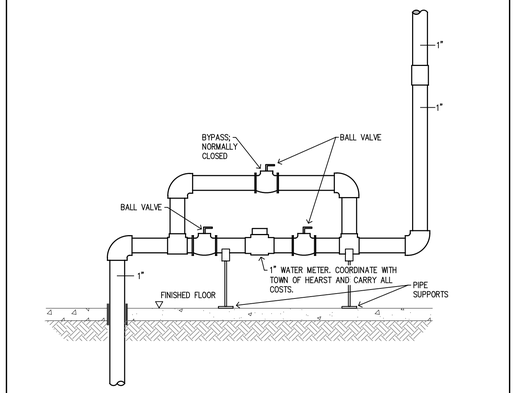
1 M103 **Sand Trap Details** N.T.S.



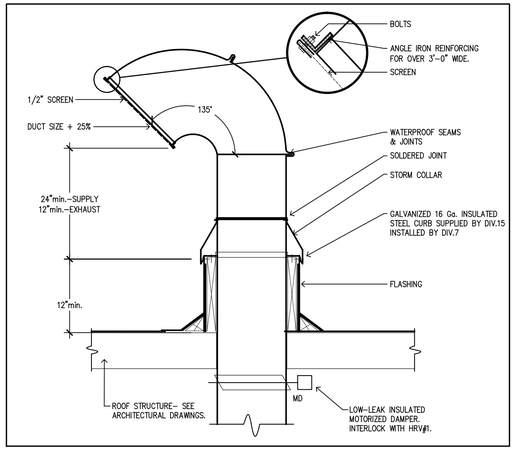
2 M103 **Compressed Air Drops (Typical)** N.T.S.



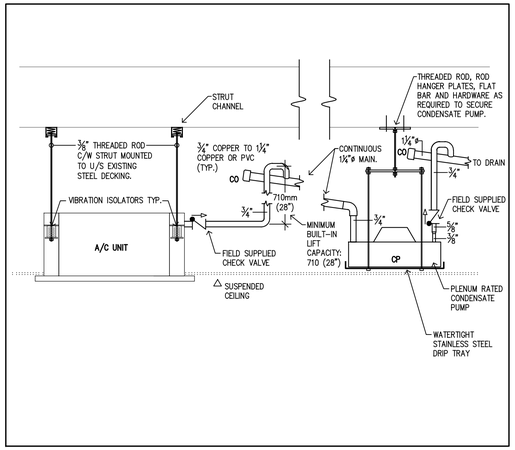
3 M103 **Standard Roof Drain Detail** N.T.S.



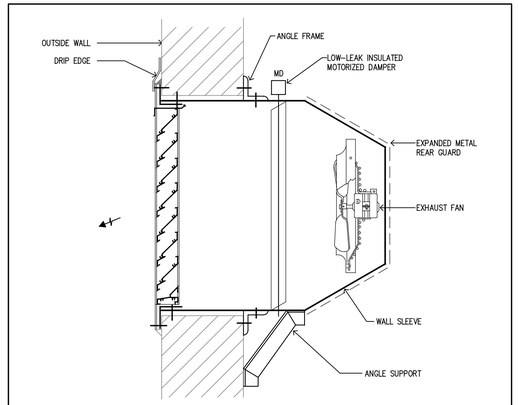
4 M103 **Water Meter Installation Detail** N.T.S.



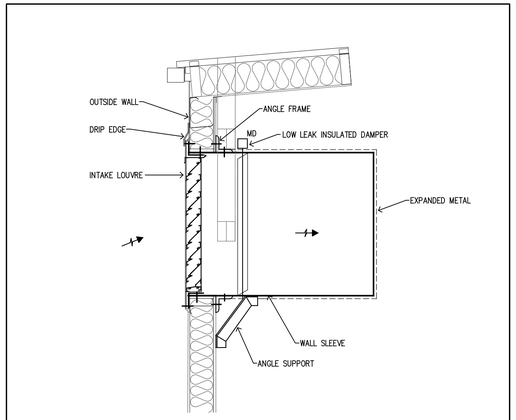
5 M103 **Intake / Exhaust Gooseneck Detail** N.T.S.



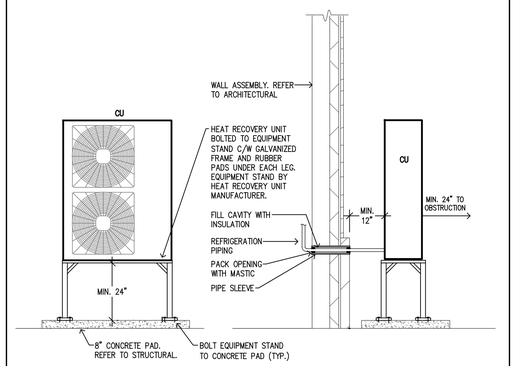
6 M103 **Typical Cassette A/C Unit & Condensate Pump Installation Detail** N.T.S.



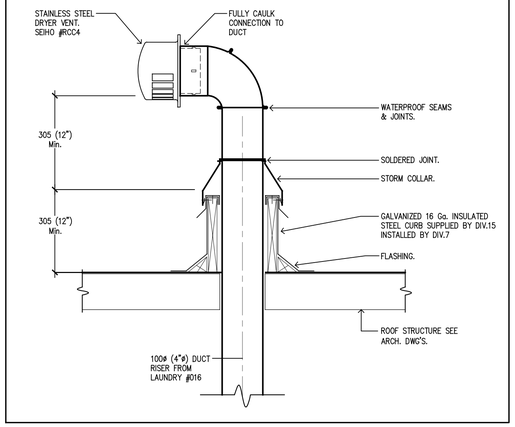
7 M103 **Exhaust Fan Mounting Detail (EF#4)** N.T.S.



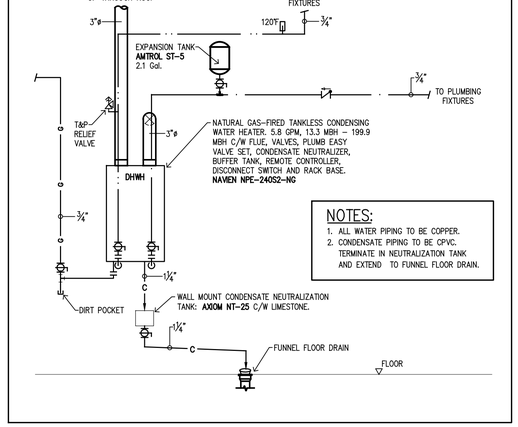
8 M103 **Intake Louvre Detail** N.T.S.



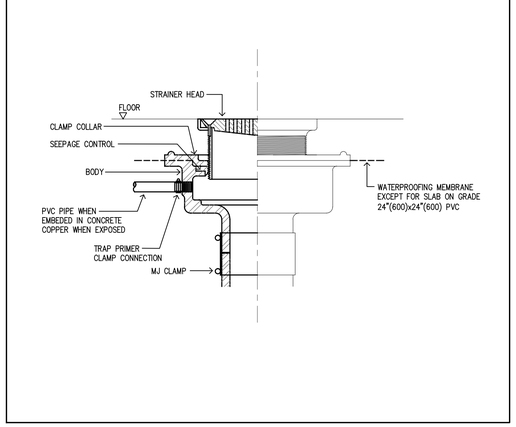
9 M103 **CU#1 Mounting and Refrigeration Piping Through Wall Detail** N.T.S.



10 M103 **Dryer Exhaust Gooseneck Detail** N.T.S.



11 M103 **DHWH#1 Piping Diagram** N.T.S.



12 M103 **Floor Drain Detail** N.T.S.

ISSUED FOR TENDER	2024.03.20
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

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project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
MECHANICAL
PLUMBING & HVAC
DETAILS

drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: M103
plotted: March 20, 2024	

ELECTRICAL LEGEND

	LIGHTING FIXTURE, CLG MTD (TYPE AS NOTED), HATCHING DENOTES UNSWITCHED
X	WALL MOUNTED LIGHT FIXTURE (TYPE AS INDICATED), HATCHING DENOTES UNSWITCHED
X	STRIP LIGHTING FIXTURE (TYPE AS INDICATED)
$	120V WALL MOUNTED SWITCH UNLESS OTHERWISE SPECIFIED
$3	120V THREE WAY WALL MOUNTED SWITCH
$4	120V FOUR WAY WALL MOUNTED SWITCH
$D1	SINGLE ZONE CAT5 CONNECTED, 0-10V WALL MOUNTED DIMMER SWITCH WITH ON/OFF CONTROL
$LV	WALL MOUNTED CAT5 CONNECTED SWITCH WITH ON/OFF CONTROL
$PL	MOTOR RATED SWITCH WITH PILOT LIGHT
$M	MOTOR RATED SWITCH
	OCCUPANCY SENSOR- WALL MOUNTED - TYPE AS NOTED
	OCCUPANCY SENSOR- CEILING MOUNTED OR INTEGRATED - TYPE AS NOTED
P	PHOTOCELL CONTROL
	SINGLE REMOTE EMERGENCY LIGHTING HEAD WALL MOUNTED
	DUAL REMOTE EMERGENCY LIGHTING HEAD WALL MOUNTED
EEP/X	COMBINATION PICTOGRAM EXIT/EMERGENCY LIGHT
	PICTOGRAM EXIT LIGHT, WALL MOUNTED, SELF POWERED. WIRE TO EMERGENCY LTG CIRCUIT.
	PICTOGRAM EXIT LIGHT, WALL MOUNTED. WIRE TO EMERGENCY BATTERY PACK AS NOTED AND EXIT LTG CIRCUIT.
POW	UNDERGROUND ELECTRICAL SERVICE
COM	OVERHEAD COMMUNICATION SERVICE
O/H	OVERHEAD ELECTRICAL SERVICE
	DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE 5-20R 20A T-SLOT
	DUPLEX RECEPTACLE 5-20R 20A T-SLOT MOUNTED ABOVE COUNTER
	GROUND FAULT DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
	SPECIAL RECEPTACLE AS NOTED
	WELDING RECEPTACLE WITH DISCONNECT
EP/X	ELECTRICAL PANEL, SURFACE MOUNTED (DESIGNATION AS SHOWN)
OR	TRANSFORMER
JB	JUNCTION BOX MOUNTED IN CEILING SPACE COMPLETE WITH COVER PLATE
WAP	WIRELESS ACCESS POINT - PROVIDE A CAT6 CABLE, TERMINATED IN A OUTLET BOX LOCATED IN ACCESSIBLE CEILING FOR CONNECTION OF A WIRELESS NETWORK ADAPTER. CONFIRM EXACT LOCATION ON SITE PRIOR TO ROUGH-IN.
	SAFETY DISCONNECT SWITCH - UNFUSED
	SAFETY DISCONNECT SWITCH - FUSED
	DIRECT CONNECTION FOR EQUIPMENT
MD	MOTORIZED DAMPER
	MOTOR CONNECTION
	ELECTRIC BASEBOARD HEATER
	VOICE/DATA OUTLET C/W ONE DATA JACKS & 1 VOICE JACK AND A 21mm CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE.
	VOICE/DATA OUTLET C/W ONE DATA JACKS & 1 VOICE JACK AND A 21mm CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE. OUTLET TO BE MOUNTED ABOVE COUNTER
	OUTDOOR LIGHTING TIMER
	THERMOSTAT- LINE VOLTAGE
LV	THERMOSTAT- ELECTRONIC LOW VOLTAGE
ACU#X	AIR CONDITIONING UNIT (DESIGNATION AS SHOWN)
CU#X	CONDENSING UNIT (DESIGNATION AS SHOWN)
EF#X	EXHAUST FAN (DESIGNATION AS SHOWN)
HRV#X	HEAT RECOVERY VENTILATOR (DESIGNATION AS SHOWN)
UH#X	UNIT HEATER (DESIGNATION AS SHOWN)
GFI	GROUND FAULT DEVICE
AFF	CENTERLINE DEVICE MOUNTING HEIGHT ABOVE FINISHED FLOOR
AFG	CENTERLINE DEVICE MOUNTING HEIGHT ABOVE FINISHED EXTERIOR GRADE
C	MOUNTED ON CEILING
HK	HOUSEKEEPING DEVICE
WG	WIRE GUARD
	POWER POLE
R	EXISTING DEVICE TO BE REMOVED
E	EXISTING DEVICE TO REMAIN

PANEL DESIGNATION

DP201#2

- CIRCUIT NUMBER
- PANEL NUMBER
- VOLTAGE LEVEL
  - 20=208V
  - 40=480V
  - 60=600V
- PANEL TYPE
  - DP=DISTRIBUTION PANEL
  - BP=BRANCH PANEL

EXAMPLE: BP201#2 = BRANCH PANEL, 208V, PANEL 1, BREAKER 2.

ELECTRICAL GENERAL NOTES:

1. ENTIRE INSTALLATION SHALL BE IN ACCORDANCE WITH THE ONTARIO ELECTRICAL SAFETY CODE.
2. ELECTRICAL CONTRACTOR IS TO OBTAIN ALL APPROVALS FROM LOCAL ELECTRICAL SAFETY AUTHORITY PRIOR TO COMMENCING WORK.
3. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH NORTH SHORE ENGINEERING DRAWINGS. ENSURE ALL REQUIREMENTS ARE COORDINATED AND CARRIED.
4. ALL DEVICES SHOWN ARE NEW, UNLESS OTHERWISE NOTED.
5. FIRE STOP ALL PENETRATIONS THRU FIRE RATED ASSEMBLIES.
6. ALL WIRING TO BE CONCEALED WHERE POSSIBLE. IF NOT POSSIBLE, PROVIDE SURFACE MOUNTED METAL RACEWAY AND MATCHING SURFACE MOUNTED BOX. RACEWAY TO BE SAME COLOUR AS BACKGROUND SURFACE, AND BE RAN AS NEAT AS POSSIBLE, PARALLEL / PERPENDICULAR TO BUILDING LINES.
7. PROVIDE STAINLESS STEEL COVERPLATES FOR ALL WIRING DEVICES, INCLUDING NEW UN-USED WALL BOXES.
8. THE EXISTING BUILDING IS CURRENTLY LOCATED WITHIN A HIGH SEISMIC AREA. THE ELECTRICAL CONTRACTOR SHALL CARRY THE SERVICES OF A PROFESSIONAL SEISMIC ENGINEER TO PROVIDE A DETAILED DESIGN OF ALL SEISMIC CONTROL MEASURES. ELECTRICAL CONTRACTOR SHALL ALSO CARRY THE COST FOR THE SUPPLY AND INSTALLATION OF ALL SUCH SECURITY MEASURES. REFER TO SPECIFICATION SECTION 15071 FOR GENERAL REQUIREMENTS AND SEISMIC ENGINEER QUALIFICATIONS.

POWER GENERAL NOTES:

1. PROVIDE BONDING CONDUCTOR AND CONNECTION (AS PER OESC) FOR ALL PERMANENTLY CONNECTED EQUIPMENT. COORDINATE EXACT REQUIREMENTS ON SITE.
2. BRANCH CIRCUIT WIRING IN CONCEALED SPACES TO BE INSTALLED IN CONDUIT. REFER TO THE SPECIFICATIONS ON THE MAXIMUM LENGTH OF ARMOURED CABLES THAT CAN BE USED.
3. COORDINATE EXACT LOCATION OF ALL DEVICES ON SITE WITH MILLWORK, FURNITURE AND EQUIPMENT SHOWN ON ARCHITECTURAL PLANS, PRIOR TO ROUGH-IN.
4. ALL DRY-TYPE TRANSFORMERS ARE GENERAL PURPOSE TYPE, UNLESS OTHERWISE NOTED.
5. ENSURE A MINIMUM OF 1M CLEARANCE IS MAINTAINED IN FRONT OF ALL PANELS, DISCONNECT SWITCHES.
6. PROVIDE CLEAR LABELS ON ALL WIRING DEVICES INDICATING PANEL AND CIRCUIT NUMBERING, (FOR EXAMPLE PNL#A CCT 11.)
7. ALL VOICE / DATA OUTLETS TO BE COMPLETE WITH 27mm CONDUIT TO ACCESSIBLE CEILING SPACE, ALL CABLES TO BE PROVIDED BY ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.
8. ALL VOICE, DATA IN CEILING SPACE TO BE SUPPORTED BY J-HOOKS. REFER TO DIVISION 16 FASTENING AND SUPPORT SPECIFICATIONS FOR FURTHER DETAILS.
9. ALL VOICE AND DATA TO BE PULLED TO MECHANICAL ROOM 104 I.T. CABINET.
10. PROVIDE ROUGH-IN FOR 4 OUTSIDE SECURITY CAMERAS.

LIGHTING GENERAL NOTES:

1. DASHED LINES JOINING FIXTURES, SENSORS, AND SWITCHES INDICATE THE FIXTURES THAT ARE CONTROLLED BY EACH SENSOR AND SWITCH.
2. COORDINATE INSTALLATION OF EXIT SIGNS WITH CEILINGS TO ENSURE ADEQUATE HEIGHT IS MAINTAINED.
3. EMERGENCY LIGHTING SHALL BE INSTALLED IN SUCH A MANNER THAT IT WILL BE AUTOMATICALLY ACTUATED UPON FAILURE OF THE POWER SUPPLY TO THE NORMAL LIGHTING IN THE AREA COVERED BY THAT UNIT EQUIPMENT. PROVIDE VOLTAGE SENSING RELAY AS REQUIRED.
4. ALL LIGHTING FIXTURES SHALL BE INDEPENDENTLY SUPPORTED TO THE STRUCTURE BY PROVIDING TWO CHAINS INSTALLED AT EACH OPPOSITE CORNER. COORDINATE EXACT REQUIREMENTS ON SITE.
5. CONTRACTOR IS RESPONSIBLE FOR ALL CONTROLS TERMINATIONS, NO SPLICES ARE PERMITTED IN CONTROL WIRING.
6. POWER AND CONTROL CONDUCTORS MUST NOT SHARE THE SAME RACEWAY OR CONDUIT EXCEPT WHERE SPECIALIZED CABLE TYPES ARE USED THAT SUPPORT SUCH INSTALLATIONS.
7. LOW VOLTAGE CABLE MUST BE INSTALLED AT LEAST 12 INCHES FROM ALL LINE VOLTAGE CONDUCTORS EXCEPT TO CROSS OR MAKE TERMINATIONS CAT. 5 CABLES MUST BE KEPT AWAY FROM ALL EMF DEVICES SUCH AS BALLASTS OR TRANSFORMERS.

ELECTRICAL DRAWING NOTES:

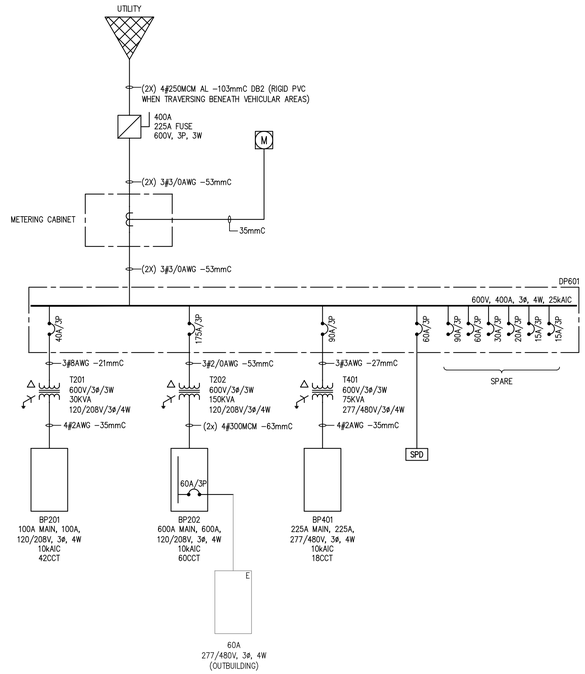
1. PROVIDE NEW 400A, 600V SERVICE FROM HYDRO POLE #11 AS SHOWN. COORDINATE ALL WORK WITH HEARST POWER. REFER TO ELECTRICAL SERVICE GENERAL NOTES.
2. PROVIDE METER BASE TO HEARST HYDRO STANDARDS & 35mmC FROM METER BASE TO METERING CABINET
3. PROVIDE 120V, 20A, 5-20R, GFI RECEPTACLE, C/W WEATHER-PROOF, LOCKABLE, RAIN-TIGHT WHILE-IN-USE CLEAR COVER, MARKED 'EXTRA DUTY', SUITABLE FOR GFI OUTLET, EQUAL TO LEVITON 5977-CL SERIES
4. SEISMIC RATED MOUNTING REQUIRED.
5. PROVIDE 19MM PLYWOOD BACKBOARD TO SUPPORT EQUIPMENT.
6. PROVIDE NEW I.T. RACK, HAMMOND MANUFACTURING MODEL# HWM2412U20BK OR APPROVED EQUAL. PROVIDE TWO 5R-20 RECEPTACLES TO BE INSTALLED BEHIND FOR IT RACK. MOUNT 86"AFF TO BOTTOM OF RACK SO THAT RACK CAN SWING OPEN ABOVE DOOR WAY.
7. FEED FROM EXHAUST FAN LOCATED IN SAME ROOM WITH 2#12AWG-16mmC
8. LOCATE UNDERGROUND FEED TO JIB CRANE, TIE INTO WEATHER PROOF JUNCTION BOX AND PROVIDE NEW FEED FROM JB TO PANEL BP202.
9. ALL LIGHT AND SENSOR WIRING, CONNECTORS AND BOXES IN THIS ROOM TO BE VAPOUR/WATER TIGHT.
10. LOCATE UNDERGROUND FEED TO OUTBUILDING PANEL, TIE INTO WEATHER PROOF JUNCTION BOX AND PROVIDE NEW FEED FROM JB TO PANEL BP202.
11. LIGHTS ARE TO BE FASTENED TO UNI-STRUT. UNI-STRUT SHALL BE HUNG BY 3/8" THREADED ROD USING BEAM CLAMPS TO BUILDING ROOF STRUCTURE. ALLOW ONE 10FT PIECE OF STRUT PER TWO FIXTURES.
12. PROVIDE 120V HAZARDOUS LOCATION ZONE 2 LIGHT SWITCH EQUAL TO EATON GHG273 SERIES.
13. PROVIDE 53mmC POWER CONDUIT WITH PULL CORD. PROVIDE 35mm COMMUNICATION CONDUIT WITH PULL CORD FROM COMMUNICATIONS BACKBOARD. COORDINATE ALL ELECTRICAL REQUIREMENTS WITH CHARGER MANUFACTURER INSTALLATION INSTRUCTIONS. PROVISION OF VEHICLE CHARGING STATION IS BY OWNER
14. WIRE SECOND RELAY CONTACT TO EXHAUST FAN
15. PROVIDE JUNCTION BOX FOR CONNECTION TO HEAT TRACE FOR STORM OVERFLOW PIPE. REFER TO DETAIL 4-ME101. PROVIDE FEED FROM PANEL BP201. PROVIDE HEAT TRACE SYSTEM, TO BE EQUAL TO SERGE BARL 8CCA, 8W/FT SELF-REGULATING HEATING CABLES, POWER CONNECTION KIT P/N PST-P-I, AND TEMPERATURE CONTROL P/N TLE-4X40. TEMPERATURE SENSOR BULB SHALL BE INSTALLED ON OPPOSITE SIDE OF HEATING CABLE ON PIPE. REFER TO INSTALLATION AND MAINTENANCE GUIDE FOR ALL INSTALLATION REQUIREMENTS.

SINGLE LINE LEGEND

- MOULDED CASE CIRCUIT BREAKER (MCCB)
- BUS DUCT
- TRANSFORMER, DELTA-WYE, SOLIDLY GROUNDED
- OUTLINE OF ENCLOSURE
- ELECTRICAL PANEL
- DISCONNECT SWITCH, FUSED
- M - HYDRO METER
- SPD - SURGE PROTECTION DEVICE

ELECTRICAL SINGLE LINE GENERAL NOTES:

1. ALL CABLES SHOWN ARE TO BE COPPER UNLESS OTHERWISE NOTED.
2. NOT ALL BREAKERS ARE SHOWN ON THIS SINGLE LINE DIAGRAM. REFER TO PANEL SCHEDULES FOR ALL BREAKERS AND ASSOCIATED LOADS.
3. CONDUIT CANNOT BE USED AS A GROUND. PROVIDE AN ADDITIONAL GROUNDING WIRE AS PER THE SPECIFICATIONS.
4. SPD ACCEPTABLE PRODUCT: INNOSYS POWER MODEL# TK-ST200-3Y600-LB. BREAKER FEEDING SPD SHALL BE SIZED BY SPD MANUFACTURER. SPD SHALL BE EXTERNALLY MOUNTED. CABLING MUST BE KEPT AS SHORT AS POSSIBLE WITH MINIMAL BENDS.



1 / E101 Power - Single Line Diagram
N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

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project
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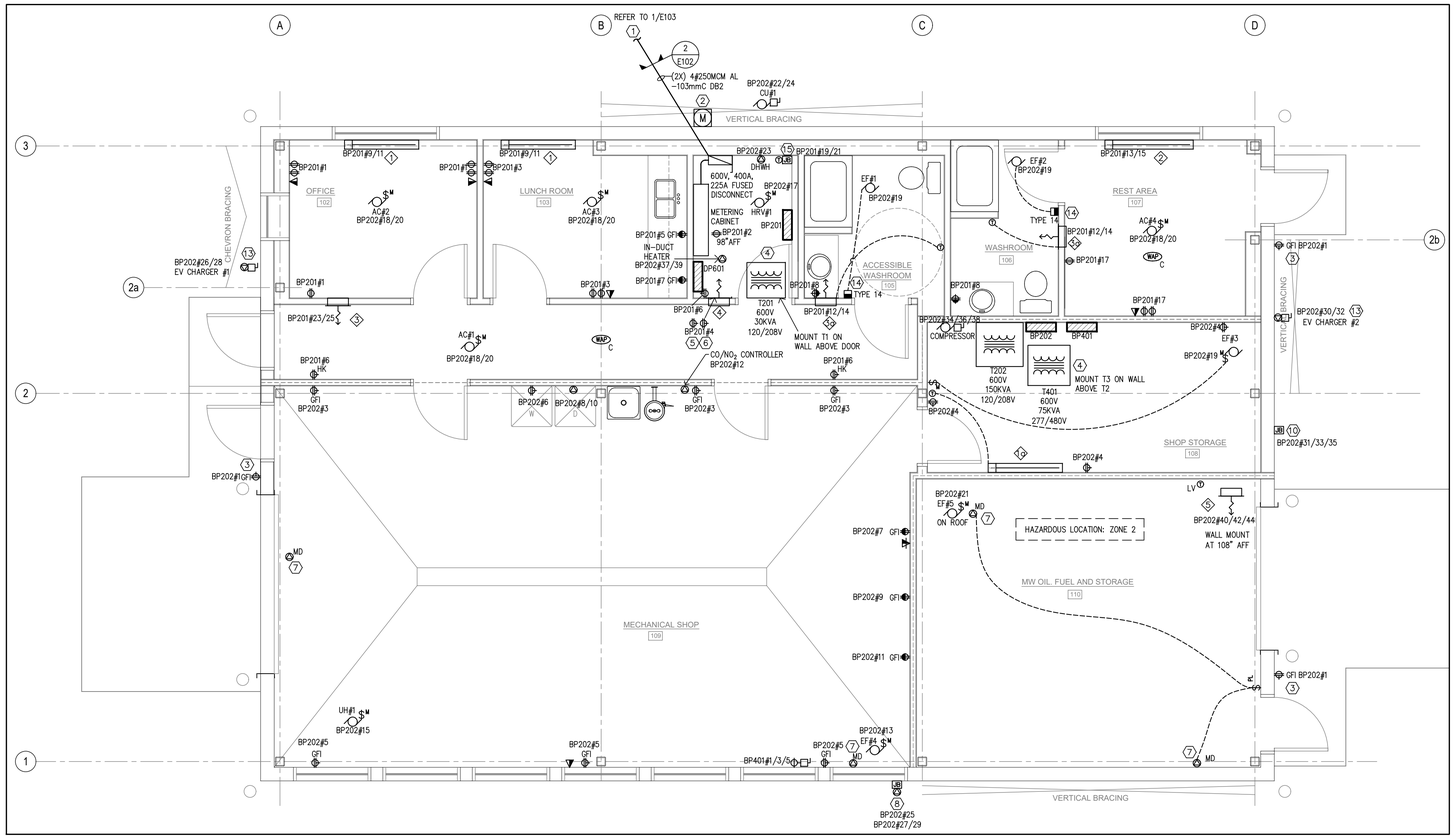
MECHANICAL SHOP
HEARST ONTARIO

title
ELECTRICAL
POWER
NOTES & LEGEND
SINGLE LINE DIAGRAM

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E101
plotted: March 22, 2024	



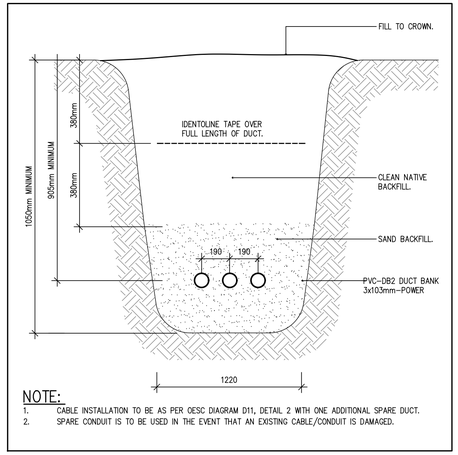
1 / E102 **Power - Main Floor Plan Proposed**

1/4" = 1'-0"

Electric Heater Schedule

No.	DESCRIPTION	MAKE & MODEL	CAPACITY (kW)	SIZE mm (in)	VOLTAGE	NOTES
1	BASEBOARD HEATER	OUELLET OFM1008	1.0	1206 (47½)	208V SP	C/W 24V RELAY
1a	BASEBOARD HEATER	OUELLET OFM1008	1.0	1206 (47½)	208V SP	C/W ELECTRONIC PROGRAMMABLE THERMOSTAT, 24V RELAY WITH TRANSFORMER
2	BASEBOARD HEATER	OUELLET OFM1258	1.25	1448 (57)	208V SP	C/W 24V RELAY
3	FORCED FAN HEATER	OUELLET OAWH04000-TAV	3.0	410 (16⅛) X 561 (22⅛)	208V SP	C/W 24V RELAY
3a	FORCED FAN HEATER	OUELLET OAWH02000-TAV	1.5	410 (16⅛) X 561 (22⅛)	208V SP	C/W ELECTRONIC PROGRAMMABLE THERMOSTAT, 24V RELAY WITH TRANSFORMER
4	FORCED FAN HEATER	OUELLET OAWH01500-TAV	1.0	410 (16⅛) X 561 (22⅛)	208V SP	C/W BUILT-IN THERMOSTAT
5	FORCED FAN HEATER	OUELLET OHX10038	10	663 (26 ⅛) X 483 (19) X 566 (22 ⅜)	208V 3PH	C/W EXPLOSTION PROOF ELECTRONIC PROGRAMMABLE THERMOSTAT (24V), CONTACTOR, TRANSFORMER, WALL MOUNT BRACKET, BUILT-IN DISCONNECT SWITCH

NOTES:
1. REMOTE THERMOSTAT: LOW VOLTAGE ELECTRONIC PROGRAMMABLE – OUELLET #OTH24-AFR.



NOTE:
1. CABLE INSTALLATION TO BE AS PER OESC DIAGRAM D11, DETAIL 2 WITH ONE ADDITIONAL SPARE DUCT.
2. SPARE CONDUIT IS TO BE USED IN THE EVENT THAT AN EXISTING CABLE/CONDUIT IS DAMAGED.

2 / E102 **Duct Bank Detail**

N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A / B detail no. / sheet no. where detailed

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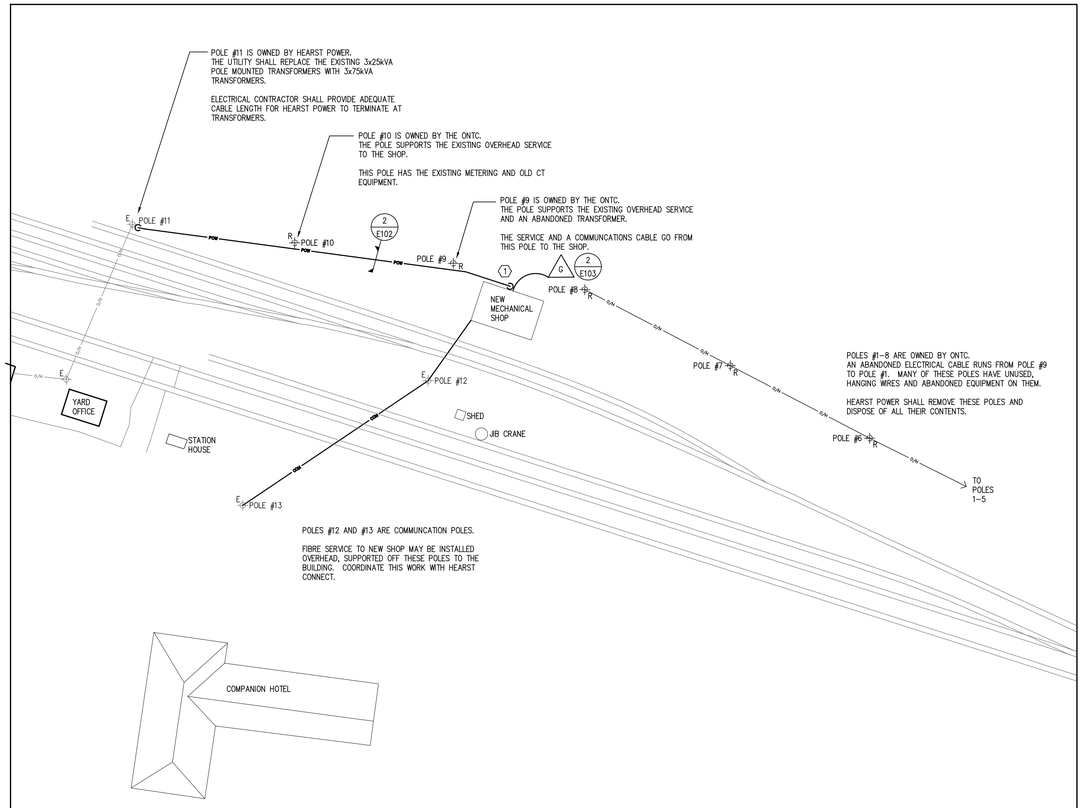
project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
ELECTRICAL
POWER
MAIN FLOOR PLAN

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E102
plotted: March 22, 2024	



1 E103 **Power - Site Plan - Removals & Proposed**

1/64" = 1'-0"

ELECTRICAL SERVICE GENERAL NOTES:

1. LOCAL HYDRO UTILITY IS HEARST POWER.

2. ALL ELECTRICAL WORK SHOWN IS BY ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.

3. CONFIRM EXACT REQUIREMENTS FROM LOCAL HYDRO UTILITY, PRIOR TO COMMENCING ANY SITE ELECTRICAL WORK.

4. ALL WORK THAT IS UNDER THE SCOPE OF LOCAL HYDRO UTILITY, INCLUDES:

4.1. POLE MOUNT TRANSFORMER(S);
4.2. PRIMARY PROTECTION, TERMINATION'S, CUTOUTS AND ARRESTERS;
4.3. PRIMARY CONNECTIONS AND PRIMARY TESTING;
4.4. SECONDARY CONNECTORS (UP TO / INCLUDING 500MCM)
4.5. APPLICATION FOR MUNICIPAL CONSENT.

ALL ASSOCIATED COSTS ARE BY CASH ALLOWANCE.

5. ALL REMAINING INCOMING ELECTRICAL SERVICE WORK THAT IS UNDER THE SCOPE OF THE ELECTRICAL CONTRACTOR INCLUDES:

5.1. SECONDARY DUCT BANK;
5.2. SECONDARY CABLES;
5.3. SECONDARY CONNECTORS OVER 500 MCM;
5.4. GROUNDING;
5.5. METER BASE TO HEARST POWER STANDARDS;
5.6. DEDICATED PHONE LINE FOR HYDRO METER;
5.7. ALL RELOCATION / REVISION TO UTILITIES
5.8. ESA INSPECTION.

6. SECONDARY DUCTS TO BE INSTALLED AS PER OESC DIAGRAM D11 DETAIL 2.

7. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF INCOMING HYDRO. ELECTRICAL CONTRACTOR TO CONTACT LOCAL UTILITIES DIRECTLY, ARRANGE FOR NEW SERVICE AND CONFIRM ALL REQUIREMENTS. PROVIDE UPDATE TO ENGINEER PRIOR TO COMMENCING ANY SITE ELECTRICAL WORK.

8. FOR ALL UNDERGROUND DUCT BANKS, PROVIDE CONTINUOUS RED PLASTIC MARKER TAPE(S) WITH BLACK LETTERS IDENTIFYING THE POWER LINES UNDERGROUND INSTALLATION WITH THE FOLLOWING CRITERIA: PLACED APPROXIMATELY HALF WAY BETWEEN THE INSTALLATION AND GRADE LEVEL INSTALLED COVERING THE WIDTH OF THE INSTALLATION AND, WHERE MULTIPLE MARKER TAPES ARE REQUIRED TO COVER THE WIDTH OF THE INSTALLATION, MARKER TAPES SHALL BE PERMITTED TO BE PLACED A MAXIMUM OF 600mm APART.

9. PROVIDE PULL CORDS IN SPARE CONDUITS AS SHOWN ON THE DRAWING.

10. ANY EXPOSED EXTERIOR CONDUIT ABOVE THE GROUND SHALL BE RIGID PVC TO PROTECT FROM MECHANICAL DAMAGE.

11. ALUMINUM CONDUCTORS ARE PERMITTED FOR SERVICE ENTRANCE ONLY. ALL UNDERGROUND WIRING TO BE RWU-90.

12. SECONDARY SERVICE ENTRANCE DUCT BANK TRAVERSING BENEATH VEHICULAR AREAS SHALL BE RIGID PVC.

13. COORDINATE TELEPHONE AND DATA SERVICE WITH HEARST CONNECT. CONTACT MARC DUFRESNE AT 705-372-8104.

ELECTRICAL DEMOLITION NOTES:

1. DISCONNECT CURRENT SERVICE FEEDS TO BUILDING AND MAKE SAFE. COORDINATE WITH HEARST POWER.

2. DISCONNECT FEEDS TO OUT BUILDING AND JIB CRANE. PULL BACK PAST NEW BUILDING AREA AND MAKE SAFE.

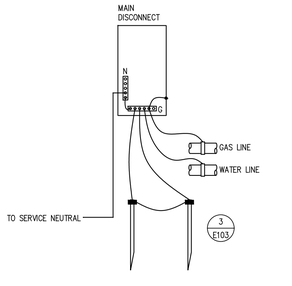
3. POLES #1-10 TO BE REMOVED BY HEARST POWER AND DISPOSE OF ABANDONED EQUIPMENT.

GROUNDING ROD DETAIL DRAWING NOTES:

1. NOT ALL DEVICES OR PANELS ARE SHOWN.

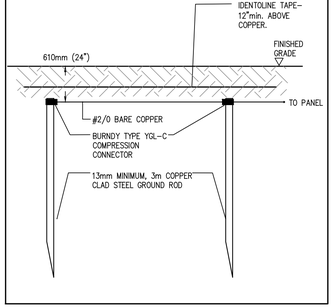
2. NOT ALL GROUNDING AND BONDING ARE SHOWN ON THIS SCHEMATIC. PROVIDE GROUNDING AND BOUNDING AS PER ONTARIO ELECTRICAL SAFETY CODE 2021.

3. SIZE ALL GROUNDING AND BONDING AS PER ONTARIO ELECTRICAL SAFETY CODE 2021 OESC).



2 E103 **Grounding Rod Detail**

N.T.S.



3 E103 **Service Equipment Ground Schematic**

N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

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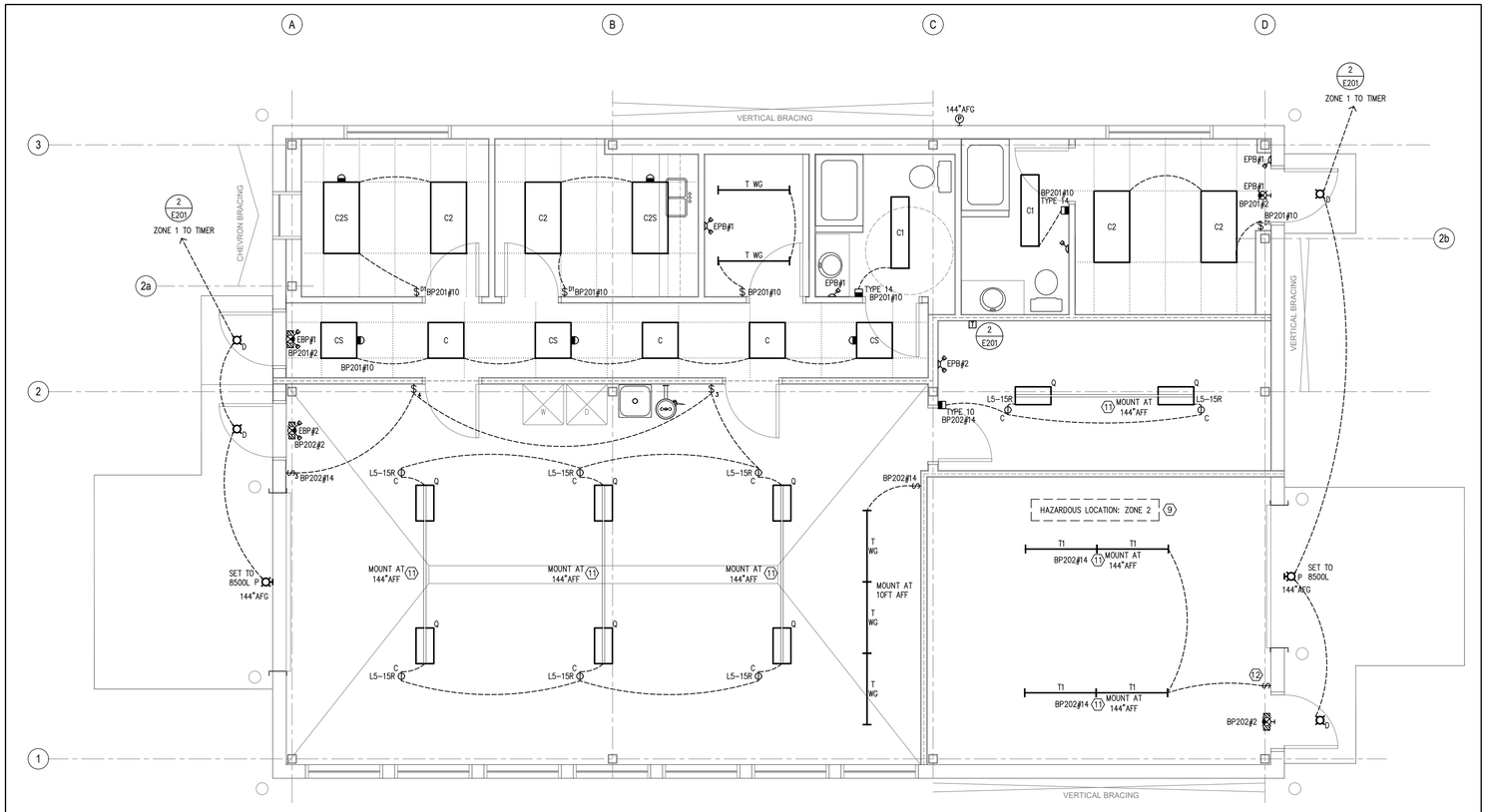
project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
ELECTRICAL
POWER
SITE PLAN

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E103
plotted: March 22, 2024	



1 E201 — Lighting - Main Floor Plan Proposed

1/4" = 1'-0"

Lighting Control Schedule

LOCATION(S)	ON	LIGHT LEVEL ON	OFF-DELAY	LIGHT LEVEL OFF	NOTES
OFFICE/LUNCHROOM	MANUAL	LAST SETPOINT	AUTO. – 10 MIN.	0%	
HALL	AUTO	100%	AUTO. – 30 MIN.	0%	
SHOP STORAGE	AUTO	100%	AUTO. – 10 MIN.	0%	
WASHROOMS	AUTO	100%	AUTO. – 10 MIN.	0%	
FUEL/STORAGE	AUTO	100%	AUTO. – 10 MIN.	0%	
MECH / SHOP	MANUAL	N/A	N/A	N/A	
CREW REST	MANUAL	N/A	N/A	N/A	

NOTES:

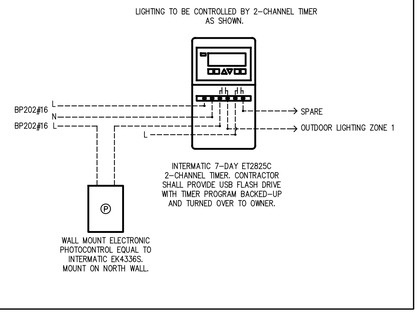
1. COORDINATE ALL SETTINGS WITH LIGHTING MANUFACTURER'S REPRESENTATIVE PRIOR TO ORDERING.
2. DASHED LINES JOINING FIXTURES, SENSORS, AND SWITCHES INDICATE THE FIXTURES THAT ARE CONTROLLED BY EACH SENSOR AND SWITCH. WHERE AN INTEGRATED SENSOR IS SHOWN CONTROLLING MORE THAN ONE FIXTURE, SOME MANUFACTURERS REQUIRE A SENSOR IN EVERY FIXTURE. A STANDALONE SENSOR IS ALSO ACCEPTABLE.

Lighting Schedule

FIXTURE TYPE	DESCRIPTION	LUMENS	COLOUR TEMP	WATTAGE	VOLTAGE	MOUNTING	DIMMING	CONTROLS	OPTIONS	ACCEPTABLE PRODUCTS
C	2X2 VOLUMETRIC TROFFER	4000	4000K	15.8	120V	RECESSED T-BAR	0-10V TO 1%	nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
CS	2X2 VOLUMETRIC TROFFER	4000	4000K	15.8	120V	RECESSED T-BAR	0-10V TO 1%	INTEGRAL PIR SENSOR & nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
C1	1X4 VOLUMETRIC TROFFER	3000	4000K	22.7	120V	RECESSED T-BAR	0-10V TO 1%	nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
C2	2X4 VOLUMETRIC TROFFER	3000	4000K	22.3	120V	RECESSED T-BAR	0-10V TO 1%	nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
C2S	2X4 VOLUMETRIC TROFFER	3000	4000K	22.3	120V	RECESSED T-BAR	0-10V TO 1%	INTEGRAL DUAL TECH SENSOR & nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
D	6" DOWNLIGHT	1200	5000k	14.5	120V	RECESSED SOFFIT	N/A	N/A	NEW CONSTRUCTION QUICK CONNECT LED HOUSING, SMOOTH TRIM KIT	JUNO E-SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
Q	1X2 HIGHBAY	12000	5000K	77	120V	SUSPENDED	N/A	N/A	SEMI DIFFUSE POLYCARBONATE LENS, THUN HANGER BRACKET, TWIST LOCK 120V CORDSET.	LITHONIA IBG SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
P	SINGLE HEAD AREA LUMINAIRE	2300/5300/8500	5000K	59	120V	WALL MOUNT	N/A	PHOTOCELL		LITHONIA TWR1 LED OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
T	4FT LED STRIP LIGHT	4000	5000K	30	120V	SUSPENDED	N/A	N/A	10' AIRCRAFT CABLE WITH HOOK, WIREGUARD	LITHONIA UFIT OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
T1	4FT LED STRIP LIGHT	10000	5000K	79	120V	SUSPENDED	N/A	N/A	SMOOTH FROSTED POLYCARBONATE LENSE	STANPRO VX4-L SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING

Emergency Lighting Schedule

DESCRIPTION	VOLTAGE	WATTAGE	LED HEADS	OPTIONS	ACCEPTABLE PRODUCTS
SINGLE REMOTE EMERGENCY LIGHTING HEADS	12V	7W	7W	COMPLETE ADJUSTABILITY, TWIST LOCK LAMP COLLAR	STANPRO M-LED SERIES
DUAL REMOTE EMERGENCY LIGHTING HEADS	12V	7W	2 X 7W	COMPLETE ADJUSTABILITY, TWIST LOCK LAMP COLLAR	STANPRO M-LED SERIES
COMBINATION PICTOGRAM EXIT/EMERGENCY LIGHT (EPB#1)	12V	72W	2 x 6W	COMPLETE WITH AUTO-TEST, LAMP DISCONNECT AND TIME DELAY	STANPRO-PRMS10720-2M6LAWH/AT LD TD SERIES
COMBINATION PICTOGRAM EXIT/EMERGENCY LIGHT (EPB#2)	12V	50W	2 x 6W	COMPLETE WITH AUTO-TEST, LAMP DISCONNECT AND TIME DELAY	STANPRO-PRMS10500-2M6LAWH/AT LD TD SERIES
RUNNING MAN PICTOGRAM EXIT SIGN (ZONE 2)	120/277/347V	2W	N/A	SELF POWERED 90 MIN. COLD WEATHER RATED	STANPRO RMRNX 1WH-IB/AT CW
RUNNING MAN PICTOGRAM EXIT SIGN	120/277/347V	2W	N/A	C22.2 RATED, EXTRUDED ALUMINUM, PROVIDE ADDITIONAL MOUNTING KITS IF APPLICABLE	STANPRO RMXL SERIES



2 E201 — Lighting Timer Relay Detail With Photocontrol

N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

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project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
ELECTRICAL
LIGHTING
MAIN FLOOR PLAN
LIGHTING SCHEDULES

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E201
plotted: March 22, 2024	

2023 REVIT MODEL (ARCH)

PART 1 - GENERAL

1.1 **General Requirements**

1.1.1 Division One, General Requirements is part of this Section and shall apply as if repeated here.

1.2 **Referenced Standards**

1.2.1 Canadian Standards Association (CSA).

.1 CSA A101-M1983, Thermal Insulation, Mineral Fibre, for Buildings.

.2 CAN/CSA-G40.21-M92, Structural Quality Steels.

.3 CSA W59-M1989, Welded Steel Construction (Metal Arc Welding).

1.2.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.181-92, Ready-Mixed Organic Zinc-Rich Coating.

.2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.

.3 CAN/CGSB-51.20-M87, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.4 CGSB 51-GP-21M-78, Thermal Insulation, Urethane and Isocyanurate, Unfaced.

1.2.3 American Society for Testing and Materials (ASTM).

.1 ASTM A653-97 (M-97), Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A924-97 (M-97), Standard Specification for General Requirements for Steel Sheet Metallic-Coated by the Hot-Dip Process.

.3 ASTM B29-92, Specification for Refined Lead.

.4 ASTM B117-95, Method of Salt Spray (Fog) Testing

.5 ASTM B749-85 (91), Specification for Lead and Lead Alloy Strip, Sheet and

Plate Products.

.6 ASTM E 152-81a, Methods for Fire Tests of Door Assemblies.

.7 ASTM E 163-94a, Methods for Fire Tests of Window Assemblies.

1.2.4 Underwriter's Laboratories of Canada (ULC).

.1 CAN4-S104M-M80, Fire Tests of Door Assemblies.

.2 CAN4-S105M-M85, Fire Door Frames.

1.2.5 Canadian Steel Door and Frame Manufacturer's Association.

.1 CSDFMA, Specifications for Commercial Steel Doors and Frames, 1990.

.2 CSDFMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.

1.2.6 National Fire Protection Association (NFPA).

.1 NFPA 80-1992, Fire Doors and Windows.

.2 NFPA 252-1990, Door Assemblies Fire Tests of.

1.3 **Requirements of Regulatory Agencies**

1.3.1 Steel Fire Rated Doors and Frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4 S104M and CAN4 S105M for ratings specified or indicated.

1.4 **Product Delivery, Storage, and Handling**

1.4.1 Brace frame units to prevent distortion in shipment, and protect finished surfaces by sturdy protective wrappings.

1.4.2 Store doors in protective wrappings in a secure dry location, to ensure that they are not damaged until hung. Install them only when work has progressed to a stage when no damage will occur to them in place.

1.5 **Shop Drawings**

1.5.1 Submit shop drawings in accordance with the requirements of specification Section

01340, Shop and Interference Drawings.

1.5.2 Indicate materials and details in scale full size for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components, and exposed finishes, fasteners, and caulking.

PART 2 - PRODUCTS

2.1 Materials

2.1.1 Steel: commercial grade, tension levelled steel to ASTM A924-97 (M97), galvanized to ASTM A653-97 (M97), coating designation ZF75 (A25) typical and Z275 (G90) in exterior locations.

2.1.2 Doors and Panels:

.1 Facings, rails, stiles: 3/64" (1.2 mm) (18 ga.) base steel thickness.

.2 Interior Stiffeners: 0.914 mm base steel thickness.

.3 Hardware Reinforcement: 1/8" (3 mm) base steel thickness.

.4 Sound Deadening and Insulating Material: semi-rigid fibreglass 24 kg/m3 minimum density, to fill core space. Honeycomb structural core consisting of kraft paper with 3/4" (19 mm) cells x core thickness may be used at interior locations.

.5 Glazing Stops: 1/16" (1.6 mm) base steel thickness, formed, drilled and countersunk for fasteners.

2.1.3 Frames:

.1 Steel: 1/16" (1.6 mm) (16 ga.) base thickness.

.2 Hardware Reinforcement: 1/8" (3 mm) base steel thickness.

.3 Mortar Guards: 0.762 mm base steel thickness.

.4 Rubber Bumpers: Glynn-Johnson GJ64 or approved equivalent.

2.1.4 Anchors:

.1 Frames in Masonry: adjustable "T" strap anchors.

.2 Labelled Frames: to conform to ULC requirements.

.3 Frames in Gypsum Board Partitions: steel anchor clips and floor anchors of suitable design securely welded inside each jamb.

.4 Anchorage to Floor: minimum 1/8" (3 mm) thick clip angles with 2 holes for expansion bolting to floor.

2.1.5 Galvanizing:

.1 Typical interior units: steel sheet galvanized to ASTM A653-97 (M97), coating designation ZF75 (A25), to a total mass coating of 120 g/m2, both sides.

.2 Exterior units, and interior units in unheated areas: steel sheet galvanized to ASTM A653-97 (M97), coating designation Z275 (G90), to a total mass coating of 275 g/m2, both sides. Mill phosphatize to provide for good paint adhesion.

.3 Interior units in Warewashing areas: steel sheet galvanized to ASTM A653-97 (M97), coating designation Z275 (G90), to a total mass coating of 275 g/m2, both sides. Mill phosphatize to provide for good paint adhesion.

2.2 **Fabrication - Generally**

2.2.1 Fit and assemble work in the shop, where possible. Make trial assembly in shop when not possible.

2.2.2 Fabricate, reinforce and anchor component parts and assemblies to support loads that usage will impose without deflection detrimental to function, appearance or safety. For interior doors either the use of metal stiffeners with the spaces between stiffeners filled with insulation, or honeycomb structural core will be acceptable. For exterior doors the core is to be completely filled with insulation.

2.2.3 Reinforce components to resist in-use stresses imposed by finishing and security hardware.

2.2.4 Prepare frames and doors for finish hardware with mortises and reinforcement. Drill and tap to template information. Reinforce for surface-mounted hardware and for door closer brackets. Provide for concealed door closers where specified. Install mortar guards at cut-outs and reinforcing plates in frame. For cylindrical locks install reinforcing

units to lock manufacturer's specification. For mortise locks provide a suitable internal bracket to hold the lock case rigidly in the centre of the door.

2.2.5 Provide for anticipated expansion and contraction of frames and supports.

2.2.6 Fit elements at intersections and joints accurately together in true planes, plumb and level.

2.2.7 Weld frame and door assemblies. Weld continuously at joints exposed to view including door edge seams, or at joints through which air or water could penetrate from the exterior of the building to the interior. Seams shall be welded, filled and sanded flush.

2.2.8 Where welding is impossible, connections may be bolted. Ream drilled holes and leave exposed edges clean and smooth.

2.2.9 Isolate from each other dissimilar metals and metal from concrete or masonry, to prevent electrolysis.

2.2.10 Ensure that exterior doors and frames are tightly fitted, and that entry of water is prevented by drips on head frames of out swinging doors exposed to weather.

2.2.11 Make allowance in frames and doors to receive electrical conduits for security strikes and contactors which may be installed in doors and frames. Provide electrical conduit protection mortar boxes to receive conduit for electric strikes, locks, door closers, and hinges as detailed.

2.3 **Door and Screen Frames**

2.3.1 Fabricate frames to details shown on Drawings using welded construction.

2.3.2 Fabricate steel frames in minimum base steel thickness specified. Minimum frame material thickness applies only to work which does not otherwise require heavier gauges to meet specified fire-rated construction.

2.3.3 Touch up frames in the factory where coating has been removed.

2.3.4 Where members join at corners, cut mitres and weld continuously along inside welding.

2.3.5 Where tubular transoms or mullions meet frame members, joint by butt welding.

2.3.6 Attach two channel spreaders at bottom of door frames to maintain square alignment. Provide removable attachment for spreaders on frames that to not extend below finished floor, and remove them after frames are built in.

2.3.7 Incorporate structural stiffeners for frame members where required to withstand loadings. Securely anchor them at bottom and top. Where they extend above ceiling, anchor them to concrete or structural framing to suit site conditions and in such a way that load from the structure is not transferred to the frames.

2.3.8 Install three rubber bumpers in latch side stops of each interior door frame. Locate lowest bumper 9" (230 mm) above bottom of door.

2.3.9 Back paint exterior frames and frames to unheated areas where in contact with masonry or concrete or other dissimilar materials.

2.3.10 Fabricate glass stops for non-rated screens the same as specified for glass stops for doors. Fabricate glass stops for fire rated screens 3/4" (19 mm) wide and of 1.35 mm thick sheet steel.

2.3.11 Note all exterior doors on the Door Schedule shall have insulated frames. Fill these frames with fibreglass or foamed in place polyurethane insulation.

2.4 **Doors and Panels**

2.4.1 Fabricate interior and exterior doors and panels with sheet steel in specified base steel thickness.

2.4.2 Minimum panel thickness applies only to doors not otherwise requiring heavier gauges to meet specified fire-rated construction.

2.4.3 Fabricate doors with faces true and smooth, and with no dimples or welds visible.

2.4.4 Bevel edges of stiles to suit door swing.

2.4.5 Locate hardware to Canadian Steel Door & Frame Manufacturer's Association Standard, unless shown otherwise on Drawings or Door Schedule.

2.4.6 Fill solid all voids within doors and panels with insulation, or honeycomb core. For exterior doors and panels, fill voids with insulation.

2.4.7 Fabricate muntins, removable stops, and glass mouldings of minimum 1.2 mm steel.

2.4.8 Prepare doors to receive glass and grilles. Install grilles. Secure removable stops with countersunk Phillips oval head screws symmetrically spaced on stop lengths.

2.4.9 Close top and bottom edges of exterior doors to make a weathertight seal, and doors to

which the tops can be seen from stair landings or other high elevations, so that they are flush with face edges.

2.5 **Anchors**

2.5.1 Provide frames for installation in masonry walls with the following number of anchors:

.1 Frames up to 7'-6" (2300 mm) height, 3 anchors
.2 Frames 7'-6" (2300 mm) to 8'-0" (2400 mm), 4 anchors
.3 Frames over 8'-0" (2400 mm), 1 anchor for each 2'-0" (600 mm) or fraction thereof in height over 8'-0" (2400 mm).

2.5.2 Provide frames for installation in stud partitions with the following number of anchors:

.1 Frames up to 7'-6" (2300 mm height, 4 anchors
.2 Frames 7'-6" (2300 mm) to 8'-0" (2400 mm),, 5 anchors
.3 Frames over 8'-0" (2400 mm),, 5 anchors, plus 1 additional for each 2'-0" (600 mm) or fraction thereof in height over 8'-0" (2400 mm).

2.5.3 Provide frames to be anchored to previously-placed concrete, masonry, or structural steel, with anchors of suitable design, as shown on reviewed shop drawings.

2.5.4 Securely weld adjustable floor anchors to inside of each jamb profile, with two holes provided at each jamb for floor anchorage.

2.5.5 Anchors shall have minimum gauges: "T" strap type, 1/16" (1.6 mm) "L" type, 3/64" (1.2 mm); wire type, 5/32" (3.9 mm) diameter; stirrup type, 1/16" (1.6 mm); stud type, 3/64" (1.2 mm); jamb spreaders; 3/64" (1.2 mm).

2.6 **Finishing**

2.6.1 Carbon Steel: clean and smooth work at welds which has been ground. Fill if necessary, and prime all areas from which zinc has been removed.

2.7 **Fire Rated Hollow Metal Doors and Frames**

2.7.1 Construct fire-rated doors and frames of ratings indicated, in accordance with ULC Section 120 IDO, and as otherwise required by Jurisdictional Authorities. Fire rated screens containing doors shall be labelled (whole assembly).

2.7.2 Ensure that hardware used meets requirements of ULC 120 ID16, and installed to NFPA 80 requirements.

2.7.3 Doors and frames indicated as labelled shall have attached ULC labels. Attach labels on the inside of the hinge jamb midway between the top hinge and the head of the door frame. Where fire doors are shown in pairs swinging in the same or opposite directions they shall bear a ULC label of a category that does not require astragals.

2.8 **Temperature Rise Limit**

2.8.1 In addition to fire protection rating, certain doors require a maximum temperature rise limit, and are indicated on the Door Schedule by the designation "TRR".

2.8.2 Provide combination temperature rise and fire protection rating label, attach to the door at the same location specified for fire rated doors.

PART 3 - EXECUTION

3.1 **Installation**

3.1.1 Installation of the work of this Section is specified in other Sections.

* * *

END OF SECTION

1 GENERAL

1.1 GENERAL REQUIREMENTS

1.2 RELATED WORK

1.3 QUALITY ASSURANCE

1.3.1 Design doors and tracks to withstand basic wind load while in the closed position of 0.47 kPa (10 psf). Maximum deflection while the door is in open horizontal position shall not exceed 1/120 of the span.

1.3.2 Installation shall be only by the specified manufacturer or an authorized representative for the region.

1.4 SUBMITTALS

1.4.1 Submit detailed shop drawings to the Consultant for review, in accordance with Section 01300.

1.4.2 Shop drawings shall clearly show and describe in detail, detailed door assemblies and adjacent construction. Show elevations, sections and details and clearances required for the door assemblies.

1.4.3 Shop drawings shall be of best quality craftsmanship, specifically prepared on one standard size drawing sheet.

1.4.4 Door manufacturer shall provide complete installation instructions for doors and hardware.

1.4.5 Provide a letter of conformance indicating that the doors are installed in accordance to the drawings and the specifications

2 PRODUCTS

2.1 MANUFACTURER

1. Standard of Acceptance: Thermatite door model “T200” 51 mm (2”) thick insulated as manufactured by Richards-Wilcox Canada Inc., with minimum requirements as specified herein:

2. Alternates will be considered provided they meet the minimum specification within and are approved & accepted in writing prior to tender closing.

2.2 MATERIALS

2.3 Door Sections:

2.3.1 Steel skins with polyurethane core sandwich type construction, thermal break and to incorporate the use of two continuous replaceable factory installed gaskets. Sections shall have a minimum thermal insulating value of RSI 3.22 (R18.28).

2.3.2 Exterior Skin: Structural quality hot-dipped galvanized steel, 0.41 mm (0.016") minimum embossing, factory applied baked on polyester paint finish, shall have non-repeating random stucco texture and Multi-Ribbed profile.

2.3.3 Interior Skin: Structural quality hot-dipped galvanized steel, 0.41 mm (0.016") minimum, baked-on acrylic paint finish, non-repeating random stucco texture and rib pattern.

2.3.4 Ends of each door section shall be caped with 1.6 mm (0.0625") hot dipped galvanized steel full height end caps. Doors width 16'-3" (4953 mm) and over shall all have double end caps.

2.3.5 Insulation: Cavity shall be filled on continuous process, formed-in-place, CFC and HCFC free rigid polyurethane core, interior and exterior skins shall feature thermal break.

2.3.6 Reinforcements: Provide 0.9 mm (0.039") minimum, continuous reinforcing strip, within core of door sections, for all hardware, accessories and mounting locations. Reinforcing strip must be of adequate width to enable the attachment of all fasteners and screws to penetrate both door interior skin and reinforcing strip. Fasteners or screws etc., secured only to the door skin will not be acceptable.

2.3.7 Weather-stripping: Doors shall be equipped with a heavy duty, factory installed continuous top seal to seal against header, continuous replaceable seals between sections and vinyl bulb shaped astragal on the bottom edge of the bottom section. Dual Durometer vinyl jamb weather seal bolted to the continuous adjustable mounting angle (ADCA) for easy replacement**.**

2.3.8 Full View Sections: Provide full view sections fabricated from white anodized tubular aluminum extrusions complete with 13 mm (½") thick thermal glazing as per architectural drawings.

2.3.9 Door Finish: Interior and exterior finish shall be door manufacturer's standard White colour.

2.3.10 Trusses: If required, provide adequate number of galvanized steel linear type reinforcing trusses to meet the wind loading.

2.4 HARDWARE

2.4.1 Standard of Acceptance: Linear Hardware System as manufactured by Richard-Wilcox Canada. Doors shall be equipped with double end roller brackets and long stem rollers.

2.4.2 Finish: Door tracks and track mounting hardware and torsion assembly mounting brackets shall be hot-dip galvanized.

2.4.3 Track: 2.7 mm (12ga), thick commercial galvanized track, formed track 80 mm (3 1/8") overall outside dimension. Vertical track sloped for weather tight closing.

2.4.4 Track Angle: Continuous adjustable track angle (ADCA), bolted type, field adjustable to ensure weather tight seal and serviceability, fabricated from 2.4 mm (13ga) commercially galvanized steel, designed to provide continuous support to the vertical track. **Combination angle and clip mounting not acceptable.**

2.4.5 Hinges: Linear type, fabricated from 2.75 mm (12ga) thick galvanized steel with embossments designed to resist higher load and to provide greater stability and improved performance. Doors width 16'-3" (4953 mm) and over shall have double end hinges featuring full width bushing for both the hinge pivot and roller carries to allow for ease installation and eliminating any possibility of misalignment of the hinges.

2.4.6 Track Hangers: Minimum 32 x 32 mm (1 1/4" x 1 1/4") steel angles roll formed from 2.0 mm (0.078") commercially galvanized steel.

2.4.7 Weather-stripping: Doors shall be equipped with a heavy duty, factory installed continuous top seal to seal against header, continuous co-polymer joint bulb seal between sections and vinyl bulb shaped astragal on the bottom edge of the door. Dual Durometer vinyl jamb weather seal bolted to the continuous adjustable mounting angle (ADCA) for easy replacement, as supplied by Richards-Wilcox Canada

2.4.8 Rollers: Steel rollers 73 mm (2 7/8") diameter, with ten (10), 8 mm (5/16") diameter ball bearings, 11 mm (7/16") diameter roller axles and both inner and outer ball races of hardened steel. Length of roller stem as required.

2.4.9 Linear Roller Brackets: Fabricated from 2.7 mm (12 ga) galvanized steel.

2.4.10 Shaft and Counter Balance Springs: Helically wound torsion springs manufactured from oil tempered spring wire stress relieved, minimum 10,000 cycles. Aluminum die cast grooved drums and flexible galvanized aircraft cables, 7 x 19 construction, mounted on minimum 25 mm (1") CRS solid steel shaft, keyed full length, rolling on flange bearings.

2.4.11 Bumper springs to be installed at the end of each horizontal track to prevent door over travel.

2.4.12 Track Guards: Continuous 4.7 mm, thick x 1524 mm, high (3/16" x 5'-0") chamfered at top at 45 degrees, painted safety yellow finish.

2.5 Doors quantity, size and the lift type as shown on door schedule and/or architectural drawings**.**

2.6 ELECTRIC OPERATORS

2.6.1 Provide Jack shaft type electric operators for doors as shown on Drawings, having sufficient power to operate the door at an approximate speed of 200 mm (8") per second.

2.6.2 Jack Shaft Operator: Lift Master industrial duty logic control type operator with on board radio receiver, model "H" to NEMA 1, shall be equipped with an adjustable friction clutch, time delay on reverse, solenoid brake integral enclosure containing the controls and floor level disconnect and emergency manual chain hoist assembly with electrical interlock, motor __ HP minimum, suitable for ___ volts, _ Ph, 60 Hz power supply.

a) Provide one push button station "OPEN/CLOSE/STOP" to NEMA 1, for inside wall mounting near the door jamb on the operator side.

b) Provide and install a "Featheredge" Reversing Safety Edge along the bottom edge of door to reverse on contact with an object as supplied by Service Door Industries. **Hose type pneumatic safety edges will not be accepted.** Power to the safety edge shall be supplied by a reelite.

2.6.3 Power supply and fused disconnect near the opening on the operator side by division 16. Wiring from the fused disconnect to the operator and to the controls by the door contractor.

3 FABRICATION

3.1 Fabricate the work true to dimensions detailed and square, and to reviewed shop drawings, free from distortion and defects detrimental to the appearance and performance.

3.2 Ensure that Site dimensions are taken prior to the fabrication of the doors.

3.3 Door shall be 25 mm (1”) higher than finished opening height and extend 25 mm (1”) beyond jamb on either side of finished opening.

3.4 Use shop and field connections complying with CAN/CSA S16.1-M.

3.5 Accurately fit joints and intersecting members with adequate fastenings.

4 EXECUTION

4.1 EXAMINATION

4.1.1 Prior to commencement of work of this Section, thoroughly examine location where door(s) and all other related components are to be installed. To ensure a satisfactory installation, the door installer must inspect the opening to ensure it is square and true, and that the floor is level to ensure proper seal at the floor.

4.1.2 Report in writing, to the Consultant, any condition adversely affecting this work.

4.1.3 Proceed with work only when conditions are satisfactory for the installation.

4.2 INSTALLATION

4.2.1 **Installation shall be by door manufacturer or by authorized manufacture’s representative for the region, as specified herein.**

4.2.2 Install doors, tracks and operating equipment complete with necessary hardware, weather-stripping, anchors, hangers, brackets and accessories, in accordance to manufacturer's printed instructions.

4.2.3 Assemble and erect work plumbs, true, square, straight, level and accurate as per Drawings and reviewed shop drawings.

4.2.4 Isolate metals where necessary to prevent corrosion due to contact with dissimilar metals and between metals, masonry and concrete. Use bituminous paint or butyl tape or as recommended by the door manufacturer.

4.2.5 Supply written instructions, drawings, and where necessary provide supervision for the installation of items to be built in by work of other Sections.

4.2.6 Steel member’s etc. including jamb extensions and spring pads, by Division 5 and as per structural drawings. All other mounting brackets, angles etc., required for the proper installation of work of this Section, shall be the responsibility of the door manufacturer.

4.2.7 Complete installation must be to the satisfaction of the Consultant. Any and all aspects of installation adversely affecting appearance and/or performance of such installation shall be deemed unacceptable and shall be fully replaced at no additional cost to the Owner

4.3 DOOR:

4.3.1 Install sectional door in strict accordance with final reviewed shop drawings, manufacturer’s instructions and as specified herein.

4.3.2 Fit, align and adjust overhead door assemblies, level and plumb, to ensure smooth operation and to provide correct closure to the satisfaction of the Consultant.

4.3.3 Ensure that complete installation includes tracks, operating equipment, necessary hardware, weather-stripping, anchors, hangers, brackets and any other accessories deemed necessary. Include any other items, not specified herein, but is required for a complete installation.

4.4 HARDWARE:

4.4.1 Install all necessary hardware, jamb and head mold strips, anchors, inserts, hangers and equipment supports in accordance with final reviewed shop drawings, manufacturer's instructions and as specified herein.

4.4.2 Mount counterbalancing mechanism with brackets at each end of shaft and at maximum 2438 mm (8'-0") o/c. in between.

4.4.3 Fasten vertical track assembly to opening frame at maximum 508 mm (1'-8") o/c. vertically. Install additional track anchors where deemed necessary by the Consultant.

4.4.4 Support the horizontal track to transmit the door dead and operating loads to the building structure. Install sufficient supports, anchors, fasteners etc. so that the track assembly is rigid and free from undue movement as required by the door manufacturer and to the satisfaction of the Consultant. Install additional track anchors where deemed necessary by the Consultant.

4.4.5 Provide bumper springs at the end of each track of manually operated doors.

4.4.6 Ensure weather-stripping properly fastened and it forms a continuous weather-tight seal at perimeter.

4.5 ADJUSTMENT AND DEMONSTRATION

4.5.1 Lubrication:

4.5.2 Upon completion of installation of doors and operating equipment, lubricate moving parts before operation.

4.5.3 Grease sprockets, bearings, cables, link chains and guides. Lubricant shall be as recommended by the manufacturer.

4.6 Demonstration:

4.6.1 Test the door operation and adjust it for smooth operation, free from warp, twist or distortion. Demonstrate the operation to the satisfaction of the Consultant at the same time of acceptance of the completed work.

4.6.2 Submit to the Owner a copy of proposed preventative maintenance program for overhead doors and other related components requiring regular maintenance and check-ups.

END OF SECTION – SECTIONAL INSULATED STEEL DOORS

1 GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.40-M89, Primer, Structural Steel, Oil Alkyd Type.
- .2 CAN/CGSB-79.1-M91, Insect Screens.

.2 Canadian Standards Association (CSA)
- .1 CAN/CSA-A440-M90, Windows.
- .2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-Z91-M90, Safety Code for Window Cleaning Operations.
- .4 CSA Z760-94, Life Cycle Assessment.
- .5 CAN/CSA ISO 14040-97, Environmental Management - Life Cycle Cost Assessment - Principle and Framework.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance Submittal Procedures.

.2 Indicate materials and details in scale full size for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.

1.3 TEST REPORTS

.1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications, for:
- .1 Windows classifications (minimum required units).
- .2 Anodized finish.
- .3 Insect screens where operable.
- .4 Air tightness A.3.
- .5 Water tightness B.7.
- .6 Wind load resistance C.5.
- .7 Ease of operation - windows with operable lights.
- .8 Mullion deflection - combination and composite windows.

1.4 MAINTENANCE DATA

.1 Provide operation and maintenance data for windows for ONTC documentation.

1.5 WARRANTY

.1 Submit a written warranty for the complete installation under this Section against defective materials and workmanship, including leaking, deformation, loss of seal, distortion or colour fade in accordance to GC 12.3 but for five (5) years.

2 PRODUCTS

2.1 MATERIALS

.1 Materials: to CAN/CSA-A440 supplemented as follows:

.2 All windows framing and screens by same manufacturer.

.3 Sash: aluminum thermally broken.

.4 Mainframe: tubular aluminum sections thermally broken nominal 108 mm deep.

.5 Glass: Sealed double-glazing IGU, see section 2.6 for glazing specifications.

.6 Screens: to CAN/CGSB-79.1.
- .1 Type 1: non security window screens
  - .1 screens: Fiberglas 18 x 14 count to CAN/CGSB-79
  - .2 fasteners: tamper proof
  - .3 frames: aluminum colour to match window frame
  - .4 mounting: for interior replacement

.7 Isolation coating: alkali resistant bituminous paint.

.8 The manufacturing process must adhere to Lifecycle Assessment (LCA) Standards as per ISO 14040/14041 LCA Standards (to be published by 1998), CSA Z760-94 LCA Standards.

2.2 WINDOW TYPE AND CLASSIFICATION

.1 Type 1 – Fixed. Non Security Windows

- .1 Acceptable Manufacturer:
  - .1 Fulton (Oldcastle): Series 1200 fixed
  - .2 Kawneer: 8400TL isolock fixed, to match Fulton
  - .3 Approved equals of Alumicor Duxton, Windspec, and Sherwood will be considered.

.2 Type 2, 3, 4 – Horizontal Slider. Non Security Windows

- .1 Acceptable Manufacturer
  - .1 Fulton (Oldcastle): Series 1250 slider
  - .2 Kawneer: 8470TL isolock slider, to match Fulton
  - .3 Approved equals of Alumicor, Duxton, Windspec, and Sherwood will be considered.

.3 Classification rating: to CAN/CSA-A440:
- .1 Air tightness: A3
- .2 Water tightness: B7 (B4 for sliding windows)
- .1 Wind load resistance: C5 (C3 for sliding windows)
- .2 Condensation resistance: Temperature Index, I 67
- .3 Insect Screens: S1
- .4 Glazing: G1 G2

2.3 FABRICATION

.1 Fabricate in accordance with CAN/CSA-A440 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.3 Face dimensions detailed are maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with 380 g/m^2 zinc coating to CAN/CSA-G164.

2.4 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes - 1980.
  .1 Anodized Aluminum anodic finish: designation AA-M12C22A31, AA-MA611.

2.5 ISOLATION COATING

.1 Isolate aluminum from following components, by means of isolation coating:
  .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
  .2 Concrete, mortar and masonry.
  .3 Wood.

2.6 GLAZING

.1 Glaze windows in accordance with CAN/CSA-A440.

.2 Insulating glass units (IGU): double glazed unit, to CAN/CGSB-12.8M, 25mm (1") overall thickness, composed as follows.
  .1 Outer lite: 6mm clear float glass with low-E coating on No.2 surface.
  .2 Inter-cavity space: to suit overall thickness and glass thickness, argon filled.
  .3 Inner lite: 6mm clear float glass

2.7 HARDWARE

.1 Hardware: stainless steel or white bronze sash locks, aluminum handles, and all other required hardware to make work complete and permit easy operation of units.

.2 Equip all opening windows with non-security screens.

2.8 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with factory site installed air barrier and vapour retarder material for sealing to building air barrier as follows:
  .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
  .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

3 EXECUTION

3.1 WINDOW INSTALLATION

.1 Install in accordance with CAN/CSA-A440.

.2 Arrange components to prevent abrupt variation in colour.

3.2 SILL INSTALLATION

.1 Install sill flashing and associated drips. Provide window sill end dam base of each jamb.

3.3 CAULKING

.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

.2 Conceal sealant within window units except where exposed use is permitted by Consultant.

.3 Caulk and seal perimeter of window frame at exterior to provide weather tight joint to surrounding structure.

.4 Caulk gap between frames and surrounding insulation or blocking with expanding polyurethane foam insulation.

3.4 CLADDING

1. Clad over other work per drawings, match aluminum to ASTM B 209M.

END OF SECTION

PART 3 – RFQ SPECIFICATIONS
SCHEDULE 3-A-5
TENDER DRAWINGS

The drawings included with this RFP are listed on the first sheet of the drawing set. The drawings include the following –

- **Drawings by Northshore Engineering:**

General

* GN0.0 - Cover Page/Drawings Index/Notes
* GN1.0 - General Notes
* GN2.0 - General Notes
* GN3.0 - General Notes
* GN4.0 - General Notes

Architectural

* A0.0 – Site Plan – Existing
* A0.1 – Site Plan – New Grading
* A1.0 – Building Code Matrix & Loading Data
* A2.0 – Floor Plan
* A2.1 – Reflective Ceiling Plan
* A2.2 – Roof Plan
* A2.3 – Proposed Slab Saw Cut Layout Plan
* A3.0 – Exterior Elevations
* A4.0 – Wall Sections
* A4.1 – Wall Sections
* A4.2 – Wall Section Details
* A5.0 – Windows & Door Schedule
* A5.1 – Window Details & Case Work Details
* A6.0 – Room Finish Schedule and Wall Schedule
* S1.0 – Foundation Plan
* S1.1 – Foundation Details
* S1.2 – Roof Framing Plan
* S2.0 – Steel Elevations
* S2.1 – Steel Elevation and Canopy Framing Details

- **Drawings by Piotrowski**:

Mechanical

* M100 - Mechanical Plumbing & Gas – Site Plan, Legend & Details
* M101 – Mechanical Plumbing HVAC – Floor Plan, Legend, Notes
* M102 – Mechanical Plumbing HVAC – Schedules
* M103 – Mechanical Plumbing HVAC – Details

Electrical

* E101 – Electrical – Power – Notes & Legend Single Line Diagram
* E102 – Electrical – Power – Main Floor Plan
* E103 – Electrical – Power – Site Plan
* E201 – Electrical – Lighting – Main Floor Plan Lighting Schedules.

ONTARIO NORTHLAND

NEW MECHANICAL SHOP

HEARST ONTARIO

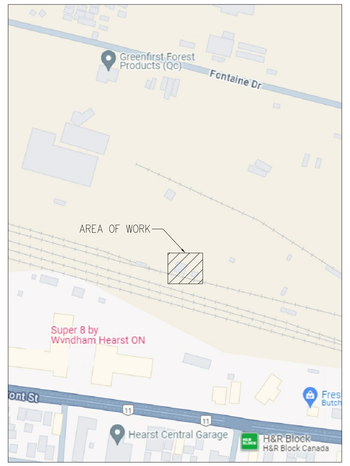
DRAWING INDEX

INSPECTION SCHEDULE

1.0 NOTIFY ENGINEER 72 HOURS (3 DAYS) PRIOR TO REQUIRED INSPECTIONS

1.1 INSPECTION REQUIRED AT THE FOLLOWING POINTS DURING CONSTRUCTION THE FOLLOWING IS A MINIMUM REQUIREMENT.

- BEFORE START OF PROJECT (PRE-CONSTRUCTION MEETING)
- AFTER EXCAVATION OF EX. SOILS FOR FOUNDATION
- AFTER INSTALLATION OF FORMWORK AND REBAR, PRIOR TO CONCRETE POURS
- AFTER INSTALLATION OF STRUCTURAL STEEL
- AFTER INSTALLATION OF METAL STUD FRAMING
- AFTER INSTALLATION OF GIRTS AND INSULATION
- AFTER INSTALLATION OF CLADDING, WINDOWS, DOORS
- PRIOR TO CONC. SLAB POUR (ONCE VP, WIRE MESH INSTALLED)
- AFTER INSTALLATION OF ALL INTERIOR FINISHES
- AT COMPLETION OF PROJECT



KEY PLAN – NTS

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revision
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LICENSED PROFESSIONAL ENGINEER
V.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

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project: ONTARIO NORTHLAND HEARST MECHANICAL SHOP HEARST, ONTARIO

title: GENERAL NOTES

drawn by: BM	checked by: ..
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	
dwg no: GN00	

SEE DRAWINGS FOR ADDITIONAL NOTES

GENERAL NOTES

THIS IS A GENERAL SPECIFICATION. SOME STATED ITEMS MY NOT APPLY.

1.0 GENERAL
1.1 DESIGN AND CONSTRUCTION IS TO CONFORM TO THE 2012 ONTARIO BUILDING CODE. REFER ALSO TO TYPICAL DETAILS, NOTES UNDER PLANS & SCHEDULE ON THE STRUCTURAL DRAWINGS, AND TO THE SPECIFICATION. ALL CODES, MANUALS, STANDARDS AND SPECIFICATIONS REFERRED TO SHALL BE THE LATEST EDITIONS INCLUDING ALL REVISIONS AND ADDENDA. ALL DIMENSIONS, AND DETAILS OTHER THAN PURELY STRUCTURAL DIMENSIONS AND DETAILS SHOWN ON THE STRUCTURAL DRAWINGS MUST BE CHECKED AGAINST THE ARCHITECTURAL DRAWINGS AND ANY INCONSISTENCIES REPORTED TO THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK. STRUCTURAL DRAWINGS MUST NOT BE SCALED.
1.2 REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR LOCATIONS AND SIZES OF OPENINGS, TRENCHES, PITS, SUMPS, EQUIPMENT, SLEEVES, DEPRESSIONS, GROOVES AND CHAMFERS NOT INDICATED ON THE STRUCTURAL DRAWINGS. UNLESS SPECIFICALLY NOTED OTHERWISE, THE ABOVE ITEMS WHERE SHOWN ON THE STRUCTURAL DRAWINGS ARE INDICATED ONLY APPROXIMATELY AS TO SIZE AND LOCATION.
1.3 UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS, NO PROVISIONS HAS BEEN MADE IN THE DESIGN FOR CONDITIONS OCCURRING DURING CONSTRUCTION. THE CONTRACTOR IS TO PROVIDE ALL NECESSARY BRACINGS AND SHORING REQUIRED FOR STRESSES AND INSTABILITY OCCURRING FROM ANY CAUSE DURING CONSTRUCTION. THE CONTRACTOR SHALL ACCEPT FULL RESPONSIBILITY FOR ALL SUCH MEASURES. IT SHALL ALSO BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL NECESSARY BRACINGS, SHORINGS, SHEET PILING OR OTHER TEMPORARY SUPPORTS TO SAFEGUARD ALL EXISTING OR ADJACENT STRUCTURES AFFECTED BY THIS WORK.
1.4 ALL LOADS SHOWN ON THESE DRAWINGS ARE FACTORED LOADS UNLESS OTHERWISE NOTED.

2.0 SHOP DRAWINGS, PLACING DRAWINGS & BAR LISTS: –
2.1 FOR ALL STRUCTURAL COMPONENTS SHOWN ON THE STRUCTURAL DRAWINGS, SUBMIT COPIES OF SHOP DRAWINGS , FOR REVIEW BY THE STRUCTURAL CONSULTANT. SHOP DRAWINGS ARE REQUIRED FOR THE FOLLOWING ITEMS AND REQUIRE AN ENGINEERING SEAL OF AN ENGINEER LICENSED IN ONTARIO & RESPONSIBLE FOR THE WORK. ALL STRUCTURAL STEEL, OWSJ, PRE–ENGINEERED WOOD TRUSS, HEAVY WOOD TIMBER CONNECTIONS, CONCRETE PRECAST CORE SLAB, ,REBAR, METAL ROOF & FLOOR DECK, PRE–ENGINEERED BUILD FRAME. SHOP DRAWINGS TO SHOW COMPLETE INFORMATION FOR THE FABRICATION AND ERECTION OF THE STRUCTURAL COMPONENTS.
2.2 REVIEW BY THE STRUCTURAL CONSULTANT SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR SEEING THAT THE WORK IS COMPLETE, ACCURATE AND IN CONFORMITY WITH THE STRUCTURAL DRAWINGS AND SPECIFICATIONS.
3.0 INSPECTION AND TESTING: – TESTING ITEMS MAY BE DELETED WITH ENGINEER PERMISSION
3.1 A SOILS CONSULTANT AND AN INDEPENDENT INSPECTION AND TESTING COMPANY ARE TO BE ENGAGED TO CARRY OUT THE FOLLOWING SERVICES: –
.1 BEARING SOIL – REFER TO NOTES ON STRUCTURAL DRAWINGS AND ALSO TO THE SOIL REPORT.
.2 FILL UNDER SLABS–ON–GRADE – CONFIRM THAT FILL MATERIAL USED IS SATISFACTORY AND THAT THE REQUIRED DEGREE OF COMPACTION HAS BEEN ATTAINED.
.3 CAST–IN–PLACE & PRECAST CONCRETE – ROUTINE INSPECTION OF MATERIALS, INCLUDING SLUMP CYLINDER AND AIR ENTRAINMENT TESTS & REINFORCING ROD TESTS WHEN REQUIRED AS DIRECTED IN ACCORDANCE WITH CAN/CSA–A23.2–M.
.4 THE PROJECT SUPERINTENDENT IS TO ADVISE THE STRUCTURAL CONSULTANT A MINIMUM OF 24 HOURS IN ADVANCE OF A CONCRETE POURS FOR A REVIEW OF PREPARATIONS.
.5 STRUCTURAL STEEL AND OWSJ – ROUTINE SHOP AND FIELD INSPECTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF CAN/CSA–16.1–M
.6 MASONRY – WHEN REQUIRED OR DIRECTED, CONCRETE BLOCKS SHALL BE TESTED IN ACCORDANCE WITH CAN3–A165–M SERIES; BRICKS IN ACCORDANCE WITH CSA CAN3–A82M; AND MORTAR AND/OR GROUT IN ACCORDANCE WITH CSA A179M.
3.2 ALL INSPECTION AND TESTING SERVICES ARE TO BE PERFORMED BY COMPANIES CERTIFIED BY THE CANADIAN STANDARDS ASSOCIATION AND WELDING, INSPECTORS ARE TO BE CERTIFIED BY THE CANADIAN BUREAU.
4.0 FOUNDATIONS
4.0 REFER TO NOTES UNDER FOUNDATION PLANS. ALL EXTERIOR FOOTINGS OR OTHER FOOTINGS EXPOSED TO FREEZING IN THE FINISHED BUILDING SHALL BE FOUNDED AT A MINIMUM1700mm (5'–6") BELOW FINISHED GRADE, UNLESS OTHERWISE NOTED. ON THE THE DRAWINGS FOOTINGS EXPOSED TO FROST ACTION DURING CONSTRUCTING SHALL BE PROTECTED BY A MINIMUM OF 1200mm (4'–0") OF EARTH OR IT'S EQUIVALENT SUFFICIENT TO PREVENT FREEZING.
4.2 THE LINE OF SLOPE BETWEEN ADJACENT EXCAVATIONS FOR FOOTINGS OR ALONG STEPPED FOOTINGS SHALL NOT EXCEED A RISE OF 7 IN A RUN OF 10, MAXIMUM STEP APPROX. 600mm (2'–0").
4.3 CAP DEPTHS AND FOOTING ELEVATIONS SHOWN ON THE STRUCTURAL DRAWINGS ARE BASED UPON INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THE STRUCTURAL DRAWINGS.
4.4 IF ACTUAL JOB SITE OR SOIL CONDITIONS VARY FROM THOSE ASSUMED, THE WRITTEN DIRECTIONS MUST BE OBTAINED FROM THE STRUCTURAL CONSULTANT BEFORE PROCEEDING WITH THE WORK.
4.5 KEEP EXCAVATIONS CONTINUOUSLY DRY BEFORE CONCRETE IS PLACED. IF THE SOIL IS SOFTENED BY WATER, THE EXCAVATION SHALL EXTENDED BELOW THE SOFTENED MATERIAL AND THE BOTTOM OF THE FOOTINGS LOWERED TO SUIT.
5.0 BACKFILLING AND COMPACTION: –
5.1 SLABS–ON–GRADE AND ALL STRUCTURAL ELEMENTS FRAMING INTO WALLS WHICH RETAIN EARTH MUST BE IN BEFORE BACKFILLING.
5.2 AT FOUNDATION WALLS WITH GRADE BOTH SIDES, UNLESS ADEQUATELY SHORED, BACKFILL & COMPACT EACH SIDE OF WALL SIMULTANEOUSLY.
5.3 UNDER SLABS–ON–GRADE, REMOVE SOFT SPOTS, ORGANIC AND FOREIGN MATTER IN THE SUB–GRADE. (WHERE SUB–GRADE CONSISTS OF COMPACTED FILL, REFER TO SPECIFIC NOTES ON THE DRAWINGS).

GENERAL NOTES CONTINUED

5.4 BACKFILL UNDER SLAB–ON–GRADE, IN FOOTING EXCAVATIONS AND IN TRENCHES ONLY WITH APPROVED MATERIAL. UNLESS SPECIFICALLY NOTED OTHERWISE, BACKFILLING SHALL BE CARRIED OUT IN MAXIMUM OF 200mm (8") THICK LIFTS OF LOOSE FILL EACH COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.
5.5 UNLESS OTHERWISE NOTED, PROVIDE IMMEDIATELY UNDER SLABS–ON–GRADE A MINIMUM OF 150mm (8") OF COMPACTED GRANULAR "A" MATERIAL. COMPACTION TO ACHIEVE A MINIMUM OF 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.

STRUCTURAL STEEL

1.0 GENERAL
1.1 STRUCTURAL STEEL & CONNECTIONS SHALL CONFORM TO CAN/CSA–S16.1–M & SHALL BE DESIGNED BY A LICENSED PROFESSIONAL ENGINEER EXPERIENCED IN THIS TYPE OF WORK.
1.2 REFER ALSO TO GENERAL NOTES, NOTES UNDER PLANS & TO THE SPECIFICATION .
1.3 WELDING SHALL CONFORM TO CSA STANDARD W59 AND BE PERFORMED BY A FABRICATOR CERTIFIED TO CSA W47.1. DIV 1 OF 2.1
1.4 BEAM CONNECTIONS SHALL BE DESIGNED FOR A MINIMUM OF 50% OF THE BEAM SHEAR CAPACITY UNLESS OTHERWISE NOTED, & IN NO CASE BE LESS THAN THE LOADS SHOWN ON OR IMPLIED BY THE DRAWINGS. WHEN EVER POSSBLE USE STANDARD DOUBLE HEADED AND TYPE CONNECTIONS. ALL CONNECTION TO BE AT LEAST HALF THE DEPTH OF THE BEAMS. USE SAFE CONNECTIONS AS REQUIRED BY THE MINISTRY OF LABOUR.
2.0 PRODUCTS
2.1 ALL STRUCTURAL STEEL MEMBERS SHALL CONFORM TO CAN/CSA–G40.20/G20.21–M. PLATES, SAG RODS, STRAP ANCHORS & BARS SHALL BE TYPE 300W AND WIDE FLANGE SECTION AND HOLLOW STUCTURAL SECTIONS SHALL BE TYPE 350W, CLASS C FOR SQUARE HSS & CLASS C FOR ROUND HSS.
2.2 BOLTS, NUTS & WASHERS FOR CONNECTIONS TO CONFORM TO ASTM A325 UNLESS NOTED.
2.4 ANCHOR BOLTS, NUTS & WASHERS FOR BASE PLATES, BEARING PLATES & WELD PLATES TO CONFORM TO ASTM A307 UNLESS NOTED.
2.5 SHEAR STUDS WHERE REQUIRED TO CONFORM TO ASTM A108, WELDING TO CONFORM TO CSA W59.
2.6 WELDING MATERIALS TO CONFORM TO CSA W48–M (SERIES).
2.7 POWER TOOL CLEAN ALL STEEL BEFORE PRIMING TO REMOVE ALL LOOSE MILL SCALE.
2.8 PRIMER PAINT TO CONFORM TO CAN/CGSB–1.40–M OR CISC/CPMA 2–75. TOP COAT TO BE INDUSTRIAL GRADE ENAMEL PAINT (AS PER ONTC REQUEST)

3.0 EXECUTION
3.1 FABRICATION, HANDLING & ERECTION TO CONFORM TO CAN/CSA–S16.1–M.
3.2 PROVIDE A MINIMUM OF 2–12mm (1/2") DIAMETER BY 250 (10") LONG WALL ANCHORS FOR ALL BEAM & OWSJ WALL PLATES ON MASONRY, OR AN APPROVED EQUAL, UNLESS OTHERWISE NOTED. BEAMS & JOIST SHOES TO BE WELDED TO BEARING PLATES.
3.3 PROVIDE ADJUSTABLE ANCHORS TO ALL STEEL TO BE BUILT INTO, ABUTTED BY, OR FACED WITH MASONRY (REFER ALSO TO DETAILS IF SHOWN). SPACING OF ANCHORS TO BE
.1 FOR VERTICAL SPACING.....600 (24") MAX. CENTRES
.2 FOR HORIZONTAL SPACING.....5 TIMES WALL THICKNESS* MAX. 1500 (5'–0") CENTRES
(*NOTE, USE BACK–UP WYTHE ONLY FOR CAVITY WALLS).
.3 WHERE STEEL PROVIDES LATERAL BRACING ONLY TO MASONRY (I.E. DOES NOT SUPPORT MASONRY) ANCHORS SHALL PERMIT DIFFERENTIAL VERTICAL MOVEMENT BETWEEN STRUCTURAL MEMBER & MASONRY. MINIMUM CLEARANCE SPAN/180 (MINIMUM 25mm 1")
3.4 CLEAN, PREPARE SURFACES AND SHOP PRIME STRUCTURAL STEEL COAT OF SPECIFIED PRIMER PAINT IN ACCORDANCE WITH CAN/CSA–S16.1–M, EXECPT WHERE MEMBERS ARE TO BE ENCASED IN CONCRETE. FIELD "TOUCH–UP' BOLTS, WELDS, BURNED OR SCRAPED SURFACES AFTER ERECTION..
3.6 PROVIDE ALL NECESSARY TEMPORARY BRACING TO KEEP STRUCTURE SAFE AND PLUMB. BRACING SHOWN ON STRUCTURAL DRAWINGS IS PERMANENT FOR FINISHED BUILDING ONLY.
3.7 CO–ORDINATE WITH MECHANICAL & ELECTRICAL CONSULTANTS & SUB–TRADES WHOSE WORK MAY EFFECT DETAILING, FABRICATION & ERECTION OF THE STEEL STRUCTURE.
3.8 TOLERANCES: VARIATION FROM PLUMB & LEVEL EXTERIOR COLUMNS AT ELEVATOR SHAFTS, & SPANDREL BEAMS INCLUDING ANGLES.....1:1000 MAX. 25mm (1/8" IN 10'–0" MAX.1")
OTHER PIECES.....1:500 (1/4" IN 10'–0")
3.9 NO HOLES OTHER THAN THOSE SHOWN ON REVIEWED SHOP DRAWINGS SHALL BE MADE IN ANY STEEL MEMBER WITHOUT WRITTEN PERMISSION OF THE STRUCTURAL CONSULTANT.
4.0 QUALITY CONTROL
4.1 SEE GENERAL NOTES, NOTES UNDER PLANS, &/OR SPECIFICATION FOR INSPECTION AND TESTING REQUIREMENT.?PREFABRICATED WOOD TRUSS NOTES

CAST–IN–PLACE CONCRETE NOTES

1.0 GENERAL
1.1 PROVIDE ALL LABOUR MATERIAL, TOOLS AND EQUIPMENT REQUIRED TO CARRY OUT THE WORK.
1.2 REFER ALSO TO GENERAL NOTES, NOTES UNDER PLANS AND SCHEDULES, TYPICAL DETAILS AND SPECIFICATION.
2.0 PRODUCTS
2.1 PORTLAND CEMENT, WATER AND AGGREGATES SHALL CONFORM TO CSA STANDARD A23.1.
2.2 PROVIDE AN APPROVED WATER REDUCING ADDITIVE IN ALL CONCRETE. PROVIDE AN APPROVED AIR ENTRAINING ADDITIVE IN ALL CONCRETE WHICH WILL BE EXPOSED TO A FREEZE/THAW CYCLE AND/OR THE ACTION OF DE–ICING SALT. ADMIXTURES SHALL CONFORM TO CSA STANDARD A23.5.
2.3 FORM WORK SHALL CONFORM TO CSA STANDARD A23.1, CSA STANDARD S269.3 AND FALSE WORK SHALL CONFORM TO CSA S269.1.
2.4 IF SO INSTRUCTED, THE DESIGNS FOR THE FORM WORK SHALL BE SUBMITTED FOR REVIEW BEFORE CONSTRUCTION. FORM WORK DRAWINGS AND DESIGN SHALL BEAR THE STAMP OF A LICENSED PROFESSIONAL ENGINEER.
2.5 UNLESS OTHERWISE NOTED PROVIDE SLAB & BEAM FORMS WITH AN UPWARD CAMBER OF 2mm/1000mm (1/4" PER 10'–0") OF SPAN, AND UPLIFT ENDS OF CANTILEVERED SLAB & BEAM FORMS 3mm/1000mm (1/4" PER 8'–0") OF CANTILEVER LENGTH.
2.6 PROVIDE STANDARD ADJUSTABLE MASONRY ANCHOR SLOTS FOR ALL MASONRY FACING OR ABUTTING CONCRETE FACES.
2.7 PROVIDE AND/OR INSTALL STANDARD ADJUSTABLE INSERTS & ALL OTHER CAST–IN INSERTS AS REQUIRED BY THE ARCHITECTURAL, STRUCTURAL, MECHANICAL & ELECTRICAL DRAWINGS & SPECIFICATION.
2.8 REINFORCING STEEL UNLESS SPECIFICALLY NOTED, SHALL BE DEFORMED BARS CONFORMING TO CAN/CSA–G30.18–M GRADE 400 (58000 PSI).
2.9 WELDED WIRE FABRIC TO CONFORM TO CSA G30.5–M.
2.10 REINFORCING SHALL BE DETAILED, BENT, PLACED AND SUPPORTED TO CONFORM TO ACI STANDARD 315 AND THE MANUAL OF STANDARD PRACTICE PUBLISHED BY THE REINFORCING STEEL INSTITUTE OF CANADA.
2.11 DRY–PACK GROUT TO BE 1 PART PORTLAND CEMENT TO 11/2 PARTS SAND TO 2 PARTS OF 8mm PEA GRAVEL WITH ONLY SUFFICIENT WATER TO DAMPEN MIXTURE. COMPRESSIVE STRENGTH 50MPa AT 28 DAYS.
2.12 NON–SHRINK GROUT TO BE AN APPROVED PRE–MIXED PROPRIETARY PRODUCT .
2.13 PROVIDE APPROVED EXTRUDED PVC WATER STOPS OF SIZE & STYLES INDICATED, WITH PRE–WELDED CORNERS & INTERSECTIONS. SEE ALSO TYPICAL DETAILS.
2.14 CURING AND SEALING COMPOUNDS WHERE APPROVED FOR USE TO CONFORM TO ASTM STANDARD C309. GENERALLY, ALL CONCRETE SURFACES ARE TO BE SEALED UNLESS NOTED OTHERWISE. COMPOUNDS ARE TO BE COMPATIBLE WITH APPLIED FINISHES.
3.0 EXECUTION
3.1 MINIMUM COMPRESSIVE STRENGTH FOR CONCRETE @ 28 DAYS SHALL BE AS FOLLOWS –25MPa FOR FOOTINGS
–25MPa FOR WALL AND PIERS
–25MPa FLOOR SLAB
3.2 SLUMP AT THE POINT OF DISCHARGE SHALL BE CONSISTENT AT 80mm +/–30mm (3" +/– 11/8") UNLESS NOTED OTHERWISE. GREATER SLUMPS ARE NOT ACCEPTABLE.
3.3 CONCRETE MIXING, TRANSPORTATION, HANDLING AND PLACING SHALL CONFORM TO CSA STANDARD A23.1.
3.4 CONSTRUCTION JOINTS FOR WALLS ARE BASED UPON VERTICAL JOINTS AT A MAXIMUM SPACING OF 10000mm (30'–0").
3.5 CONSTRUCTION JOINTS FOR WALLS, SLABS, AND BEAMS NOT SHOWN ON THE DRAWINGS SHALL BE APPROVED BY THE STRUCTURAL CONSULTANT BEFORE CONSTRUCTION. GENERALLY JOINTS IN SLABS SHALL BE AT RIGHT ANGLES TO THE SPANS, AT MID–SPAN IF POSSIBLE AND BE CLEAR OF SUPPORTS AND POINT LOADS.
3.6 INSERTS, FRAME–OUTS, SLEEVES, BRACKETS, CONDUITS AND FASTENING DEVICES, SHALL BE INSTALLED AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS IN A MANNER THAT SHALL NOT IMPAIR THE STRUCTURAL STRENGTH OF THE SYSTEM, BE SO INSTALLED THAT THEY SHALL NOT REQUIRE THE CUTTING, BENDING, OR DISPLACEMENT OF THE REINFORCING OTHER THAN AS SHOWN ON THE TYPICAL DETAILS.
3.7 ELECTRICAL CONDUIT SHALL NOT PASS THROUGH A COLUMN, SHALL NOT BE LARGER IN OUTSIDE DIAMETER THAN 1/3 SLAB THICKNESS OR WALL OR BEAM IN WHICH IT IS EMBEDDED, SHALL NOT BE SPACED CLOSER THAN 3 DIAMETERS ON CENTRE UNLESS APPROVED AND HAVE A MINIMUM CONCRETE COVER OF 25mm (1") AND UNLESS SPECIFICALLY PERMITTED OTHERWISE, SHALL NOT RUN HORIZONTALLY IN A CONCRETE WALL.
3.8 OPENINGS AND DRIVEN FASTENERS REQUIRED IN THE CONCRETE AFTER THE CONCRETE IS PLACED SHALL BE APPROVED BY THE STRUCTURAL CONSULTANT BEFORE PROCEEDING.
3.9 FINISHING, REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR REQUIRED FINISH TO EXPOSED CONCRETE. ALL HONEYCOMBING SHALL BE CUT OUT AND FILLED. FLOOR FINISHES SHALL BE AS REQUIRED BY THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS AND SHALL CONFORM TO CSA STANDARD A23.1 (CLASS A CONVENTIONAL SMOOTH CLASSIFICATION).
3.10 TOLERANCES FOR PLACING STRUCTURAL CONCRETE, REINFORCING STEEL, CAST–IN HARDWARE AND FOR FLOOR & ROOF FINISHES SHALL BE AS SPECIFIED IN CSA STANDARD A23.1.
3.11 MINIMUM REINFORCING FOR ANY CONCRETE WALL TO BE AS SHOWN ON TYPICAL DETAIL FOR CONCRETE WALLS.
3.12 MINIMUM REINFORCING FOR ANY SUSPENDED SLAB SHALL BE TEMPERATURE BARS BOTTOM EACH WAY PLUS 10M @ 400 (16") DOWLES 600x600 (2'–0" x 2'–0") TOP AROUND PERIMETER, REFER TO TYPICAL DETAIL OF ONE WAY SLABS.
4.0 QUALITY CONTROL
4.1 FOR INSPECTION AND TESTING, SEE GENERAL NOTES.

revision		
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LICENCED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
GENERAL NOTES

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scale: NTS	project no: 231978
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WOOD CONSTRUCTION

1.0 GENERAL
1.1 TRUSSES, BRACING, BRIDGING AND CONNECTORS ARE TO BE DESIGNED AND FABRICATED BY THE TRUSS FABRICATOR TO THE REQUIREMENTS OOF CAN/CSA–086–M OR CAN/CSA–086.1–M UNLESS OTHERWISE NOTED, TO SAFELY CARRY THE LOADS, INCLUDING ACCUMULATED SNOW DRIFT LOADS AS INDICATED ON THE DRAWINGS, AND ALL WIND LOADS.
1.2 DEFLECTION UNDER LIVE LOAD ONLY SHALL NOT EXCEED 1/240TH OF THE SPAN, EXCEPT THAT WHERE PLASTER OR GYPSUM BOARD CEILINGS ARE HUNG DIRECTLY FROM THE TRUSSES, LIVE LOAD DEFLECTION SHALL NOT EXCEED 1/360TH OF THE SPAN.
1.3 IDENTIFY LUMBER BY OFFICIAL GRADE MARKS.
1.4 WOOD PRESERVATIVE (PRESSURE TREATED):– WHERE REQUIRED TO CONFORM TO CAN/CSA–080–M.
1.5 SHOP DRAWINGS
.1 SUBMIT SHOP DRAWINGS FOR REVIEW AS DIRECTED BEARING THE STAMP OF THE LICENCED PROFESSIONAL ENGINEER RESPONSIBLE FOR THE DESIGN.
.2 CLEARLY INDICATE ON THE SHOP DRAWINGS, THE SPECIES, SIZES AND STRESS GRADES OF LUMBER USED.
.3 SHOW PITCH, SPAN, CAMBER CONFIGURATION, AND SPACING.
.4 INDICATE CONNECTOR TYPES, THICKNESSES, SIZES, LOCATION, DESIGN VALUES AND BRIDGING REQUIREMENTS.
.5 SHOW BEARING & WIND UPLIFT ANCHORAGE DETAILS.
.6 REVIEW OF THE SHOP DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR SEEING THAT THE WORK IS COMPLETE, ACCURATE AND IN CONFORMITY WITH THE STRUCTURAL DRAWINGS.
2.0 MATERIALS
2.1 LUMBER:–UNLESS OTHERWISE NOTED, TO BE SPF SPECIES, GRADE NO. 2 CONFORMING TO CSA STANDARD 0141 WITH MAXIMUM MOISTURE CONTENT OF 19% AT THE TIME OF FABRICATION.
2.2 CONNECTOR PLATES: – GALVANIZED SHEET STEEL TO ASTM A446 GRADE "A" WITH g90 "WIPED COAT" DESIGNATION, AND WITH HOLES, PLUGS, TEETH OR PRONGS UNIFORMLY SPACED AND FORMED.
2.3 NAILS:–ZINC COATED STEEL TO CSA STANDARD B111.
2.4 SCREW & LAG SCREWS:–CADMIUM PLATED STEEL TO CSA STANDARD B35.(SERIES)
2.5 SPLIT RINGS:–HOT ROLLED CARBON STEEL TO CAN/CSA–G40.20/G40.21–M, TYPE 260W.
2.6 PLYWOOD GUSSETS: – PLYWOOD TO CSA STANDARD 0121–M OR 0151–M.
3.0 EXECUTION
3.1 HOIST TRUSSES INTO POSITION IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3.2 INSTALL ALL NECESSARY TEMPORARY BRACING REQUIRED TO HOLD TRUSSES PLUMB UNTIL PERMANENT BRACING IS INSTALLED.
3.3 INSTALL PERMANENT BRACING AND RELATED COMPONENTS PRIOR TO APPLICATION OF LOADS TO TRUSSES.
3.4 TIGHTEN LOOSE CONNECTORS.
3.5 DO NOT CUT OR REMOVE CHORDS OR OTHER TRUSS MEMBERS. DO NOT NOTCH OR DRILL MEMBERS UNLESS SUCH NOTCHING OR DRILLING IS ALLOWED FOR IN THE DESIGN OF THE TRUSS.

CLADDING/FLASHING & EXTERIOR PANEL NOTES

1.0 DESIGN REQUIREMENTS
1.1 DESIGN METAL SIDING SYSTEM IN ACCORDANCE WITH CSA S136, S136.1 AND TO WITHSTAND LIVE, DEAD, LATERAL, WIND, SEISMIC, HANDLING, TRANSPORTATION, AND ERECTION LOADS
1.2 DESIGN METAL SIDING SYSTEM IN ACCORDANCE WITH FOLLOWING CLIMATE DESIGN DATA FOR COCHRANE ONTARIO CONTAINED IN ONTARIO BUILDING CODE
a. DESIGN TEMPERATURE: JANUARY 1%, JULY 2 1/2%
b. WIND (HOURLY WIND PRESSURES): 0.35kPa 1 IN 50 YEAR OCCURRENCE
GUST FACTOR: 2
c. EARTHQUAKE: SEISMIC DATA AS LISTED
1.3 DESIGN METAL SIDING SYSTEM TO LIMIT DEFLECTION UNDER DESIGN LOADS, TO L/240.
1.4 DESIGN METAL SIDING SYSTEM TO PREVENT RESTRICTION OF THERMAL INDUCED MOVEMENT WHICH WOULD INDUCE DEFORMATION SUCH AS WARPING, BUCKLING, AND FAILURE OF JOINT SEALS AND FASTENERS. DESIGN METAL SIDING TO PREVENT VIBRATION WHEN SUBJECT TO THE EFFECTS OF WIND.
1.5 DESIGN MISCELLANEOUS, ADDITIONAL STRUCTURAL FRAMING MEMBERS AND SAG RODS, REQUIRED TO COMPLETE METAL SIDING SYSTEM, WHERE NOT INDICATED ON CONTRACT DRAWINGS.
2.0 SUBMITTALS
2.1 SHOP DRAWINGS: SUBMIT SHOP DRAWINGS INDICATING ELEVATIONS, DETAILS, PROFILES, DIMENSIONS, THICKNESS OF MATERIALS, FINISHES, METHODS OF JOINING, ARRANGEMENT OF SHEETS, JOINTS, AND SEAMS, SPECIAL SHAPES, METHODS OF ANCHORING, ANCHOR AND CLIP DETAILS, TYPES OF SEALANTS AND GASKETS, WATERPROOF CONNECTIONS TO ADJOINING WORK, DETAILS OF OTHER PERTINENT COMPONENTS OF THE WORK (I.E. WINDOWS, PENETRATIONS, MEMBRANES, ETC) AND COMPLIANCE WITH DESIGN CRITERIA AND REQUIREMENTS AS NOTED ON CONTRACT DRAWINGS.
3.0 EXECUTION
3.1 INSTALL METAL SIDING IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS AND MANUFACTURER'S WRITTEN INSTRUCTIONS.
3.2 INSTALL METAL SIDING IN ONE PIECE, FULL HEIGHT, EXCEPT AS INDICATED OTHERWISE.
3.3 MAINTAIN JOINTS IN EXTERIOR SIDING, PLUMB, TRUE TO LINE, TIGHT FITTING, HAIRLINE JOINTS.
3.4 ATTACH METAL SIDING SYSTEM COMPONENTS TO PREVENT WARPING, BUCKLING, AND DEFORMATION INDUCED BY RESTRICTION OF THERMAL INDUCED MOVEMENT.
3.5 INSTALL CORNER PIECES, CLOSURES, FLASHING, ETC, WHERE SHOWN AND WHERE REQUIRED.
3.6 BED FLASHING, CLOSURES, AND CORNER PIECES IN SEALANT TO PROVIDE A WEATHERTIGHT INSTALLATION
3.7 CAULK AND SEAL ALL JOINTS, CORNERS, AND CLOSURE AREAS AS REQ'D TO MAKE WORK COMPLETE

LOAD–BEARING METAL STUDS NOTES

1.0 DESIGN REQUIREMENTS
1.1 DESIGN LOAD–BEARING METAL STUDS TO WITHSTAND LIVE, DEAD, WIND, SEISMIC, HANDLING, TRANSPORTATION, AND ERECTION LOADS.
1.2 DESIGN LOAD–BEARING METAL STUDS BASED ON LIMIT STATES DESIGN PRINCIPLES USING FACTORED LOADS AND RESISTANCES. LOADS AND LOAD FACTORS TO BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE (NBC). RESISTANCE FACTORS TO BE DETERMINED IN ACCORDANCE WITH THE NBC AND CAN/CSA–S136–M.
1.3 DESIGN BRIDGING TO PREVENT MEMBER ROTATION AND MEMBER TRANSLATION PERPENDICULAR TO THE MINOR AXIS. PROVIDE FOR SECONDARY STRESS EFFECTS DUE TO TORSION BETWEEN LINES OF BRIDGING.
1.4 DESIGN LOAD–BEARING METAL STUDS IN ACCORDANCE WITH FOLLOWING CLIMATE DESIGN DATA FOR COCHRANE CONTAINED IN THE ONTARIO BUILDING CODE:
1. DESIGN TEMPERATURE: JANUARY 1%, JULY 2 1/2%
2. WIND (HOURLY WIND PRESSURES): 0.35kPa 1 IN 50 YEAR OCCURRENCE.
1.5 DESIGN LOAD–BEARING METAL STUDS FOR THE FULL SPECIFIED DESIGN WIND LOAD WITH A DEFLECTION LIMIT OF L/360.
1.6 DESIGN LOAD–BEARING METAL STUDS WITHOUT RELYING ON SHEATHING OR GYPSUM BOARD TO RESIST TORSION AND WEAK AXIS BUCKLING.
2.0 SUBMITTALS
2.1 SHOP DRAWINGS: SUBMIT SHOP DRAWINGS INDICATING: WALL CONSTRUCTION, LOAD BEARING METAL STUD WALL SYSTEM, DESIGN LOADS, MEMBER SIZES, MATERIALS, COMPONENT DETAILS, DEPTH AND GAUGE DESIGNATION EXCLUSIVE OF COATING, LOCATION, AND SPACINGS OF FRAMING MEMBERS, CONNECTION AND BRACING DETAILS, BEARING, ANCHORAGE, LOADINGS, TEMPORARY BRACING, TYPES AND LOCATIONS OF MECHANICAL FASTENERS, AND SHEATHING
3.0 EXECUTION
3.1 INSTALL LOAD–BEARING STUDS IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS AND MANUFACTURER'S WRITTEN INSTRUCTIONS.
3.2 ERECT STUDS PLUMB, ALIGNED AND SECURELY ATTACHED WITH 2 SCREWS MINIMUM AT EACH POINT OF ATTACHEMENT. ANCHOR TRACKS SECURELY @ 400 O.C
1. ALL SCREWS TO BE PANHEAD No 10 U.N.O
2. ALL BRIDGING SCREWS TO BE No. 10 HEXHEAD SELF TAPPING FRAMING SCREWS
3. USE HILTI 1/4" DIAMETER ZAMAC PIN BOLT TO FASTEN STUDS & TRACKS TO CONCRETE. MINIMUM EMBEDDMENT 32MM

SPRAYED INSULATION – POLYURETHANE FOAM NOTES

1.0 MATERIALS
1.1 ALL MATERIALS UNDER WORK OF THIS SECTION, INCLUDING BUT NOT LIMITED TO, PRIMERS SEALANTS ARE TO HAVE LOW 'VOC' CONTENT LIMITS
1.2 SPRAYED FOAM INSULATION: SPRAYED/FROTHED POLYURETHANE FOAM CONFORMING TO CAN/ULC S705.1 AND CONTAINING NO FLUROCARBONS AND CONFORMING TO THE FOLLOWING MINIMUM REQUIREMENTS:
a. AGED RSI FACTOR: 0.97 PER 25mm TO CAN/ULC S770.
b. CLOSED CELLS (ASTM D2856): 92%
c. COMPRESSIVE STRENGTH (ASTM D1621): 186 kPa (27.0 PSI).
d. WATER ABSORPTION (ASTM E96): 50mm SAMPLE 42 NG/Pa*s*M² (0.70 PERMS).
e. FLAME SPREAD: <500.
f. SMOKE DEVELOPED: <500.
g. BLOWING AGENT: PRODUCT TO UTILIZE ZERO ODS (OZONE DEPLETING SUBSTANCE) BLOWING.
h. RECYCLED CONTENT: >5% RECYCLED CONTENT BY MASS OF FINISHED PRODUCT.
i. SPRAYED URETHANE FOAM: 'WALLTITE ECO V.2' BY BASF OR 'HEATLOK SOYA' BY DEMILEC INC.
1.3 PRIMERS: AS RECOMMENDED BY SPRAYED FOAM INSULATION MANUFACTURER

2.0 PREPARATION
2.1 VERIFY SUBSTRATE SURFACES ARE SOLID, FREE FROM SURFACE WATER, FROZEN MATTER, DUST, OIL, GREASE, SCALING OR LAITANCE, PROJECTIONS AND ANY OTHER FOREIGN MATTER DETRIMENTAL TO PERFORMANCE.
–TO SUIT MANUFACTURER'S APPROVED SUBSTRATE
2.2 SUPPLY AND INSTALL TEMPORARY PROTECTION TO ADJACENT SURFACES TO PREVENT DAMAGE RESULTING FROM WORK OF THIS SECTION.
2.3 IF REQUIRED, APPLY PRIMER TO SUBSTRATE SURFACES IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTION.

3.0 EXECUTION
3.1 INSTALL INSULATION IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS
3.2 APPLY SPRAYED FOAM INSULATION TO THICKNESS INDICATED ON DRAWINGS. APPLY INSULATION TO WITHIN 6mm OF THICKNESS INDICATED ON DRAWINGS. PROVIDE ONE MEASURING PIN FOR EVERY 50M².
3.3 INSULATION THICKNESS GREATER THAN 50mm SHALL BE COMPLETED IN A MINIMUM OF 2 STEPS
3.4 INSULATION TO BE CONTINUOUS, LEVEL, PLUMB, AND UNIFORM THICKNESS THROUGHOUT. INSULATION SHALL BE FREE OF VOIDS AND IMBEDDED FOREIGN MATERIALS.

POLYVINYL–CHLORIDE ROOFING

1.0 GENERAL
1.1 THIS SECTION SHALL BE READ IN ITS ENTIRETY
1.2 EXAMINATION RESPONSIBILITIES
1.2a PRIOR TO COMMENCING, EXAMINE ALL SURFACES, SUBSTRATES, EXISTING AND AS–BUILT CONDITIONS RELATING TO THE WORK IN THIS SECTION, AS REQUIRED TO VERIFY CONDITIONS ARE ACCEPTABLE FOR EXECUTING THE WORK OF THIS SECTION.
1.2b REPORT IN WRITING TO THE CONTRACTOR ANY DEFECTS OR DEFICIENCIES THAT WILL ADVERSELY AFFECT THE WORK OF THIS SECTION. DO NOT COMMENCE WORK UNTIL ANY/ALL SUCH DEFECTS HAVE BEEN CORRECTED
1.2c COMMENCEMENT OF THE WORK OF THIS SECTION SHALL IMPLY ACCEPTANCE OF ALL SURFACES, SUBSTRATES, EXISTING AND AS–BUILT CONDITIONS RELATED TO THE WORK OF THIS SECTION
1.3 SECTION INCLUDES:
PROVISION OF ALL LABOUR, MATERIALS, EQUIPMENT AND INCIDENTAL SERVICES NECESSARY TO PROVIDE POLYVINYL–CHLORIDE ROOFING WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
1.4 REFERENCES
1.4a ASTM INTERNATIONAL
ASTM C 726–05e1, STANDARD SPECIFICATION FOR MINERAL FIBER ROOF INSULATION
ASTM C 728–05, STANDARD SPECIFICATION FOR PERLITE THERMAL INSULATION BOARD.
ASTM C 1002–07, STANDARD SPECIFICATION FOR STEEL SELF–PIECING TAPPING SCREWS FOR THE APPLICATION OF GYPSUM PANEL PRODUCTS OR METAL PLASTER BASES TO WOOD STUDS OR STEEL STUDS
ASTM C 1177/C 1177M–08, STANDARD SPECIFICATION FOR GLASS MAT GYPSUM SUBSTRATE FOR USE AS SHEATHING
ASTM C 1396/C 1396M–09, STANDARD SPECIFICATION FOR GYPSUM BOARD.
ASTM D 4434–09, STANDARD FOR POLYVINYL CHLORIDE SHEET ROOFING.
1.4b CSA INTERNATIONAL
CSA A123.21–04, STANDARD TEST METHOD FOR THE DYNAMIC WIND UPLIFT RESISTANCE OF MECHANICALLY ATTACHED MEMBRANE–ROOFING SYSTEMS
CSA A231.1–2006, PRECAST CONCRETE PAVING SLABS/PRECAST CONCRETE PAVERS.
CSA 0121–08, DOUGLAS FIR PLYWOOD
CSA 0151–09, CANADIAN SOFTWOOD PLYWOOD
1.4c GREEN SEAL ENVIRONMENTAL STANDARDS (GSES)
GS–36–00, COMMERCIAL ADHESIVES
1.4d UNDERWRITERS' LABORATORIES OF CANADA (ULC)
CAN/ULC–S701–05, STANDARD OF THERMAL INSULATION, POLYSTYRENE, BOARDS AND PIPE COVERING.
CAN/ULC–S702–09, STANDARD FOR THERMAL INSULATION MINERAL FIBRE FOR BUILDINGS.
CAN/ULC–S704–03, STANDARD FOR THERMAL INSULATION, POLYURETHANE AND POYLISOCYANURATE, BAORDS, FACED.
CAN/ULC–S706–09, STANDARD TEST METHOD FOR DETERMINATION OF LONG–TERM THERMAL RESISTANCE OF CLOSED–CELL THERMAL INSULATING FOAMS.
1.5 SUBMITTALS
1.5a PRODUCT DATA:
–TECHNICAL ROOFING COMPONENT DATASHEETS DESCRIBING MATERIALS' PHYSICAL PROPERTIES AND INCLUDE PRODUCT CHARACTERISTICS, PERFORMANCE CRITERIA, PHYSICAL SIZE, FINISH AND LIMITATIONS.
–MANUFACTURER'S INSTALLATION INSTRUCTIONS TO INDICATE SPECIAL HANDLING CRITERIA, INSTALLATION SEQUENCE, CLEANING PROCEDURES AND ANY SPECIAL PRECAUTIONS REQUIRED FOR SEAMING THE MEMBRANE
–WHMIS MSDS MAERIAL SAFETY DATA SHEETS.
1.5b SHOP DRAWINGS:
SUBMIT SHOP DRAWINGS INDICATING ROOF LAYOUT, SECTIONS, DETAILS, MATERIALS, FASTENERS LAYOUT, FLASHINGS AND MEMBRANE TERMINATIONS, PERIMETER SECUREMENT, VAPOUR RETARDER TERMINATIONS, SEAMS AND LAYOUT, INSULATION WRAPPING PROCEDURES, TAPERED INSULATION LAYOUT, MEMBRANE PENETRATIONS, SCUPPER AND ROOF ACCESSORIES
–SHOP DRAWING SUBMISSION TO IDENTIFY ANY SPECIFIC SYSTEM REQUIREMENTS, MATERIALS, COMPONENTS, FASTENING METHODS, ETC. AS REQUIRED TO ENSURE ALL PROVISIONS TO ADDRESS THE PROJECT DESIGN REQUIREMENTS RELATIVE TO THIS PROJECT.
1.5c CERTIFICATES AND REPORTS:
–SUBMIT COPY OF MEMBERSHIP IN GOOD STANDING OF CANADIAN ROOFING CONTRACTORS ASSOCIATION (CRCA) OR ONTARIO INDUSTRIAL ROOFING CONTRACTORS ASSOCIATION (OIRCA).
–MANUFACTURER'S CERTIFICATE CERTIFYING THAT PRODUCTS MEET OR EXCEED SPECIFIED REQUIREMENTS.
– LABORATORY TEST REPORTS CERTIFYING ROOFING MATERIAL AND MEMBRANE COMPLIANCE WITH SPECIFICATION REQUIREMENTS
1.6 QUALITY ASSURANCE
1.6a INSTALLER QUALIFICATIONS: COMPANY IN SPECIALIZING IN APPLICATION OF PVC ROOFING SYSTEMS WITH A MINIMUM OF FIVE (5) YEARS DOCUMENTED EXPERIENCE ON INSTALLATIONS OF SIMILAR COMPLEXITY AND SCOPE, APPROVED BY THE MANUFACTURER.
1.6b APPLY ROOFING MEMBRANES BY MECHANICS SKILLED IN ROOFING WORK IN ACCORDANCE WITH ROOF MEMBRANE MANUFACTURERS WRITTEN SPECIFICATIONS.
1.6c PERFORM HEAT WELDING OF ROOF MEMBRANES ONLY BY SKILLED WELDERS WHO HAVE SUCCESSFULLY COMPLETED A COURSE OF INSTRUCTION PROVIDED BY ROOF MEMBRANE MANUFACTURER.
1.6d CONTRACTOR TO NOTIFY NORTSHORE ENGINEERING PRIOR TO START OF ROOFING FOR INSPECTION SCHEDULE.
1.7 DELIVERY, STORAGE AND HANDLING
1.7a DELIVER ALL ROOFING MATERIALS IN ORIGINAL, UNOPENED CONTAINERS, COMPLETE WITH LABELS INDICATING BRAND NAME, CONTENT, USAGE INSTRUCTIONS AND SAFETY PRECAUTIONS. MEMBRANE ROLLS ARE TO BE LEFT IN THEIR UNOPENED PACKAGING UNTIL IMMEDIATELY PRIOR TO USE.
1.7b PROVIDE AND MAINTAIN DRY, OFF–GROUND IN WEATHERPROOF STORAGE.
1.7c STORE ROLLS OF PVC FLAT ON CROSS SUPPORTS.
1.7d REMOVE ONLY IN QUANTITIES REQUIRED FOR SAME DAY USE.
1.7e STORE INSULATION PROTECTED FROM SUNLIGHT AND WEATHER AND DELETERIOUS MATERIALS.
1.8 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS
1.8a TEMPERATURE, RELATIVE HUMIDITY, MOISTURE CONTENT:
–APPLY PVC MEMBRANE ONLY WHEN SUBSTRATE SURFACES AND AMBIENT TEMPERATURES ARE WITHIN MANUFACTURER'S PRESCRIBED LIMIT.
–DO NOT INSTALL PVC MEMBRANE WHEN TEMPERATURE REMAINS BELOW –5°C, OR WHEN WIND CHILL GIVES EQUIVALENT COOLING EFFECT.
–INSTALL PVC MEMBRANE ON DRY SUBSTRATE, FREE OF SNOW AND ICE. USE ONLY DRY MATERIALS AND APPLY ONLY DURING WEATHER THAT WILL NOT INTRODUCE MOISTURE INTO SYSTEM.
1.8b SAFETY:
COMPLY WITH REQUIREMENT OF WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) REGARDING USE, HANDLING, STORAGE, AND DISPOSAL OF ASPHALT, SEALING COMPOUNDS, PRIMERS AND CAULKING MATERIALS.
1.8c PROTECTION:
–PROTECT WORK OF OTHER SECTIONS FROM DAMAGE WHILE DOING THIS WORK. PROVIDE TARPAULINS AND OTHER COVERINGS, AS REQUIRED TO PROTECT ADJACENT WALL FINISHES AND SURFACES.
–ADEQUATE CARE SHOULD BE TAKEN BY ALL TRADES AND END USERS TO PROTECT COMPLETED MEMBRANES FROM MECHANICAL DAMAGE DURING AND AFTER CONSTRUCTION.
–PROTECT MEMBRANES FROM CONTACT WITH BITUMINOUS AND OTHER INCOMPATIBLE MATERIALS.
–SEAL EXPOSED EDGES OF MEMBRANE TO PREVENT WATER INFILTRATION INTO THE SYSTEM AT END OF EACH DAY'S WORK.
–PROTECT COMPLETED PORTIONS OF ROOFS FROM DAMAGE BY PLACING 19MM PLYWOOD ON 25MM EXTRUDED POLYSTYRENE TO SERVE AS RUNWAYS FOR MOVEMENT OF MATERIALS AND OTHER TRAFFIC.
–PROTECT PARTIALLY COMPLETED WORK OF THIS SECTION LEFT EXPOSED LONGER THAN EIGHT (8) HOURS.
1.9 EXTENDED WARRANTY
PROVIDE A MANUFACTURER'S SYSTEM WARRANTY COVERING DEFECTS IN MATERIALS OR INSTALLATION WORKMANSHIP, INCLUDING WATERTIGHTNESS FOR A PERIOD OF THIRTY (30) YEARS FROM THE DATE OF SUBSTANTIAL PERFORMANCE.
1.10 DESCRIPTION OF ROOF MEMBRANE SYSTEMS (TYPES)
PROVIDE ROOF MEMBRANE SYSTEMS (TYPES) AS INDICATED
ROOF TYPE 1 (FROM TOP DOWN)
–80 MILS (2MM) SINGLY PLY PVC MEMBRANE: MECHANICALLY FASTENED
–TAPERED INSULATION WHERE INDICATED ON DRAWINGS OR REQUIRED BY ROOF SYSTEM MANUFACTURER
–TWO LAYERS OF 50MM ROOF INSULATION
–VAPOUR RETARDER
–ROOF SHEATHING
–STEEL ROOF DECK

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HEARST MECHANICAL SHOP
HEARST, ONTARIO

title GENERAL NOTES

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POLYVINYL-CHLORIDE ROOFING CONTINUED

PART 2 PRODUCTS

2.1 COMPATIBILITY
2.1a COMPATIBILITY BETWEEN COMPONENTS OF SYSTEM AND ADJACENT MATERIALS IS ESSENTIAL. PROVIDE CONFIRMATION TO CONSULTANT STATING THAT MATERIALS AND COMPONENTS, AS ASSEMBLED IN SYSTEM, MEET THIS REQUIREMENT.
2.2 ACCEPTABLE MANUFACTURERS
2.2a PRODUCTS SPECIFIED HEREIN ARE BY SIKA SARNAFIL CANADA INC.
2.2b ALTERNATE PRODUCTS BY ONE OF THE FOLLOWING MANUFACTURER'S, WHICH MEET OR EXCEED THE MATERIAL SPECIFICATIONS AND ARE ACCEPTABLE AS PART OF THE ROOF MANUFACTURER'S THIRTY (30) YEAR SYSTEMS WARRANTY AS SPECIFIED, WILL BE ACCEPTED
-CARLISLE SYNTECT CANADA
-JOHNS MANVILLE
-LEXSUCO CORPORATION
2.3 ROOFING SYSTEM MATERIALS
2.3a PVC MEMBRANE: FLEXIBLE POLYVINYL CHLORIDE PVC SHEET MEMBRANE TO ASTM D4434, MECHANICALLY FASTENED, CLASS B, TYPE III NON-WOVEN POLYESTER REINFORCED, UV RESISTANT C/W ACRYLIC DIRT REPELLANT COATING.
1) MINIMUM OVERALL THICKNESS OF PVC MEMBRANE: 80MILS (2mm) THICK.
2) MINIMUM THICKNESS ABOVE THE SCRIM: 40MILS (1mm)
3) MEMBRANE COLOUR: WHITE
4) SOLAR REFLECTIVE INDEX (SRI) ASTM E1980-01: MINIMUM 78
ACCEPTABLE MATERIAL: 'SARNAFIL S327.20 ENERGYSMART ROOF MEMBRANE' (OR APPROVED EQ.)
2.3b TAPERED INSULATION: TO CAN/ULC-S704, TYPE 2, CLASS 3, CLOSED-CELL POLYISOCYANURATE FOAM MANUFACTURED USING HCFC-FREE BLOWING AGENTS, AND WITH PROPRIETARY GLASS SCRIM, BOTH SIDES.
1) ACCEPTABLE MATERIAL: 'SARNATHERM TAPERED' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.3c ROOF INSULATION: TO CAN/ULC-S704, TYPE 2, CLASS 3, CLOSED-CELL POLYISOCYANURATE FOAM MANUFACTURED USING HCFC-FREE BLOWING AGENTS, AND WITH PROPRIETARY GLASS SCRIM, BOTH SIDES. 76MM (3") THICKNESS.
1) ACCEPTABLE MATERIAL: 'SARNATHERM III' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.3d VAPOUR RETARDER: LOOSE-LAID VAPOUR RETARDER TO CAN/CGSB-51.34
1) ACCEPTABLE MATERIAL: 'SARNAVAP 10', BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.3e ROOF SHEATHING: TO ASTM C1177/C117M, 13mm (1/2") THICK.
1) ACCEPTABLE MATERIAL: 'DENS DECK' BY GEORGIA-PACIFIC BUILDING PRODUCTS. (OR APPROVED EQ.)
2.4 ACCESSORIES
2.4a EDGE AND FASCIA FLASHING: PVC CLAD GALVANIZED STEEL, 0.76mm (0.030", 22 GAUGE) BASE METAL THICKNESS, COLOUR AS LATER SELECTED BY CONSULTANT TO MATCH CLADDING AS PER CONTRACT DOCUMENTS.
1) ACCEPTABLE MATERIALS: 'SARNACLAD' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4b STEEL TERMINATION STRIPS, "U" SHAPED STEEL CHANNELS, AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIALS; 'SARNABAR' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4c DRAIN: HINGED STRAINER TYPE, ALUMINUM C/W PVC COATED FLANGES AND ALUMINUM SUPER DOME AND MJ CLAMP.
1) ACCEPTABLE MATERIAL: 'RD-4A' VANDALPROOF ALUMINUM ROOF DRAIN', BY THALER (OR APPROVED EQ.)
2.4d FASTENERS: #15 STEEL, CLIMASEAL COATED, F.M LISTED, FASTENERS. MINIMUM STEEL DECK PENETRATION 19MM (3/4"), MAXIMUM DECK PENETRATION 32MM (1 1/4")
1) ACCEPTABLE MATERIAL: 'SARNAFASTENER XP' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4e MEMBRANE PLATES: 20 GAUGE AZ-50 GALVALUME COATED, ROUND STEEL PLANT, 60MM (2-3/8") DIAMETER, AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIAL: 'SARNADISC 2-3/8"' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4f INSULATION PLATE: 75MM (3") SQUARE OR ROUND, 26 GAUGE STAMPING OF SAE 1010 STEEL WITH AN AZ 55 GALVALUME COATING, AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIAL: 'SARNAPLATE XP"' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4g FASTENING BAR: AN FM-APPROVED HEAVY-DUTY, 14 GAUGE, GALVANIZED OR STAINLESS, ROLL-FORMED STEEL BAR USED TO ATTACH MEMBRANE TO ROOF DECKS. THE FORMED STEEL IS PRE-PUNCHED WITH HOLES EVERY 25MM (1") ON CENTRE TO ALLOW VARIOUS FASTENER SPACING OPTIONS AS RECOMMENDED BY PVC MEMBRANE MANUFACTURER.
1) ACCEPTABLE MATERIAL: 'SARNASTRIP"' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2.4h FOAM ROD TUBING: FOAM ROD TUBING, COMPATIBLE WITH ROOF SYSTEM, AND AS REQUIRED FOR EXPANSION JOINT WORK AT CURBS AND INTERFACE WITH EXISTING CONSTRUCTION.
2.4i ROOF SCUPPER: PRE-MANUFACTURED PVC COATED SCUPPER SIZE AND PROFILE AS INDICATED ON DRAWINGS.
2.5 WALKWAY MEMBRANE: POLYESTER REINFORCED, 2.4MM (0.096"), MEMBRANE WITH SURFACE EMBOSSMENT, 1000MM (39.3") WIDE, HEAT WELED TO FIELD MEMBRANE:
1) ACCEPTABLE MATERIALS: 'SARNATRED - V' BY SIKA SARNAFIL CANADA INC. (OR APPROVED EQ.)
2) PROVIDE WALKWAY MEMBRANE AS INDICATED ON DRAWINGS AND TO ALL ROOF TOP UNITS.
2.6 ROOF ACCESS HATCH
ROOF ACCESS HATCH: PRE-ASSEMBLED 915mm x 762mm SINGLE LEAF POLYCARBONATE ROOF HATCH. EPDM RUBBER GASKET ADHERED TO COVER. COVER TO CONSIST OF ALUMINUM EXTRUSION CHANNEL WITH UV-RESISTANT POLYCARBONATE DOUBLE DOMES. 305MM HIGH CURB WITH INTEGRAL FLASHING, INSULATION AND FULL WELDED CORNERS. LIFTING MECHANISM WILL BE COMPRESSION SPRING OPERATORS ENCLOSED IN TELESCOPTIC TUBES. SLAM LATCH WITH INTERIOR AND EXTERIOR TURN HANDLES AND PADLOCK HASPS.

POLYVINYL-CHLORIDE ROOFING CONTINUED

PART 3 EXECUTION

3.1 PROTECTION
3.1a COVER WALLS AND ADJACENT WORK WHERE MATERIALS HOISTED OR USED.
3.1b USE WARNING SIGNS AND BARRIERS. MAINTAIN IN GOOD ORDER UNTIL COMPLETION OF WORK.
3.1c DISPOSE OF RAIN WATER AWAY FROM FACE OF BUILDING UNTIL DRAINS OR HOPPERS INSTALLED AND CONNECTED.
3.1d PROTECT FROM TRAFFIC AND DAMAGE. COMPLY WITH PRECAUTIONS DEEMED NECESSARY BY CONSULTANT.
3.1e PLACE PLYWOOD RUNWAYS OVER WORK TO ENABLE MOVEMENT OF MATERIAL AND OTHER TRAFFIC.
3.1f AT END OF EACH DAY'S WORK OR WHEN STOPPAGE OCCURS DUE TO INCLEMENT WEATHER, PROVIDE PROTECTION FOR COMPLETED WORK AND MATERIALS OUT OF STORAGE.
3.1g SEAL AND BALLAST EXPOSED EDGES.
3.2 SUBSTRATE EXAMINATION
3.2a EXAMINE AND IMMEDIATELY INFORM CONSULTANT IN WRITING OF DEFECTS.
3.2b PRIOR TO COMMENCEMENT OF WORK ENSURE:
-SUBSTRATES ARE FIRM, STRAIGHT, SMOOTH, DRY, FREE OF SNOW, ICE OR FROST, AND SWEPT CLEAN OF DUST AND DEBRIS.
-CURBS HAVE BEEN BUILT
-WORK IS READY TO RECEIVE ROOF PARAPET UPSTAND
-DRAINS HAVE BEEN INSTALLED AT PROPER ELEVATIONS RELATIVE TO FINISHED SURFACE
-PLYWOOD AND LUMBER NAILER PLATES HAVE BEEN INSTALLED TO WALLS AND PARAPETS AS INDICATED
3.3 ROOF SHEATHING
3.3a INSTALL ROOF SHEATHING PANELS WITH LONG SIDE PARALLEL TO DECK FLUTES
3.3b STAGGER END JOINTS
3.4 VAPOUR RETARDER
3.4a LOOSE-LAID VAPOUR RETARDER:
-INSTALL VAPOUR BARRIER LOOSELY LAID OVER SUBSTRATE.
-OVERLAP ALL EDGES 100mm (4") AND SEAL WITH ISOBUTYL TAPE
-EXTEND VAPOUR BARRIER TO PERIMETER AND DECK PROTRUSIONS. SEAL ALL ENDS WITH ISOBUTYL TAPE TO PROVIDE CONTINUITY OF BUILDING AIR/VAPOUR ENVELOPE.
3.5 INSULATION APPLICATION (MECHANICALLY FASTENED)
3.5a INSTALL ROOF INSULATION BOARDS, CUT AND TRIMMED TO PROVIDE PLAIN BUTT JOINTS AT PERIMETERS, PARAPETS, CURBS, ETC.
3.5b LAY INSULATION BOARDS IN PARALLEL COURSES, BUTTED TOGETHER TIGHTLY IN FIRM CONTRACT WITH ONE ANOTHER, WITHOUT GAPS, COMPLETE WITH STAGGERED END JOINTS.
3.5c INSTALL ADDITIONAL LAYERS WITH JOINTS OFFSET FROM UNDERLYING LAYER.
3.5d INSTALL TAPERED INSULATION IN LOCATIONS AS INDICATED ON ROOF PLAN
3.5e MECHANICALLY FASTEN INSULATION TO THE DECK WITH APPROVED FASTENERS AND PLATES AT A RATE OF 1/4 FT², OR AS PER THE RECOMMENDATIONS OF INSULATION MANUFACTURER AND AS REQUIRED TO MEET THE REQUIREMENTS OF THE ROOF SYSTEMS WARRENTY AS SPECIFIED UNDER THIS SECTION. THE QUANTITY AND LOCATIONS OF THE FASTENERS AND PLATES SHALL ALSO CAUSE THE INSULATION BOARDS TO REST EVENLY ON THE ROOF DECK/SUBSTRATE SO THAT THERE ARE NO SIGNIFICANT AND AVOIDABLE AIR SPACES BETWEEN THE BOARDS AND THE SUBSTRATE. EACH INSULATION BOARD SHALL BE INSTALLED TIGHTLY AGAINST THE ADJACENT BOARDS ON ALL SIDES.
3.6 MEMBRANE APPLICATION (MECHANICALLY FASTENED)
3.6a INSPECT SURFACE OF THE INSULATION OR SUBSTRATE PRIOR TO INSTALLATION OF THE ROOF MEMBRANE. THE SUBSTRATE SHALL BE CLEAN, DRY, FREE FROM DEBRIS AND SMOOTH WITH NO SURFACE ROUGHNESS OR CONTAMINATION. BROKEN, DELAMINATED, WET OR DAMAGED INSULATION BOARDS SHALL BE REMOVED AND REPLACED.
3.6b ATTACH MEMBRANE WITH FASTENERS AND DISCS ACCORDING TO MEMBRANE MANUFACTURER'S REQUIREMENTS
3.6c SHINGLE MEMBRANE OVERLAPS WITH THE FLOW OF WATER WHERE POSSIBLE.
3.6d USE FULL-WIDTH ROLLS AND FASTEN PERPENDICULAR TO THE DIRECTION OF THE STEEL DECK FLUTES, WOOD, PLANK, PRECAST OR CEMENTITIOUS WOOD FIBER PANEL WHERE POSSIBLE.
3.6e TACK WELDING OF FULL OR HALF-WIDTH ROLLS FOR PURPOSES OF TEMPORARY RESTRAINTS DURING INSTALLATION IS NOT PERMITTED. CONSULT MEMBRANE MANUFACTURER'S TECHNICAL DEPARTMENT FOR FURTHER INFORMATION.
3.6f PERIMETER AND CORNER AREAS: OVER THE PROPERLY INSTALLED AND PREPARED SUBSTRATE SURFACE, HALF-WIDTH ROLLS ARE TO BE INSTALLED PARALLEL WITH THE ENTIRE PERIMETER EDGE. THE NUMBER OF ADJACENT HALF-ROLLS WILL BE DETERMINED BY BUILDING HEIGHT AND WIDTH AND OTHER CONDITIONS ACCORDING TO MEMBRANE MANUFACTURER. INSTALL FASTENERS AND PLATES ALONG THE EDGE OF MEMBRANE ON THE FASTENING LINE AT A SPACING DETERMINED BY MEMBRANE MANUFACTURER AND OWNER'S REPRESENTATIVE/DESIGNER. HOLD BACK PLATES 25mm (1") FROM THE OUTER EDGE OF THE MEMBRANE. POSITION ADJACENT HALF-ROLL TO OVERLAP THE FASTENED EDGE OF THE FIRST HALF-ROLL BY 140mm (5-1/2") IN ACCORDANCE WITH THE OVERLAP LINES MARKED ON ITS EDGE. THE 140mm (5-1/2") OVERLAP WILL ALLOW THE TOP MEMBRANE TO EXTEND 63mm (2-1/2") PAST THE PLATES FOR HEAT-WELDING. FASTENERS SHALL CLAMP THE MEMBRANE TIGHTLY TO THE SUBSTRATE. IN CORNER AREAS WHERE PERIMETER HALF-ROLLS INTERSECT, ADD ROWS OF FASTENERS AND PLATES OVER THE TOP OF HALF-ROLLS AND WELD A COVERSTRIP ABOVE THEM FOR WATERTIGHTNESS. SEE DETAIL DRAWINGS.
1) PERIMETER AREA IS DEFINED AS OUTER BOUNDARY OF THE ROOF. IF THE ROOF IS BROKEN INTO DIFFERENT LEVELS, EACH ROOF AREA SHALL BE TREATED AS AN INDIVIDUAL ROOF WITH ITS OUTER BOUNDARY BEING TREATED AS A PERIMETER. TYPICALLY, INTERNAL EXPANSION JOINTS AND FIREWALLS ARE NOT CONSIDERED TO BE FULL PERIMETERS.
2) THE RIDGE AREA IS DEFINED AS THE HIGH POINT IN THE ROOF AREA FORMED BY TWO INTERSECTING PLANES. WHEN THE SUM OF THE SLOPES IS A MINIMUM OF 4" IN 12" (30 DEGREES) EACH SIDE OF THE RIDGE SHALL BE TREATED AS PERIMETER AREA.
3.6g HOT-AIR WELD OVERLAPS ACCORDING TO MEMBRANE MANUFACTURER'S REQUIREMENTS. SEAM TEST CUTS SHALL BE TAKEN AT LEAST THREE (3) TIMES PER DAY.
3.6h INTERIOR AREA OVER THE PROPERLY INSTALLED AND PREPARED SUBSTRATE SURFACE, S327 FULL WIDTH ROLLS ARE TO BE INSTALLED PERPENDICULAR TO THE STEEL DECK FLUTES, WOOD PLANK OR WOOD OR CONCRETE PANELS. FASTENERS AND DISCS ARE INSTALLED ALONG THE EDGE OF THE MEMBRANE ON THE FASTENING LINE AT A SPACING DETERMINED BY MEMBRANE MANUFACTURER AND OWNER'S REPRESENTATIVE/DESIGNER. HOLD BACK DISCS 25mm (1") FROM THE OUTER EDGE OF THE MEMBRANE. POSITION ADJACENT FULL-ROLL TO OVERLAP THE FASTENED EDGE OF THE FIRST FULL-ROLL BY 140mm (5-1/2") IN ACCORDANCE WITH THE OVERLAP LINES MARKED ON ITS EDGE. THE 140mm (5-1/2") OVERLAP WILL ALLOW THE TOP MEMBRANE TO EXTEND 63mm (2-1/2") PAST THE DISCS FOR HEAT-WELDING. FASTENERS SHALL CLAMP THE MEMBRANE TIGHTLY TO THE SUBSTRATE. SEE DETAIL DRAWINGS.
3.6i SECUREMENT AROUND ROOFTOP PENETRATIONS
1) AROUND ALL PERIMETERS, AT THE BASE OF WALLS, DRAINS, CURBS, VENT PIPES, OR ANY OTHER ROOF PENETRATIONS, FASTENERS AND DISCS SHALL BE INSTALLED ACCORDING TO PERIMETER RATE OF ATTACHMENT. FASTENERS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS. FASTENERS SHALL BE INSTALLED USING THE FASTENER MANUFACTURER'S RECOMMENDED TORQUE-SENSITIVE FASTENING TOOLS WITH DEPTH LOCATORS. FASTENERS SHALL CLAMP THE MEMBRANE TIGHTLY TO THE SUBSTRATE.
2) MEMBRANE FLASHINGS SHALL EXTEND 63mm (2-1/2") PAST THE DISCS AND BE HOT-AIR WELDED TO THE DECK MEMBRANE.
3.7 FLASHING
3.7a INSTALL PVC MEMBRANE FLASHINGS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
3.7b PENETRATIONS: INSTALL DRAINS PANS, VENT STACK COVERS AND OTHER PENETRATION FLASHINGS AND SEAL TO MEMBRANE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND DETAILS.
3.7c INSTALL ROOF MEMBRANE MANUFACTURER'S ATTACHMENT BAR WITH APPROVED FASTENERS INTO THE STRUCTURAL DECK AT THE BASE OF PARAPETS, WALLS AND CURBS.
3.7d INSTALL ROOF/PARAPET SCUPPER AS INDICATED ON DRAWINGS.
3.8 DRAIN INSTALLATION
3.8a ENSURE MJ CLAMP IS INSTALLED ON DRAIN STEM BEFORE FASTENING DRAIN TO DECK. REFER TO MECHANICAL SECTION FOR CONNECTION OF MJ CLAMP TO PLUMBING SYSTEM.
3.8b MECHANICALLY FASTEN DRAIN TO DECK WITH FOUR (4) FASTENERS. EXTEND PVC FLASHING MEMBRANE INTO DRAIN OPENING AND TRIM TO SUIT. INSTALL ISOBUTYL TAPE BETWEEN FLASHING MEMBRANE AND DRAIN HUB. INSTALL CAST ALUMINUM CLAMPING RING, AND TIGHTEN TO DRAIN HUB. SECURE VANDAL PROOF STRAINER TO CLAMPING RING.
3.9 WALKWAY MEMBRANE
INSTALL WALKWAY MEMBRANE ON ALL SIDES OF ROOFTOP MECHANICAL UNITS AS INDICATED ON ROOF PLAN.
3.10 FIELD QUALITY CONTROL
3.10a SUBMIT ALL MANUFACTURER'S ROOF INSPECTION REPORTS AS DESCRIBED IN ITEM 1.9 TO CONSULTANT.
3.10b AT THE REQUEST OF THE OWNER OF CONSULTANT, ADDITIONAL INSPECTION AND TESTING OF PVC ROOF MEMBRANE SYSTEM APPLICATION MAY BE CARRIED OUT BY A THIRD-PARTY AGENCY DESIGNATED BY THE CONSULTANT.
3.12 CLEANING
CLEAN TO CONSULTANT'S APPROVAL, SOILED SURFACES, SPATTERS, AND DAMAGE CAUSED BY WORK OF THIS SECTION.
CHECK DRAINS TO ENSURE CLEANLINESS AND PROPER FUNCTION, AND REMOVE DEBRIS, EQUIPMENT AND EXCESS MATERIAL FROM SITE.

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title
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RIGID BOARD AND BATT INSULATION – NOTES

PART 1 – GENERAL
1.1 SECTION INCLUDES
.1 BOARD INSULATION AT PERIMETER FOUNDATION WALL AND WALL CONSTRUCTION.
.2 THERMAL BATT AND BLANKET INSULATION.
1.2 REFERENCES
.1 ASTM C208–12(2017)E2 – STANDARD SPECIFICATION FOR CELLULOSIC FIBER INSULATING BOARD.
.2 ASTM C552–21– STANDARD SPECIFICATION FOR CELLULAR GLASS THERMAL INSULATION.
.3 ASTM C578–19 – STANDARD SPECIFICATION FOR RIGID, CELLULAR POLYSTYRENE THERMAL INSULATION.
.4 ASTM C591–21 – STANDARD SPECIFICATION FOR UNFACED PREFORMED RIGID CELLULAR POLYISOCYANURATE THERMAL INSULATION.
.5 ASTM C612–14(2019) – STANDARD SPECIFICATION FOR MINERAL FIBER BLOCK AND BOARD INSULATION.
.6 ASTM C665–17 – STANDARD SPECIFICATION FOR MINERAL–FIBER BLANKET THERMAL INSULATION FOR LIGHT FRAME CONSTRUCTION AND MANUFACTURED HOUSING.
.7 ASTM C1126–19 – STANDARD SPECIFICATION FOR FACED OR UNFACED RIGID CELLULAR PHENOLIC THERMAL INSULATION.
.8 ASTM C1289–21 – STANDARD SPECIFICATION FOR FACED RIGID CELLULAR POLYISOCYANURATE THERMAL INSULATION BOARD.
.9 ASTM E84–21A – STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.
.10 ASTM E96/E96M–16 – STANDARD TEST METHODS FOR WATER VAPOR TRANSMISSION OF MATERIALS.
.11 CAN/ULC–S102–18 – STANDARD METHOD OF TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS AND ASSEMBLIES.
.12 CAN/ULC–S701–11 – STANDARD FOR THERMAL INSULATION, POLYSTYRENE, BOARDS AND PIPE COVERING.
.13 CAN/ULC–S702–14 – STANDARD FOR MINERAL FIBRE THERMAL INSULATION FOR BUILDINGS.
.14 CAN/ULC–S703–09 (R2020) – STANDARD FOR CELLULOSE FIBRE INSULATION (CFI) FOR BUILDINGS.
.15 CAN/ULC–S704.1–17 – STANDARD FOR THERMAL INSULATION, POLYURETHANE AND POLYISOCYANURATE BOARDS, FACED.
.16 CAN/ULC–S770–15 – STANDARD TEST METHOD FOR DETERMINATION OF LONG–TERM THERMAL RESISTANCE OF CLOSED–CELL THERMAL INSULATING FOAMS.
.17 NFPA 255 – STANDARD METHOD OF TEST OF SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS, LATEST EDITION.
.18 ULC UNDERWRITERS LABORATORIES OF CANADA, ONLINE DIRECTORY.
1.4 SYSTEM DESCRIPTION
.1 PROVIDE A CONTINUOUS THERMAL BARRIER AT THE BUILDING ENVELOPE, IN CONJUNCTION WITH THERMAL INSULATING MATERIALS IN ROOF SYSTEM ASSEMBLIES.
.2 PROVIDE THERMAL PROTECTION FOR VAPOUR RETARDERS, IN CONJUNCTION WITH VAPOUR RETARDER MATERIALS IN SECTION 072600.
.3 PROVIDE THERMAL PROTECTION FOR AIR BARRIER SEAL MATERIALS AT THE BUILDING ENVELOPE, IN CONJUNCTION WITH AIR BARRIER MATERIALS IN SECTION 072700.
1.5 ADMINISTRATIVE REQUIREMENTS
.1 DIVISION 01: PROJECT MANAGEMENT AND COORDINATION PROCEDURES.
.2 COORDINATE WITH OTHER WORK HAVING A DIRECT BEARING ON WORK OF THIS SECTION, INCLUDING SECTION 072600 FOR VAPOUR RETARDERS AND SECTION 072700 FOR AIR BARRIERS.
1.6 SUBMITTALS FOR REVIEW
.1 PRODUCT DATA: DESCRIBE PRODUCT CHARACTERISTICS, PERFORMANCE CRITERIA, LIMITATIONS, AND TESTING TO APPLICABLE CRITERIA.
1.7 SUBMITTALS FOR INFORMATION
.1 INSTALLATION DATA: INDICATE SPECIAL ENVIRONMENTAL CONDITIONS REQUIRED FOR INSTALLATION, INSTALLATION TECHNIQUES, AND FASTENING DETAILS.
.2 MANUFACTURER'S CERTIFICATE: CERTIFY THAT PRODUCTS MEET OR EXCEED SPECIFIED REQUIREMENTS.

PART 2 – PRODUCTS
2.1 MANUFACTURERS – INSULATION MATERIALS
.1 MANUFACTURER'S OF HIGH–STRENGTH EXPANDED POLYSTYRENE (EPS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 ATLAS ROOFING CORPORATION / ATLAS EPS.
.2 MANUFACTURER'S OF EXTRUDED POLYSTYRENE (XPS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 DUPONT DE NEMOURS, INC.
.2 OWENS CORNING CANADA INC.
.3 MANUFACTURER'S OF POLYISOCYANURATE (ISO) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 ATLAS ROOFING CORPORATION.
.2 FIRESTONE BUILDING PRODUCTS.
.3 GAF MATERIAL CORPORATION.
.4 HUNTER PANELS.
.5 IKO INDUSTRIES LTD.
.6 SOPREMA.
.7 TREMCO CANADA.
.4 MANUFACTURER'S OF MINERAL GLASS FIBRE BATT (BB–INS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 CERTAINTEED INSULATION CANADA INC.
.2 KNAUF INSULATION.
.3 JOHN MANSVILLE.
.4 OWENS–CORNING CANADA INC.
.5 ROXUL (ROCKWOOL) INC.
.5 MANUFACTURER'S OF SOUND ATTENUATION MINERAL GLASS FIBRE BATT (SB–INS) INSULATION HAVING PRODUCTS CONSIDERED ACCEPTABLE FOR USE:
.1 CERTAINTEED INSULATION CANADA INC.
.2 KNAUF INSULATION.
.3 JOHN MANSVILLE.
.4 OWENS–CORNING CANADA INC.
.5 ROCKWOOL.
.6 SUBSTITUTIONS: REFER TO DIVISION 01.

2.2 RIGID BOARD INSULATION MATERIALS
.1 MOULDED POLYSTYRENE INSULATION (EPS) – FROST SLAB VOID FORM APPLICATION: CAN/ULC–S701, TYPE XIV; HIGH:STRENGTH EXPANDED POLYSTYRENE RIGID BOARD, WITH THE FOLLOWING CHARACTERISTICS:
.1 COMPRESSIVE STRENGTH: MINIMUM [275 KPA].
.2 AGED THERMAL RESISTANCE: CAN/ULC S770, [RSI–0.74] PER [25 MM] OF THICKNESS.
.3 WATER ABSORPTION: 2% BY VOLUME MAXIMUM.
.4 WATER VAPOUR PERMEANCE: ASTM E96, LESS THAN 130 NG/PA*S*M2

.5 BOARD THICKNESS: AS NOTED IN DRAWINGS.
.6 PRODUCT: THERMALSTAR X–GRADE 40 HIGH LOAD, MANUFACTURED BY ATLAS EPS.
.2 EXTRUDED POLYSTYRENE INSULATION (XPS) – CAVITY WALL, BELOW GRADE, UNDERSLAB APPLICATIONS: CAN/ULC–S701, TYPE 4; CLOSED CELLULAR TYPE, WITH INTEGRAL HIGH DENSITY SKIN CONFORMING TO THE FOLLOWING:
.1 COMPRESSIVE STRENGTH: [210 KPA].
.2 THERMAL RESISTANCE: [RSI–0.87].
.3 WATER ABSORPTION: 0.7% BY VOLUME MAXIMUM.
.4 WATER VAPOUR PERMEANCE: ASTM E96, LESS THAN 90 NG/PA*S*M2

2.2 RIGID BOARD INSULATION MATERIALS CONT'D
.5 BOARD SIZE: [600 X 2400 MM].
.6 BOARD THICKNESS: AS INDICATED ON DRAWINGS.
.7 BOARD EDGES: SHIPLAPPED.
.8 PRODUCT: STYROFOAM SM, MANUFACTURED BY DUPONT DE NEMOURS, INC.
.9 PRODUCT: FOAMULAR C–300, MANUFACTURED BY OWENS–CORNING CANADA INC.
.3 POLYISOCYANURATE INSULATION (ISO) – CAVITY WALL, ROOF APPLICATIONS: CAN/ULC–S704, TYPE 2 CLASS 3 OR TYPE 3 CLASS 3, GLASS FIBRE REINFORCED CORE, CLOSED CELL INSULATION CONFORMING TO THE FOLLOWING:
.1 COMPRESSIVE STRENGTH: [140 KPA].
.2 AGED THERMAL RESISTANCE: CAN/ULC S770, MINIMUM OF [RSI–0.98] PER [25 MM] OF THICKNESS.
.3 WATER ABSORPTION: 1.5% BY VOLUME MAXIMUM.
.4 WATER VAPOUR PERMEANCE: ASTM E96, LESS THAN 229 NG/PA*S*M2

.5 FACING: FACTORY APPLIED FACING OF GLASS REINFORCED MAT ON BOTH FACES.
.6 BOARD SIZE: [1220 X 1220 MM] OR [1220 X 2440 MM].
.7 BOARD THICKNESS: TO THICKNESS INDICATED ON DRAWINGS, BUT NOT LESS THAN [38 MM]; TOTAL THICKNESS AS INDICATED ON DRAWINGS USING A MINIMUM OF 2 LAYERS WITH OFFSET JOINTS.
.8 BOARD EDGES: SQUARE.
.9 FLAME/SMOKE PROPERTIES: MEETS CAN/ULC–S102, CAN/ULC–S107 AND CAN/ULC S126.
.10 PRODUCT: ACFOAM–III, MANUFACTURED BY ATLAS ROOFING CORPORATION.

2.3 BATT AND BLANKET INSULATION MATERIALS
.1 BATT INSULATION (BB–INS) – STUD WALL APPLICATION: CAN/ULC–S702, TYPE 1, NON–RIGID BOARD, FRICTION FIT, MANUFACTURED FROM GLASS ROCK OR SLAG FIBRES, WITH THE FOLLOWING CHARACTERISTICS:
.1 DENSITY: 32 KG/CU M WHEN TESTED TO ASTM C612.
.2 AGED THERMAL RESISTANCE: RSI–0.70 PER 25 MM OF THICKNESS.
.3 BATT SIZE: NOMINAL [415 X 1220 MM TO SUIT STUD SPACING AS INDICATED ON DRAWINGS.
.4 BATT THICKNESS: AS INDICATED ON DRAWINGS.
.5 FACING: UNFACED.
.6 BOARD EDGES: SQUARE.
.7 FLAME/SMOKE PROPERTIES: NON–COMBUSTIBLE TESTED TO CAN/ULC–S114.
.8 PRODUCT: COMFORTBATT AS MANUFACTURED BY ROCKWOOL.
.2 SOUND ATTENUATION BATT INSULATION (SB–INS) – SOUND SEPARATION APPLICATION: CAN/ULC–S702, TYPE 1, NON:RIGID BOARD, FRICTION FIT, MANUFACTURED FROM GLASS ROCK OR SLAG FIBRES, WITH THE FOLLOWING CHARACTERISTICS:
.1 NOISE REDUCTION COEFFICIENT: 1.10 AT 100MM THICKNESS, TO ASTM C423.
07 21 00

THERMAL INSULATION
.2 DENSITY: MINIMUM OF 40 KG/CU M WHEN TESTED TO ASTM C612.
.3 AGED THERMAL RESISTANCE: RSI–0.70 PER 25 MM OF THICKNESS.
.4 BATT SIZE: NOMINAL 415 X 1220 MM TO SUIT STUD SPACING AS INDICATED ON DRAWINGS.
.5 BATT THICKNESS: AS INDICATED ON DRAWINGS.
.6 FACING: UNFACED.
.7 BOARD EDGES: SQUARE.
.8 FLAME/SMOKE PROPERTIES: NON–COMBUSTIBLE TESTED TO CAN/ULC–S114.
.9 PRODUCT: AFB (ACOUSTICAL FIRE BATT) AS MANUFACTURED BY ROCKWOOL.
.10 PRODUCT: QUIETZONE ACOUSTIC AS MANUFACTURED BY OWENS–CORNING CANADA INC.
2.4 ADHESIVE MATERIALS
.1 ADHESIVE TYPE 1: TYPE RECOMMENDED FOR INTENDED USE BY BOTH INSULATION MANUFACTURER AND APPROVED BY THE AIR/VAPOUR BARRIER MANUFACTURER FOR THE APPLICATION. ENSURE CHEMICAL COMPATIBILITY OF ALL MATERIALS WHICH MAKE CONTACT WITH THE ADHESIVE.

PART 3 – EXECUTION
3.1 EXAMINATION
.1 VERIFY THAT SUBSTRATE, ADJACENT MATERIALS, AND INSULATION BOARDS ARE DRY AND READY TO RECEIVE INSULATION AND ADHESIVE.
.2 ENSURE AIR BARRIER SEALS AND VAPOUR RETARDERS ARE IN PLACE PRIOR TO INSTALLATION.
.3 VERIFY SUBSTRATE SURFACE IS FLAT, FREE OF IRREGULARITIES, MATERIALS OR SUBSTANCES THAT MAY IMPEDE ADHESIVE BOND, HONEYCOMB, FINS.
.4 VERIFY THAT ALL WALL, FLOOR AND CEILING CAVITIES TO BE INSULATED ARE NOT OBSTRUCTED AND THAT OPENINGS ARE SEALED TO PREVENT ESCAPE OF LOOSE FILL INSULATION.

3.2 INSTALLATION – GENERAL
.1 ONLY USE BOARDS WHICH ARE FREE FROM BROKEN OR CHIPPED EDGES.
.2 USE LARGEST SHEETS POSSIBLE.
.3 INSTALL
.4 OFFSET VERTICAL JOINTS IN SINGLE LAYER APPLICATION. OFFSET BOTH VERTICAL AND HORIZONTAL JOINTS IN MULTI–LAYERED INSTALLATION.
.5 DO NOT ENCLOSE INSULATION UNTIL IT HAS BEEN INSPECTED AND APPROVED BY CONSULTANT.

3.3 FIELD QUALITY CONTROL
.1 NOTIFY CONSULTANTS AND SPECIALIZED INSPECTORS FROM RELATED SECTIONS BEFORE, DURING AND UPON COMPLETION OF INSTALLATION.
.2 OBTAIN CONSULTANT APPROVAL PRIOR TO COVERING INSULATION.
3.4 PROTECTION OF FINISHED WORK
.1 DO NOT PERMIT WORK TO BE DAMAGED PRIOR TO COVERING INSULATION.
.2 PROTECT BATT INSULATION FROM WETTING.
.3 PROTECT INSULATION REQUIRING A THERMAL BARRIER TO REQUIREMENTS OF LOCAL AND PROVINCIAL LEGISLATION.
END OF SECTION

VAPOUR BARRIER NOTES

PART 1 – PRODUCTS
1.1 MATERIALS
.1 SHEET VAPOUR RETARDER (ABOVE GRADE EXTERIOR WALL APPLICATION): CAN/CGSB 51.34, CLASS I, POLYETHYLENE FILM FOR ABOVE GRADE APPLICATION, [0.15 MM] THICK; A MAXIMUM PERM RATING OF [2.3 NG/(PA•S•SQ M)].
.2 SHEET VAPOUR RETARDER (AROUND FRAMED CONNECTIONS): CAN/CGSB 51.34, CLASS I, POLYETHYLENE FILM FOR ABOVE GRADE APPLICATION, [0.25 MM] THICK; A MAXIMUM PERM RATING OF [2.3 NG/(PA•S•SQ M)].

1.2 ACCESSORIES
.1 CLEANER: NON–CORROSIVE TYPE; RECOMMENDED BY SEALANT MANUFACTURER; COMPATIBLE WITH ADJACENT MATERIALS.
.2 ADHESIVE: COMPATIBLE WITH SHEET BARRIER AND SUBSTRATE, PERMANENTLY NON–CURING.
.3 TAPE: POLYPROPYLENE FILM, UV RESISTANT, SELF–ADHERING TYPE, 75 MM WIDE, COMPATIBLE WITH SHEET MATERIAL, FORMULATED FOR USE IN A VAPOUR BARRIER SYSTEM.
.4 ELECTRICAL VAPOUR BARRIER BOX: RIGID, MOULDED POLYETHYLENE BOX WITH REINFORCED FLANGES.
.5 JOINT SEALANT: AS SPECIFIED IN SECTION 079200.

PART 2 – EXECUTION
2.1 EXAMINATION
.1 VERIFY CONDITION OF SUBSTRATE AND ADJACENT MATERIALS.
2.2 PREPARATION
.1 REMOVE LOOSE OR FOREIGN MATTER WHICH MIGHT IMPAIR ADHESION.
.2 ENSURE SURFACES TO RECEIVE VAPOUR RETARDER ARE CLEAN, DRY, AND FREE OF OIL, GREASE, DIRT, EXCESS MORTAR OR OTHER CONTAMINANTS.
.3 INSPECT ALL SURFACES TO RECEIVE THE MEMBRANE TO ENSURE THAT THEY ARE CONTINUOUS AND FREE OF VOIDS AND EXCESSIVE GAPS. BLOCKWORK SHALL BE COMPLETE AND LAID UP TIGHT TO ALL FRAMED OPENINGS. REPORT AND HAVE CORRECTED ANY DEFICIENCIES.
.4 CONCRETE TO CURE FOR A MINIMUM OF TWO (2) WEEKS PRIOR TO APPLICATION. ALLOW ADEQUATE DRYING TIME FOLLOWING PRECIPITATION AS RECOMMENDED BY MANUFACTURER.
.5 CLEAN AND PRIME SUBSTRATE SURFACES TO RECEIVE MEMBRANES, ADHESIVE, SEALANTS IN ACCORDANCE WITH MANUFACTURERS' WRITTEN INSTRUCTIONS. TO AVOID EXCESS PICK UP OF AIR BORNE DUST ONCE PRIMING HAS BEEN COMPLETED, PRIME ONLY AS MUCH AREA AS CAN BE COVERED WITH MEMBRANE THE SAME WORKING DAY, IF NOT COVERED IN THE SAME WORKING DAY, RE–PRIME.
.6 THE MEMBRANES AND ACCESSORY MATERIALS SHALL BE APPLIED AT AMBIENT TEMPERATURES SATISFACTORY TO THE MANUFACTURER AND UNDER DRY CONDITIONS ONLY.
2.3 INSTALLATION – POLYETHYLENE VAPOUR RETARDER
.1 INSTALL PRODUCTS AND MATERIALS TO SWRI SEALANT AND CAULKING GUIDE SPECIFICATION AND TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
.2 POLYETHYLENE SHEETS:
.1 POSITION JOINTS OR LAPS OF SHEETS OVER FIRM BEARING TO ACHIEVE AN EFFECTIVE AND PERMANENT SEAL.
.2 SEAL LAPS, JOINTS AND TERMINATIONS WITH AN APPROVED SEALANT TO ENSURE COMPLETE AND CONTINUOUS SEAL OF THE BUILDING ENVELOPE.
.3 APPLY SEALANT WITHIN RECOMMENDED APPLICATION TEMPERATURE RANGES. CONSULT MANUFACTURER WHEN SEALANT CANNOT BE APPLIED WITHIN THESE TEMPERATURE RANGES OR WHERE COMPATIBILITY WITH ADJACENT MATERIALS MAY BE IN DOUBT.
.4 INSTALL SHEET VAPOUR BARRIER ON WARM SIDE OF EXTERIOR WALL, CEILING AND FLOOR ASSEMBLIES PRIOR TO INSTALLATION OF GYPSUM BOARD TO FORM CONTINUOUS BARRIER.
.5 USE SHEETS OF LARGEST PRACTICAL SIZE TO MINIMIZE JOINTS.
.6 INSPECT SHEETS FOR CONTINUITY. REPAIR PUNCTURES AND TEARS WITH SEALING TAPE BEFORE WORK IS CONCEALED.
.7 DURING FRAMING INSTALLATION, WRAP HEADER TRACKS, SLAB ENDS AND OTHER CONSTRUCTIONS REQUIRING INSTALLATION DURING FRAMING, USING 10 MIL POLYETHYLENE SHEETS FOR LATER SEALING TO LARGER SHEETS. ENSURE SHEET IS INSTALLED WITH SUFFICIENT LENGTH/WIDTH TO ALLOW LAPPING AND SEALING TO OTHER MEMBRANES. SEAL THESE CONNECTING PIECES TO MEMBRANE AIR AND VAPOUR BARRIER WHERE REQUIRED.
.8 FOR WINDOWS AND OTHER WALL OPENINGS:
.1 CUT SHEET VAPOUR RETARDER TO FORM OPENINGS AND ENSURE MATERIAL IS LAPPED AND SEALED TO WINDOW FRAME OR OTHER OPENING FRAME TO FORM CONTINUOUS SEAL.
.2 SEAL VAPOUR RETARDER TO AIR BARRIER AND/OR MEMBRANE AIR/VAPOUR BARRIER AT ALL OPENINGS.
.9 SEAL PERIMETER OF SHEET VAPOUR RETARDER AS FOLLOWS:
.1 APPLY CONTINUOUS BEAD OF SEALANT TO SUBSTRATE AT PERIMETER OF SHEETS.
.2 LAP SHEET OVER SEALANT AND PRESS INTO SEALANT BEAD.
.3 INSTALL STAPLES THROUGH LAPPED SHEETS AT SEALANT BEAD INTO WOOD SUBSTRATE.
.4 ENSURE THAT NO GAPS EXIST IN SEALANT BEAD. SMOOTH OUT FOLDS AND RIPPLES OCCURRING IN SHEET OVER SEALANT.
.10 SEAL LAP JOINTS OF SHEET VAPOUR RETARDER AS FOLLOWS:
.1 ATTACH FIRST SHEET TO SUBSTRATE.
.2 APPLY CONTINUOUS BEAD OF SEALANT OVER SOLID BACKING AT JOINT.
.3 LAP ADJOINING SHEET MINIMUM 150 MM AND PRESS INTO SEALANT BEAD.
.4 INSTALL STAPLES THROUGH LAPPED SHEETS AT SEALANT BEAD INTO WOOD SUBSTRATE.
.5 ENSURE THAT NO GAPS EXIST IN SEALANT BEAD. SMOOTH OUT FOLDS AND RIPPLES OCCURRING IN SHEET OVER SEALANT.
.11 SEAL ELECTRICAL SWITCH AND OUTLET DEVICE BOXES THAT PENETRATE VAPOUR RETARDER AS FOLLOWS:
.1 FOR SHEET–TYPE VAPOUR RETARDERS, INSTALL MOULDED BOX VAPOUR BARRIER.
.2 APPLY SEALANT TO SEAL EDGES OF FLANGE TO MAIN VAPOUR BARRIER AND SEAL WIRING PENETRATIONS THROUGH BOX COVER.
.12 VAPOUR RETARDER FOR WALL/ROOF JUNCTION:
.1 LAP SHEET VAPOUR RETARDER FROM WALL RETARDER ONTO ROOF VAPOUR RETARDER CONTINUOUSLY.
.2 SEAL EDGES AND ENDS WITH SEALANT.
.3 POSITION LAPS OVER FIRM BEARING.

2.4 FIELD QUALITY CONTROL
.1 INSPECT VAPOUR RETARDERS PRIOR TO CONCEALMENT AND IDENTIFY GAPS, HOLES, PUNCTURES, ETC.
.2 REVIEW WORK OF THIS SECTION WHILE IT PROGRESSES WITH A VIEW TO IDENTIFYING WEAKNESSES OR GAPS IN THE AIR/VAPOUR BARRIER SYSTEMS.
.3 COORDINATE THE TIMING AND INSTALLATION OF THE VARIOUS AIR/VAPOUR BARRIER SYSTEMS AND CLADDING SYSTEMS TO ENSURE A COMPLETE AND INTEGRAL SYSTEM OF VAPOUR RETARDERS.
.4 REVIEW AND ENSURE CONTINUITY OF AIR AND VAPOUR RETARDANT MEMBRANES AT JUNCTION OF CLADDING AND SUBSTRATE SYSTEMS AND OTHER CONSTRUCTION DETAILS.
.5 IF THE POSSIBILITY OF DISCONTINUITY IS DISCOVERED BRING TO THE ATTENTION OF THE CONSULTANT FOR FURTHER DIRECTION AND DO NOT CONCEAL.
.6 ALL MEMBRANES AND ACCESSORIES SHALL BE APPLIED BY A CONTRACTOR ACCEPTABLE TO THE MANUFACTURER. PROVIDE WRITTEN EVIDENCE OF SUCH ENDORSEMENT FROM THE MANUFACTURER WHEN REQUESTED.
.7 INSTALLATION OF MEMBRANE SYSTEMS SHALL BE INSPECTED PRIOR TO, PERIODICALLY DURING AND UPON COMPLETION BY A REPRESENTATIVE OF THE MANUFACTURER TO ENSURE COMPLIANCE WITH THE SPECIFICATIONS AND THE MANUFACTURERS PUBLISHED GUIDELINES. SUBMIT WRITTEN COPIES OF INSPECTION REPORTS PREPARED BY THE REPRESENTATIVE OF THE MANUFACTURER TO THE CONSULTANT PRIOR TO CONCEALING MEMBRANE.
.8 NOTIFY CONSULTANT OF TIMING OF THE WORK OF THIS SECTION AND DO NOT CONCEAL WORK OF THIS SECTION UNTIL WORK HAS BEEN REVIEWED BY CONSULTANT AND IDENTIFIED DEFECTS CORRECTED.
.9 REPAIR HOLES, PUNCTURES AND OTHER DEFICIENCIES.
.10 SEAL GAPS IN VAPOUR RETARDERS WITH JOINT SEALER AS SPECIFIED IN SECTION 079200.
.11 REQUEST CONSULTANT REVIEW OF VAPOUR RETARDERS PRIOR TO CONCEALMENT. WORK THAT HAS BEEN CONCEALED PRIOR TO CONSULTANT INSPECTION, SHALL BE EXPOSED WHILE CONSULTANT REMAINS AT THE PLACE OF WORK, REVIEWED, AND THEN CONCEALED UPON CONSULTANT'S ACCEPTANCE OF CONDITIONS. IDENTIFIED DEFECTS SHALL BE CORRECTED IMMEDIATELY AND PRIOR TO CONCEALMENT.
2.5 CLEANING
.1 CLEAN EXTRA MATERIALS FROM ADJACENT SURFACES.
.2 LEAVE SUITABLE SUBSTRATE FOR SUBSEQUENT INSTALLATIONS BY OTHER SECTIONS.

revision
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LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

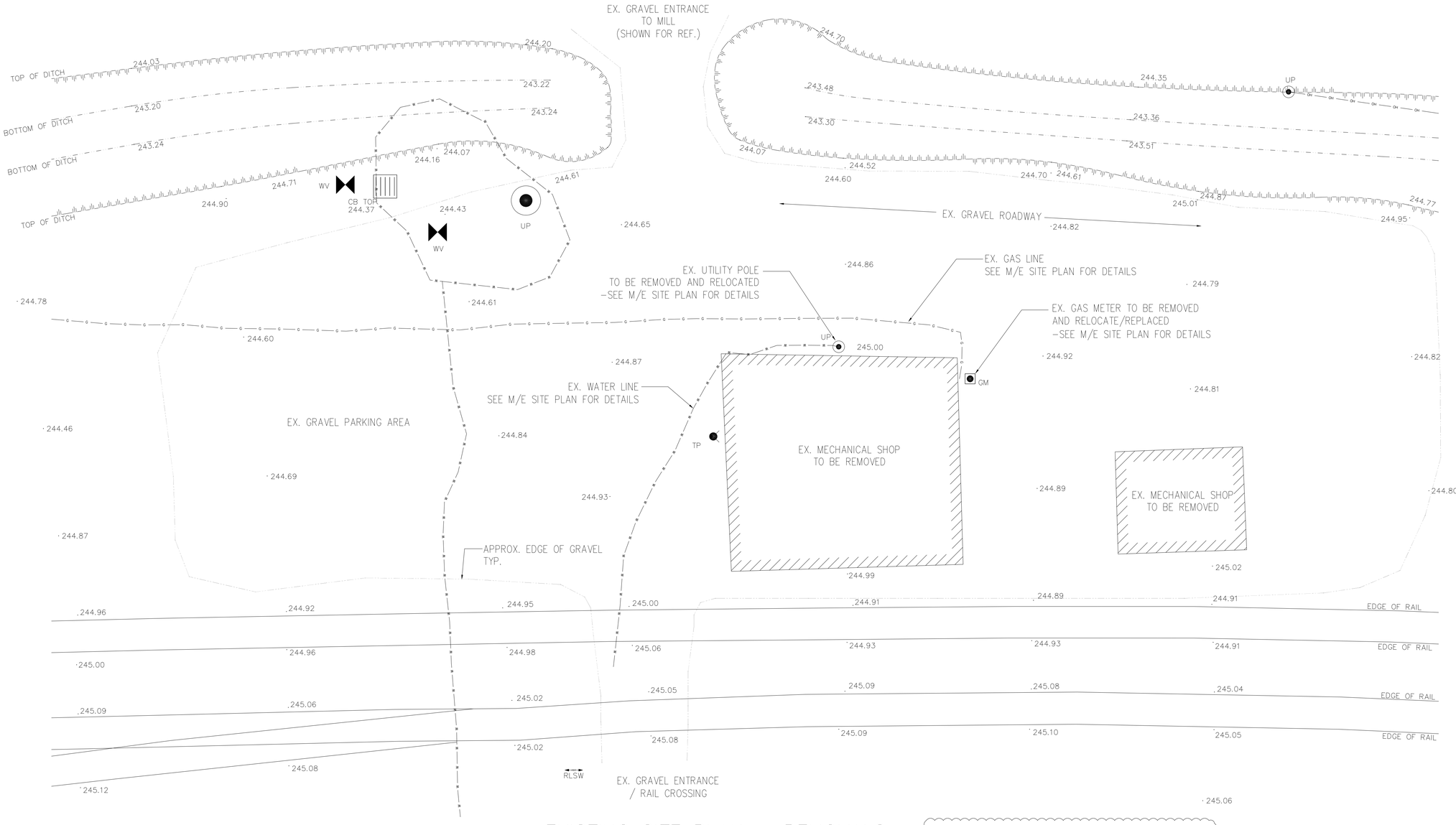
NORTHSHORE ENGINEERING & DRAFTING SERVICES
184 McNaughton Ave.
NORTH BAY ONT.
705–495–0981

project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
GENERAL NOTES

drawn by: BM
checked by: ..
scale: NTS
project no: 231978
date plotted: MAR 25 24
date: NOV 10 23

dwg no:
GN04



EXISTING SITE PLAN – REMOVALS

EXISTING/NEW UTILITIES SHOWN FOR REFERENCE ONLY
REFER TO MECHANICAL SITE SERVICING PLAN FOR DETAILS

LEGEND

GM	GAS METER
HM	HYDRO METER
RLSW	RAILWAY SWITCH
TP	TRAFFIC LIGHT
UP	UTILITY POLE
WV	WATER VALVE
–C–	UNDERGROUND CABLE LINE
–H–	UNDERGROUND HYDRO LINE
–G–	UNDERGROUND GAS LINE
–OH–	OVERHEAD UTILITY WIRES
–W–	UNDERGROUND WATER LINE
× 123.45	SPOT ELEVATION (METRES)

GENERAL NOTES

1) THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION AND PROTECTION OF ALL UTILITIES AND SERVICES. ALL UTILITIES NOT NECESSARILY SHOWN ON THE DRAWINGS.

2) LOCATION OF ALL EXISTING DETAILS SHOWN ON THE DRAWINGS IS APPROXIMATE AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR. FIELD LOCATE UTILITIES AND COORDINATE WITH THE LOCAL AUTHORITIES.

3) ALL MATERIAL, WORKS, AND CONSTRUCTION METHODS SHALL BE IN COMPLIANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS, AND THE ONTARIO PROVINCIAL STANDARDS DRAWINGS (OPSD) UNLESS OTHERWISE NOTED.

4) CONTRACTOR SHALL SUPPLY ALL THE MATERIALS OF NEW QUALITY AND IN QUANTITIES SUFFICIENT TO COMPLETE THE WORK SHOWN ON THE DRAWINGS.

5) THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REINSTATEMENT OF ALL AFFECTED AREAS TO A CONDITION EQUAL TO OR GREATER THAN EXISTING AND FOR THE REPAIR OF ANY DAMAGE CAUSED DURING THE CONSTRUCTION.

6) SURVEY INFORMATION SHOWN IS BASED ON DATA AS PROVIDED BY "SURVEYOR ON SITE INC."

SITE PREPARATION AND REMOVAL NOTES

1) REMOVAL OF OVERBURDEN WITHIN THE CONSTRUCTION AREA TO GRADES INDICATED SHALL BE AS PER OPSS 201. THIS INCLUDES ALL SOIL, GRANULAR, ORGANICS AND ROCK COBBLES.

2) REMOVALS SHALL BE IN ACCORDANCE WITH OPSS 510

3) EXCAVATION AND GENERAL SITE GRADING SHALL BE COMPLETED IN ACCORDANCE W/ OPSS.MUNI 206.

4) DISPOSE OF ALL CONSTRUCTION DEBRIS AT LEGALLY DESIGNATED SITES IN ACCORDANCE WITH APPLICABLE LAWS. COORDINATE WITH ONTC

5) BACKFILLING AND COMPACTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS.MUNI 401.

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LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
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184 McNaughton Ave.
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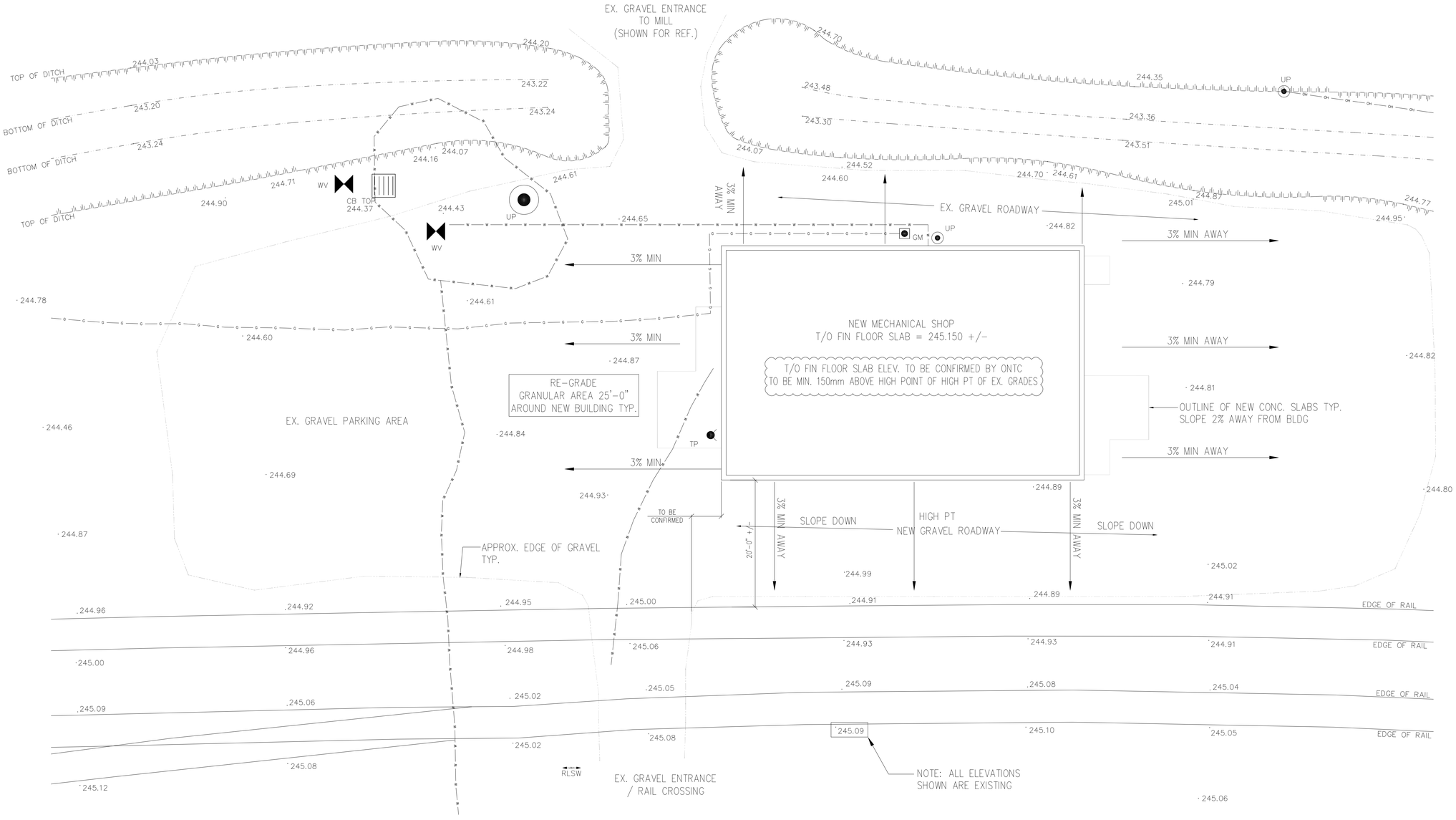
project: ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title: SITE PLAN - EXISTING

drawn by: BM	checked by: TIM T
scale: NTS	project no: 231979
date plotted: MAR 25 2024	
date: MAR 11 2024	
dwg no: A0.0	



LEGEND

GM	GAS METER
HM	HYDRO METER
RLSW	RAILWAY SWITCH
TP	TRAFFIC LIGHT
UP	UTILITY POLE
WV	WATER VALVE
-C-	UNDERGROUND CABLE LINE
-H-	UNDERGROUND HYDRO LINE
-G-	UNDERGROUND GAS LINE
-OH-	OVERHEAD UTILITY WIRES
-W-	UNDERGROUND WATER LINE
x 123.45	EX. SPOT ELEVATION (METRES)

NEW SITE GRADING PLAN

REFER TO A0.0 FOR NOTES

EXISTING/NEW UTILITIES SHOWN FOR REFERENCE ONLY
REFER TO MECHANICAL SITE SERVICING PLAN FOR DETAILS

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0	FOR TENDER	MAR 25 24

LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

NORTHSHORE ENGINEERING & DRAFTING SERVICES
184 McNaughton Ave.
NORTH BAY ONT.
705-495-0981

project: ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title: SITE PLAN - NEW GRADING

drawn by: BM	checked by: TIM T
scale: NTS	project no: 231979
date plotted: MAR 25 2024	
date: MAR 11 2024	
dwg no: A0.1	

1	ONTARIO BUILDING CODE DATA MATRIX PART 3 & 9		OBC REFERENCE	
2			☒ PART 3	☐ PART 9
3	PROJECT:	ONTC NEW MECHANICAL SHOP HEARST ONT		
4	DESCRIPTION:	☒ NEW ☐ ADDITION ☐ ALTERATION		
5	OCCUPANCY:	GROUP F2,	CL 3.1.2.1.(1)	
6	BLDG AREA: SQ m.	GROUP F2 REPAIR SHOP EXISTING 0 NEW 192 TOTAL 192 NEW 2073 SQ FT		
9	NO OF STOREYS	ABOVE GR. 1 BELOW GR. 0	CL 3.2.1.1	
10	NO OF STREETS/ACCESS ROUTES = 1		CL 3.2.2.10&3.2.5.5.	
11	BUILDING CLASSIFICATION F2 CL3.2.2.70		CL 3.2.2..70	
12	SPRINKLER PROPOSED	☐ ENTIRE BUILDING ☐ BASEMENT ONLY ☐ IN LIEU OF ROOF RATING ☒ NOT REQUIRED	CL 3.2.2.70	
13	STANDPIPE REQUIRED	☐ YES ☒ NO	CL 3.2.9	
14	FIRE ALARM REQUIRED	☐ YES ☒ NO	CL 3.2.4	
15	WATER SUPPLY IS ADEQUATE	☒ YES ☐ NO	CL 3.2.5.7	
16	HIGH BUILDING	☐ YES ☒ NO	CL 3.2.6	
17	PERMITTED CONSTRUCTION	☐ COMBUSTIBLE ☐ NON-COMBUSTIBLE ☒ BOTH	CL 3.2.2.70	
18	OCCUPANCE LOAD BASED ON OCCUPANCY F2	☐ SQ M/PERSON ☒ DESIGN OF BUILDING LOAD 12 PERSONS	CL 3.1.17.1	
19	BARRIER-FREE	☒ YES ☐ NO ☐ EXISTING	CL 3.8	
20	HAZARDOUS SUBSTANCE	☐ YES ☒ NO	CL 3.3.1.2&3.3.1.19	
21	REQUIRED FIRE RESISTANCE RATING (FRR)	HORIZ. ASSEMBLIES FRR (HOURS) / LISTED DESIGN No or DESCRIPTION (SG 2)	CL 3.3.1.2&3.3.1.19	
		FLOORS 0 / NONCOMBUSTIBLE	CL 3.2.2.70	
		ROOF 0 / NONCOMBUSTIBLE		
		FRR OF SUPPORTING MEMBERS		
		FLOORS 0 / NONCOMBUSTIBLE		
		ROOF 0 / NONCOMBUSTIBLE		
24	TRAVEL DIST. MAX DIST 25m (82')		CL 3.3.1.5(c) TABLE 3.3.1.5(A) CL 3.4.2.5.(a)	

NOTE: ONTC TO NOTIFY LOCAL MUNICIPALITY / BUILDING DEPARTMENT OF PROPOSED NEW BUILDING CONSTRUCTION.

LOADING DATA

ROOF LOADS

-SNOW Ss=(2.8 kPa)
-SNOW Sr=(0.3 kPa)
-ROOF DEAD LOAD = 1.0 kPa
-MECH LOAD 1.0 KPa
-NO ALLOWANCE FOR SPRINKLER
-SEE ROOF PLAN MECHANICAL UNIT LOADS LOCATIONS & WEIGHTS
-SEE ROOF PLAN FOR SNOW ACCUMULATION LOAD AT PARAPET & ROOF UNITS

FLOOR LOADS

-GROUND FLOOR INDUSTRIAL LOAD LL = 4.8 kPa

WIND LOADS

-MINIMUM DESIGN WIND LOAD 1/50 q= 0.30kPa

EARTHQUAKE LOADS

-SITE SOIL CLASSIFICATION D
-IMPORTANCE FACTOR 1

SEISMIC DATA

Sa (0.2) = 0.073
Sa (0.5) = 0.048
Sa (1.0) = 0.028
Sa (2.0) = 0.0031

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
BUILDING CODE MATRIX AND LOADING DATA

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
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dwg no: A1.0	

N
W E
S

48X32
shower

VERTICAL BRACING

OFFICE 102
LUNCH ROOM 103
MECHANICAL ROOM 104
SHOWER
ACCESSIBLE WASHROOM 105
SHOWER
WASHROOM 106
REST AREA 107
101 CORRIDOR
SHOP STORAGE 108
109
MW OIL, FUEL AND STORAGE 110

CHEVRON BRACING
VERTICAL BRACING
VERTICAL BR EXPOSED
OUTLINE OF SLAB
SLOPE TO DRAIN
DRAIN SEE M&E

1 HR FIRE SEPARATION
P2a 1 HR FIRE SEPARATION
P2 1 HR FIRE SEPARATION
P2 1 HR FIRE SEPARATION
P2b 1 HR FIRE SEPARATION

10'X10' HIGH O/H
8'X10' HIGH O/H

W1 LOWER
W2 LOWER

17'-11 1/2"
18'-7"
1'-1"
35'-6 3/8"
19'-2 7/8"
36'-8"
20'-0"
56'-8" O/S FND
36'-7" FND

FLOOR PLAN

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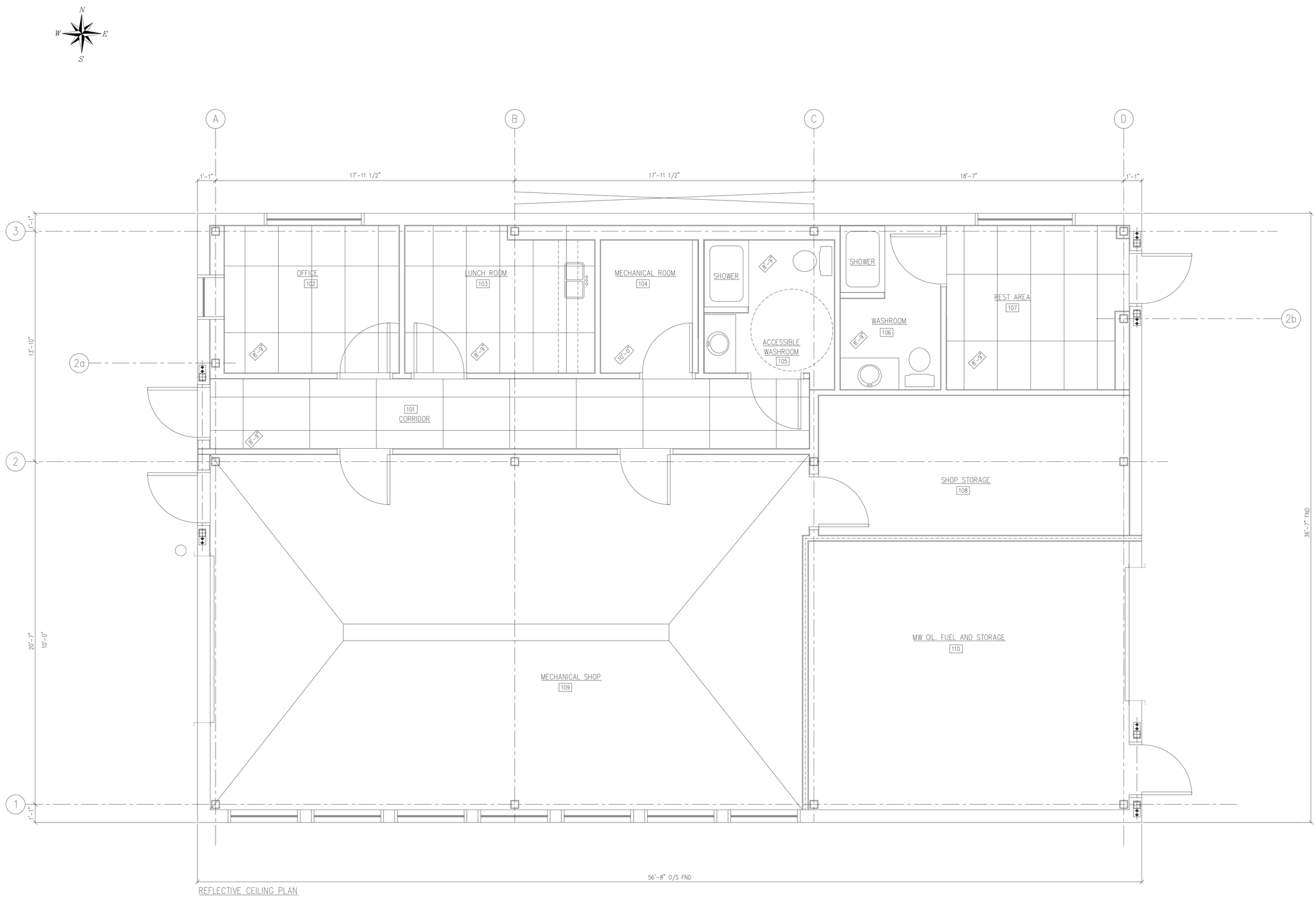
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - FLOOR PLAN

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	
dwg no: A2.0	



REFLECTIVE CEILING PLAN

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
REFLECTIVE CEILING PLAN

drawn by: TIM T	checked by: BM
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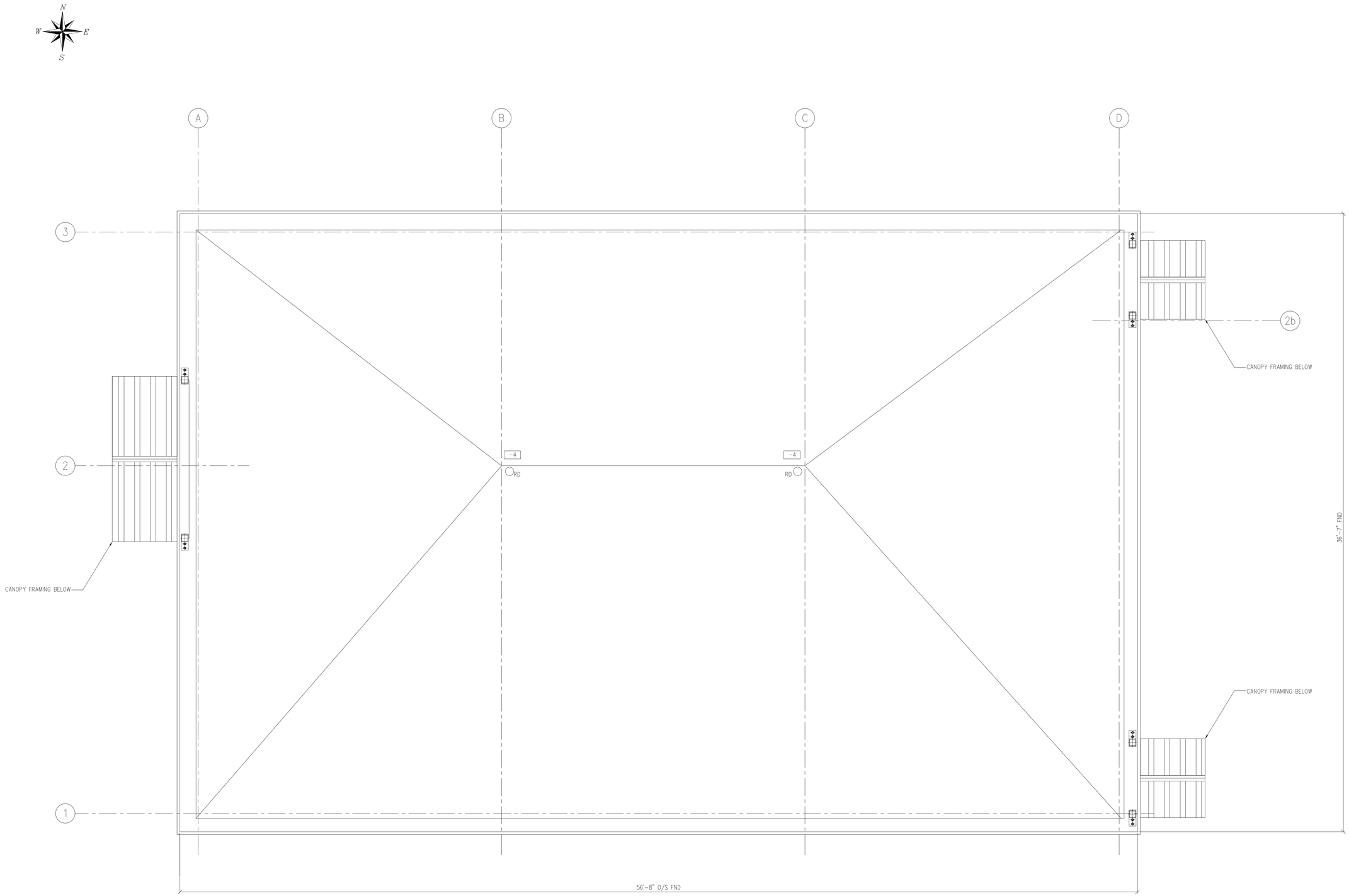
date plotted: MAR 25 24	
date: NOV 10 23	
dwg no: A2.1	



ROOF PLAN

SEE M&E FOR ROOF DRAIN AND VENT DETAILS

revision	FOR TENDER	0
	MAR 25 24	

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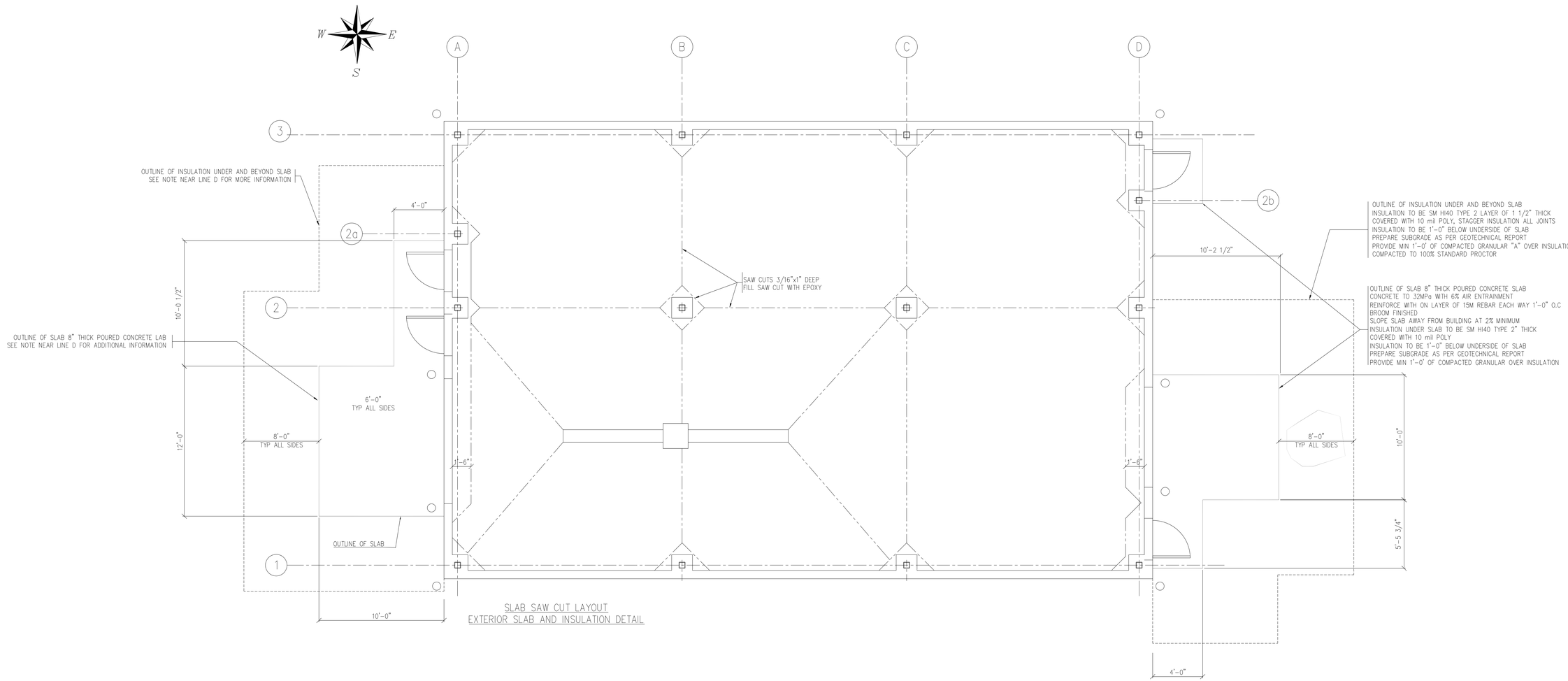
title
ARCH - ROOF PLAN

drawn by:	checked by:
TIM T	BM
scale:	project no:
NTS	231979
date plotted:	
MAR 25 24	
date:	
NOV 10 23	

dwg no:
A2.2



SLAB SAW CUT LAYOUT
EXTERIOR SLAB AND INSULATION DETAIL

revision	
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MAR 25 24	

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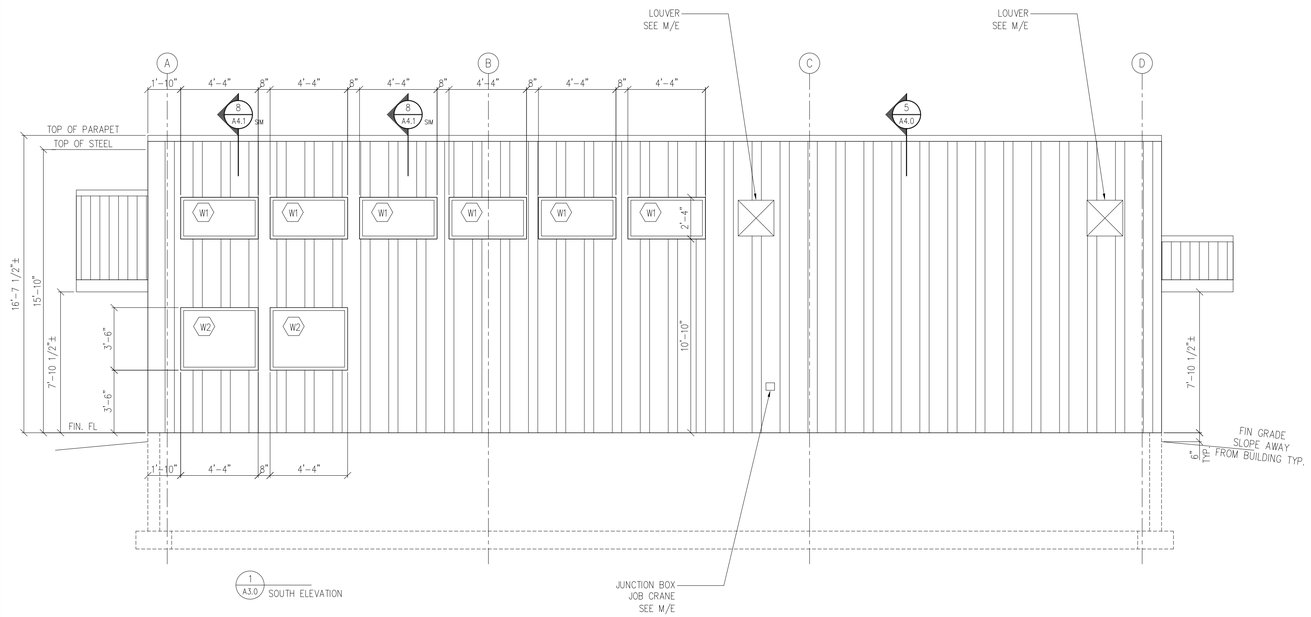
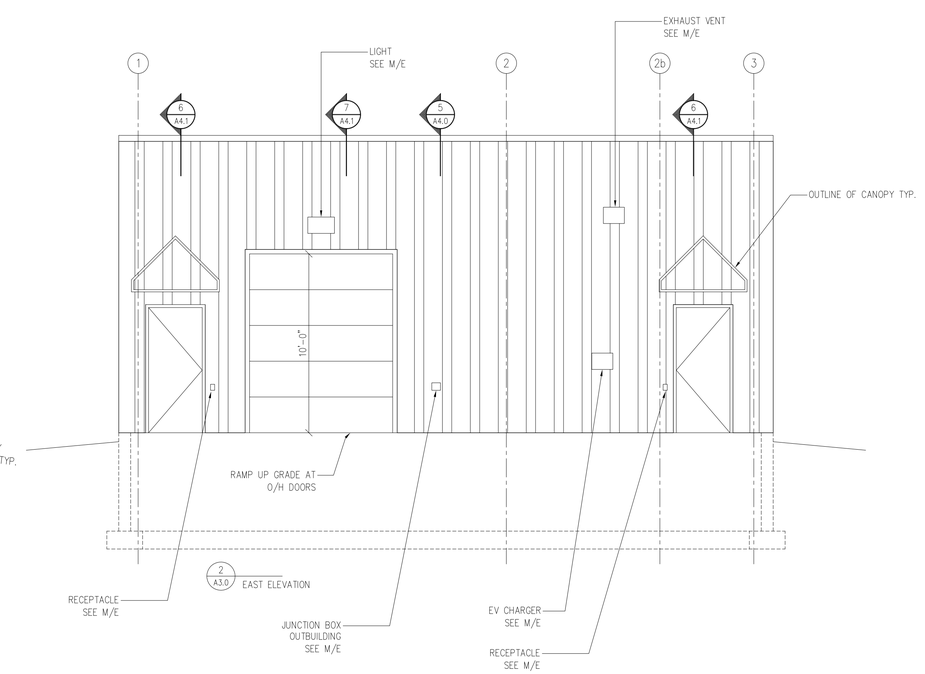
project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

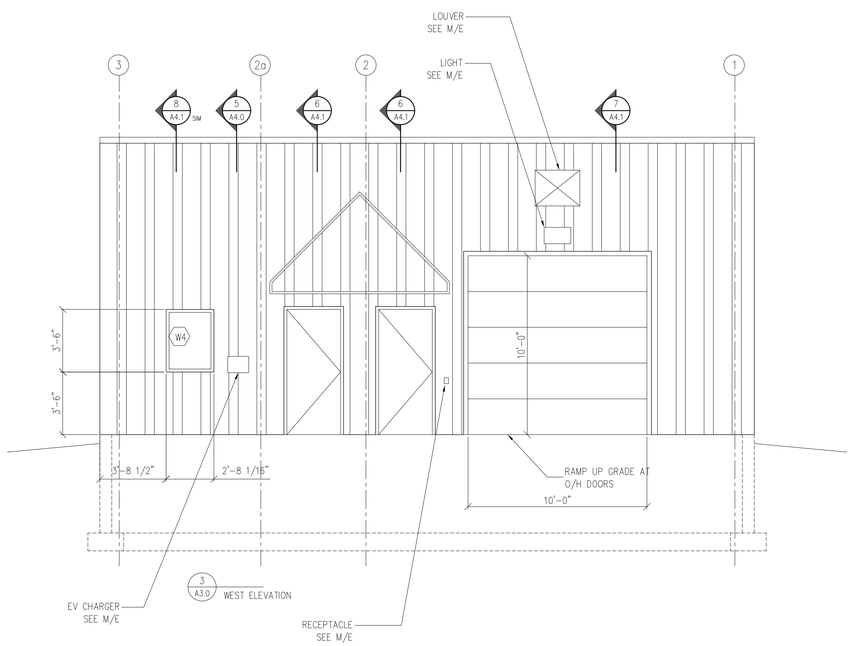
title
PROPOSED SLAB SAW CUT LAYOUT
EXTERIOR SLAB DETAILS

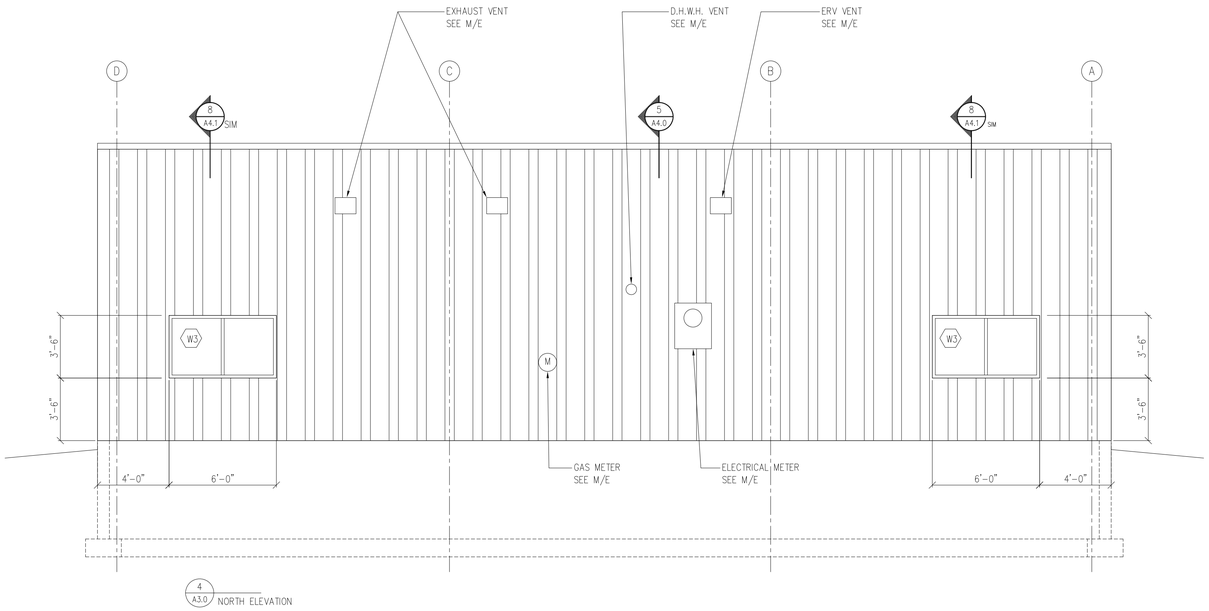
drawn by:	checked by:
TIM T	BM
scale:	project no:
NTS	231979
date plotted:	
MAR 25 24	
date:	
NOV 10 23	

dwg no:
A2.3









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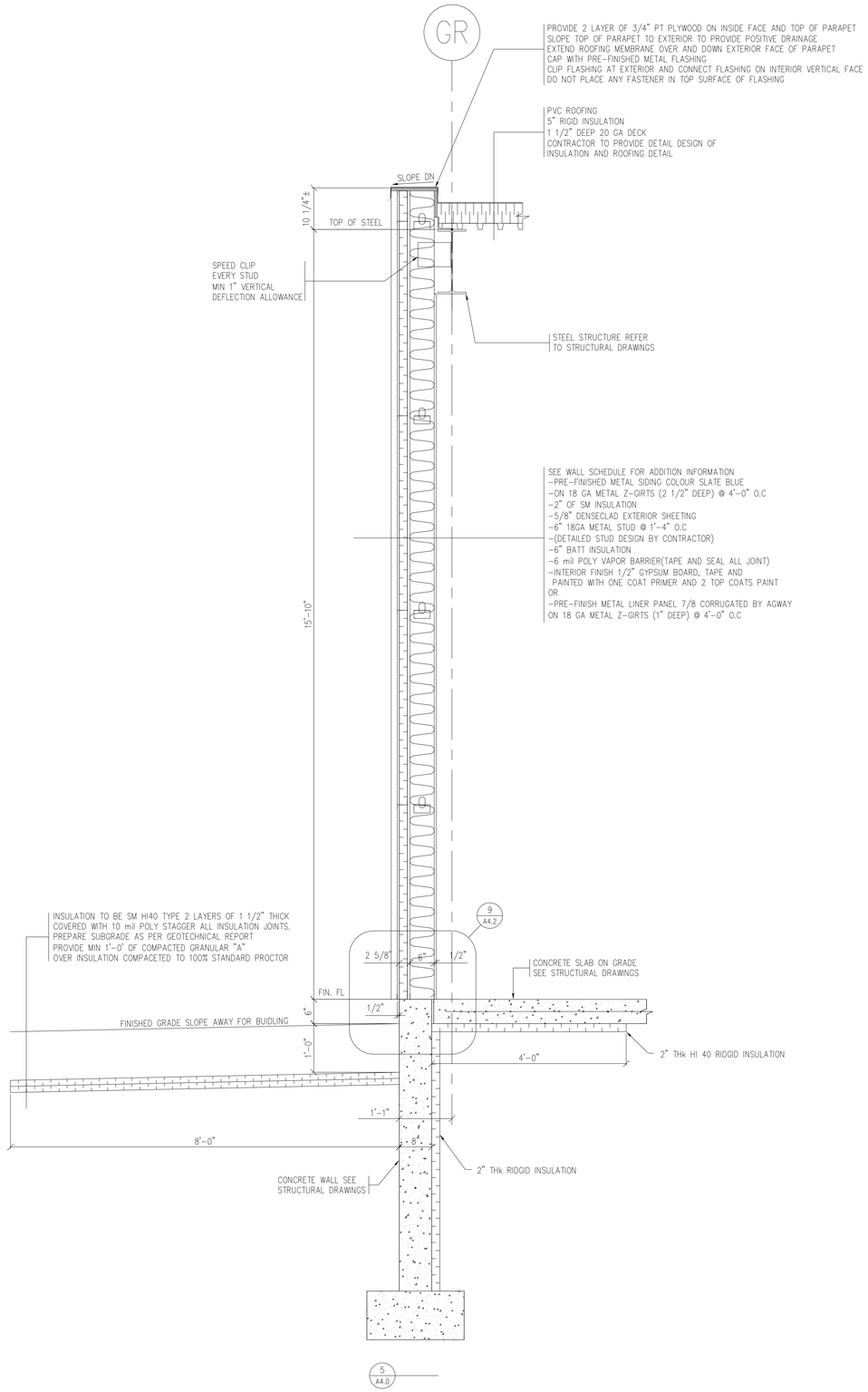
project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - EXTERIOR ELEVATION

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	

dwg no:
A3.0



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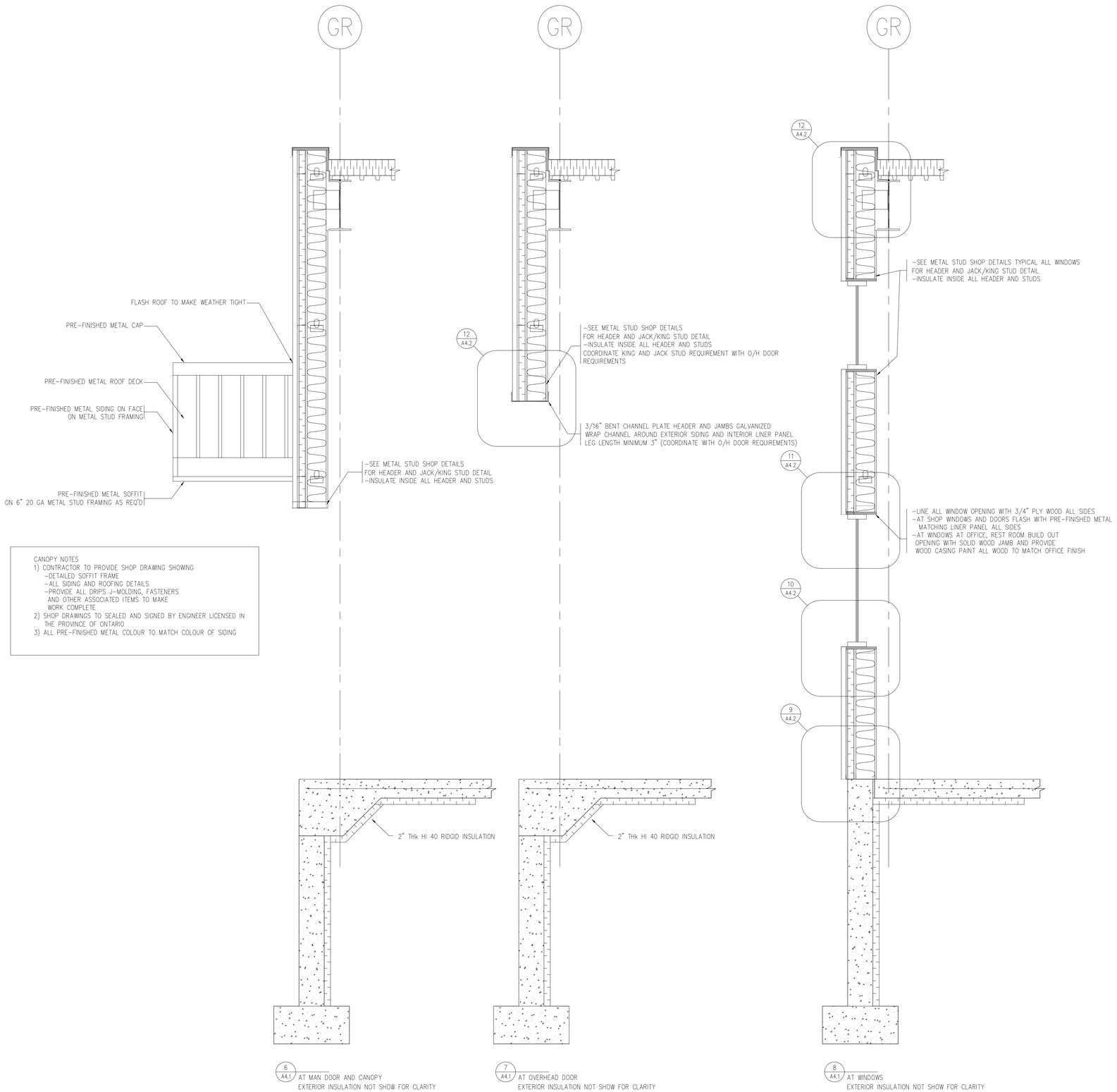
project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - EXTERIOR WALL SECTIONS

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	
dwg no: A4.0	



CANOPY NOTES
1) CONTRACTOR TO PROVIDE SHOP DRAWING SHOWING
   -DETAILED SOFFIT FRAME
   -ALL SIDING AND ROOFING DETAILS
   -PROVIDE ALL DRIPS J-MOLDING, FASTENERS AND OTHER ASSOCIATED ITEMS TO MAKE WORK COMPLETE
2) SHOP DRAWINGS TO SEALED AND SIGNED BY ENGINEER LICENSED IN THE PROVINCE OF ONTARIO
3) ALL PRE-FINISHED METAL COLOUR TO MATCH COLOUR OF SIDING

6 / A4.1 AT MAN DOOR AND CANOPY
EXTERIOR INSULATION NOT SHOW FOR CLARITY

7 / A4.1 AT OVERHEAD DOOR
EXTERIOR INSULATION NOT SHOW FOR CLARITY

8 / A4.1 AT WINDOWS
EXTERIOR INSULATION NOT SHOW FOR CLARITY

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project: ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title: ARCH - DETAIL AT DOORS AND WINDOWS

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
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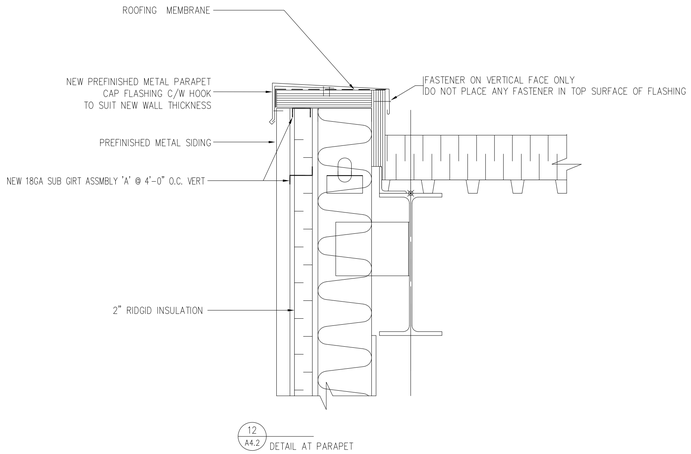
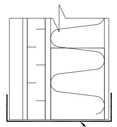
dwg no: A4.1	

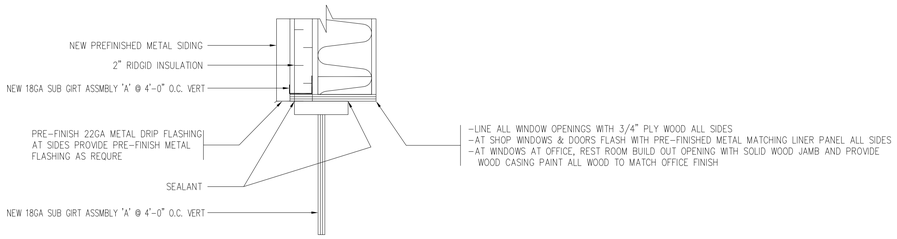


12 / A4.2 DETAIL AT PARAPET

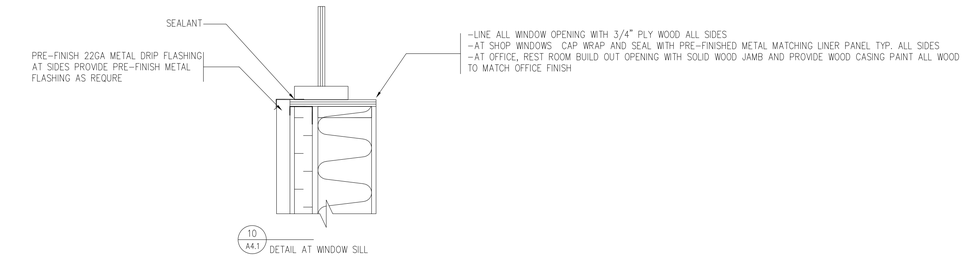


3/16" BENT CHANNEL PLATE HEADER AND JAMBS GALVANIZED
WRAP CHANNEL AROUND EXTERIOR SIDING AND INTERIOR LINER PANEL
LEG LENGTH MINIMUM 3" (COORDINATE WITH O/H DOOR REQUIREMENTS)

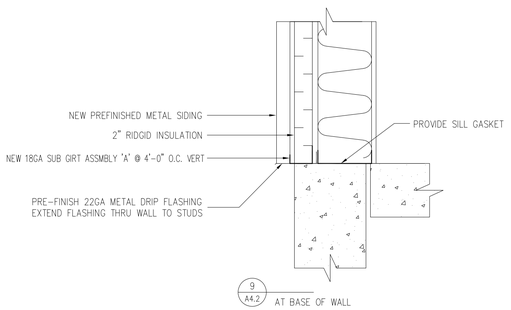
12 / A4.2 DETAIL AT WINDOW HEADER AND SIDES
SIMILAR AT MANDOORS



11 / A4.2 DETAIL AT WINDOW HEADER AND SIDES
SIMILAR AT MANDOORS



10 / A4.1 DETAIL AT WINDOW SILL



9 / A4.2 AT BASE OF WALL

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - DETIAL AT DOORS AND WINDOWS

drawn by:	checked by:
TIM T	BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	

dwg no:
A4.2

DOOR & FRAME SCHEDULE

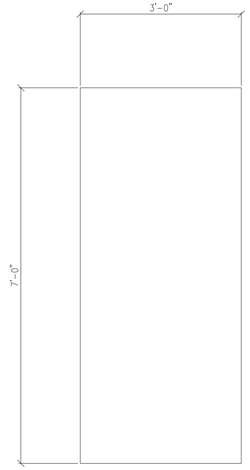
DOOR								FRAME				REMARKS
QTY.	MARK	TYPE	MAT	FIN	WIDTH	HEIGHT	FIRE RATING	TYPE	FIN	MAT	WALL THK.	DOOR & FRAME
1	D1	1	HM	PT	3'-0"	7'-0"		F1	PT	METAL	4 5/8"	DOOR & FRAME
1	D2	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D3	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D4	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D5	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D6	1	HM	PT	3'-0"	7'-0"	45 MIN	F1	PT	HM	4 5/8"	DOOR & FRAME, AND CLOSER
1	D7	1	HM	PT	3'-0"	7'-0"	45 MIN	F1	PT	HM	4 5/8"	DOOR & FRAME, AND CLOSER
1	D8	1	HM	PT	3'-0"	7'-0"		F1	PT	HM	4 5/8"	DOOR & FRAME
1	D9	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D10	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D11	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D12	2	HMI	PT	3'-0"	7'-0"		F1	PT	HM		INSUL. DOOR & FRAME c/w WEATHER STRIP, SWEEP, AND CLOSER
1	D13	3	HMI	PRE-F	10'-0"	10'-0"		GALV	PT	3/16" PL	TO SUIT	COMPLETE WITH ELECTRIC POWER DOOR OPENER
1	D14	2	HMI	PRE-F	8'-0"	10'-0"		GALV	PT	3/16" PL	TO SUIT	COMPLETE WITH MANUAL OPENER

DOOR & FRAME NOTES

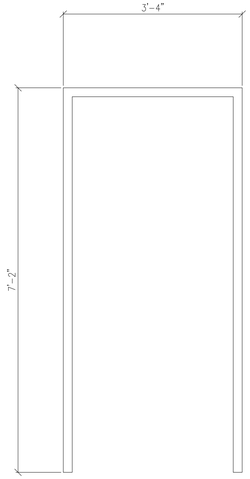
1) SITE CONFIRM ALL WALL THICKNESSES AND OPENING SIZES WITH FRAMES BEFORE ORDERING
2) ALL FRAMES HOLLOW METAL U.N.O.
3) PROVIDE 3/4" PLYWOOD FRAMING AROUND ALL ROUGH OPENINGS, CLAD OPENINGS WITH PRE-FINISH GA METAL MATCHING EXTERIOR SIDING AND LINER PANEL IN COLOUR.
4) HARDWARE STANDARD COMMERCIAL GRADE
5) HM FRAMES TO BE STANDARD 6" DEPTH AT ALL LOCATIONS U.N.O.
6) HARDWARE TO INCLUDE:
   A) 3 HINGES (BALL BEARING TYPE)
   B) DOOR CLOSURE FOR EXTERIOR DOORS
   C) KEY PAD ENTRY SYSTEM FOR EXTERIOR DOORS AT HALL WAY AND REST ROOM DOORS ALL OTHER EXTERIOR DOORS LOCK SET (KEYED TO ONTC STANDARDS)
   D) PANIC BAR HARDWARE FOR ALL EXTERIOR EXIT DOORS
   E) LOCK SET (KEYED TO ONTC STANDARDS) FOR OFFICE, MECHANICAL ROOM, & SHOP STORAGE
   F) PRIVACY SET FOR WASHROOMS
   G) PASSAGE SET FOR ALL OTHER DOORS
7) DOOR AND HARDWARE TO MATCH ONTC STANDARD FOR SHOP DOORS
8) PROVIDE FOAM INSULATE, CAULK AND SEAL AS REQUIRED TO MAKE ALL WORK COMPLETE

LEGEND

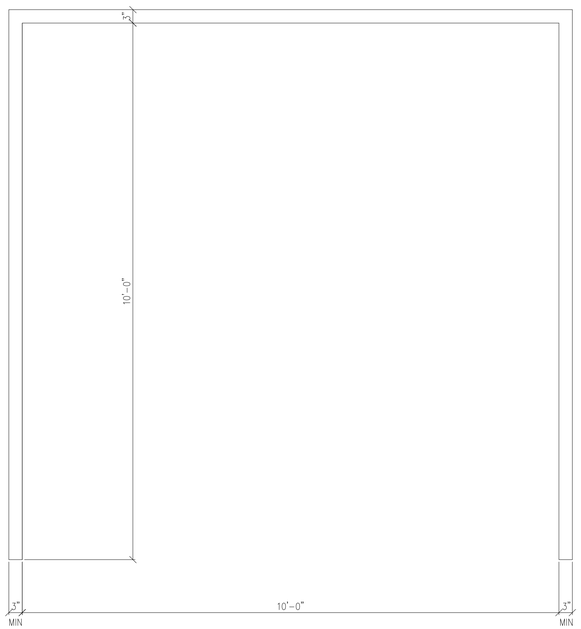
HM – HOLLOW METAL
HMI – HOLLOW METAL INSULATED
WD – WOOD
FR – FIRE RATED
PT – PAINT
ST – STAINED
AL – ALUMINUM
AL/G – ALUMINUM w/ GLASS
TBAL – THERAMLLY BROKEN ALUMINUM (OR APPROVED EQUAL.)



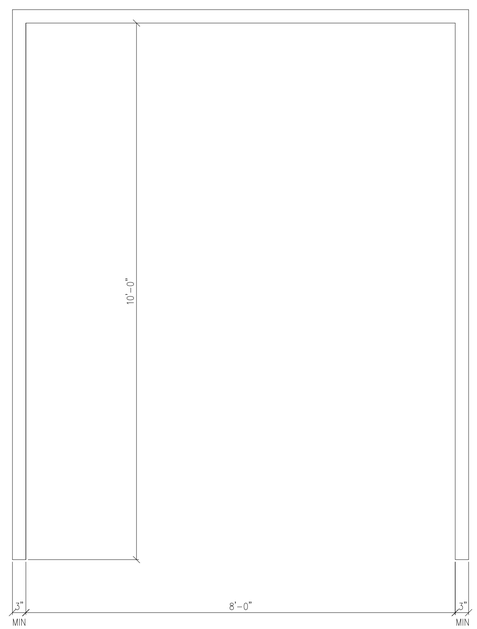
DOOR TYPE 1 & 2



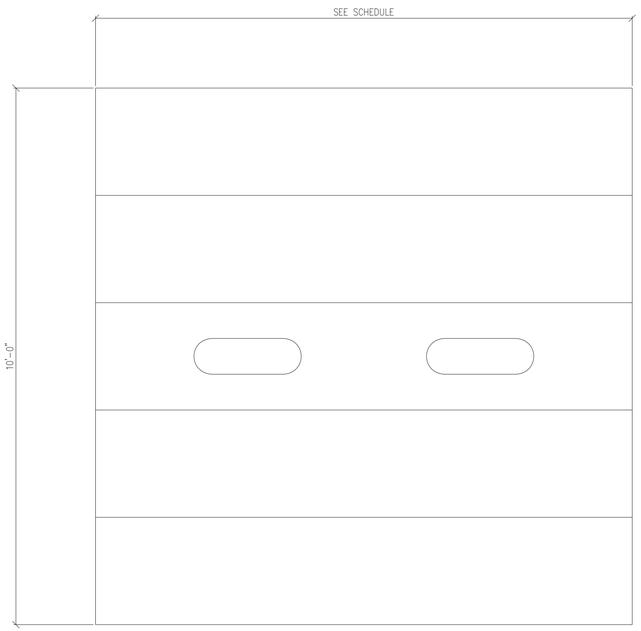
FRAME F1



FRAME F3



FRAME F2



DOOR TYPE 13, 14

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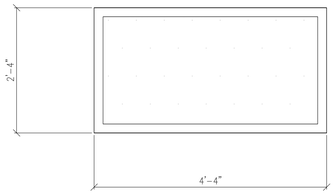
HEARST MECHANICAL SHOP
HEARST, ONTARIO

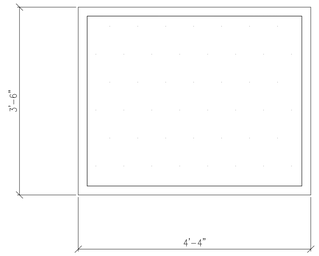
title
ARCH - DOOR SCHEDULE AND DETAILS

drawn by: TIM T	checked by: BM
scale: NTS	project no: 231979
date plotted: MAR 25 24	
date: NOV 10 23	

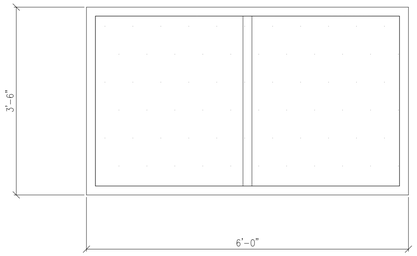
dwg no:
A5.0



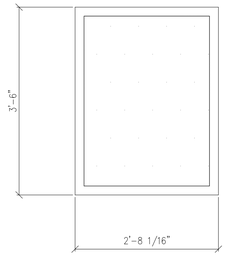
W1 FIXED THERMAL PANE GLASS
ALUM. FRAME (ALUM. ANODIZED COLOUR)



W2 FIXED THERMAL PANE GLASS
ALUM. FRAME (ALUM. ANODIZED COLOUR)

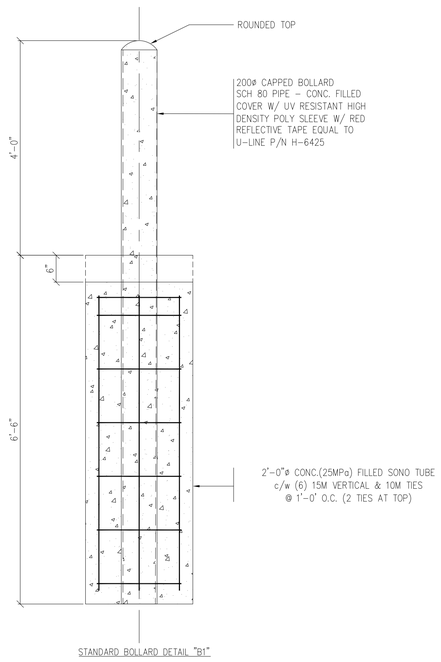


W3 SLIDING GLASS
THERMAL PANE GLASS (OFFICE AND REST ROOM
FRAME (ALUM. ANODIZED COLOUR)
C/W SCREEN

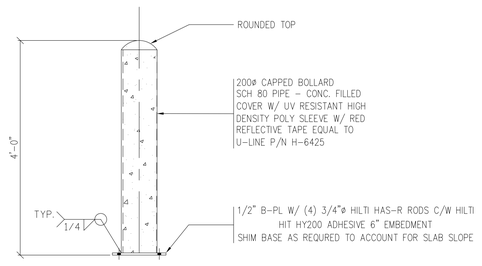


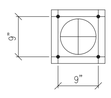
W4 FIXED THERMAL PANE GLASS
ALUM. FRAME (ALUM. ANODIZED COLOUR)

WINDOW NOTE:
1) ALL FIXED WINDOWS TO BE "ALUMICOR 230 FIXED" OR EQUIV.
2) ALL SLIDER WINDOWS TO BE "ALUMICOR 250 SLIDERS" OR EQUIV.
3) ALL WINDOW SILLS ARE TO HAVE A 3" JAM DEFLECTOR BOTH SIDES
4) ALL SLIDER WINDOWS ARE TO COME C/W FULL SCREENS AS NOTED
5) ALL WINDOWS ARE TO BE SUPPORTED WITH 3/4" PRESSURE TREATED PLYWOOD ALL AROUND
6) NO BLOCK OR CONNECTION @ TOP OF WINDOW (ALLOW FOR 1/2" DEFLECTION AT TOP)
7) PROVIDE FOAM INSULATE, CAULK AND SEAL AS REQ'D TO MAKE WORK COMPLETE



STANDARD BOLLARD DETAIL "B1"

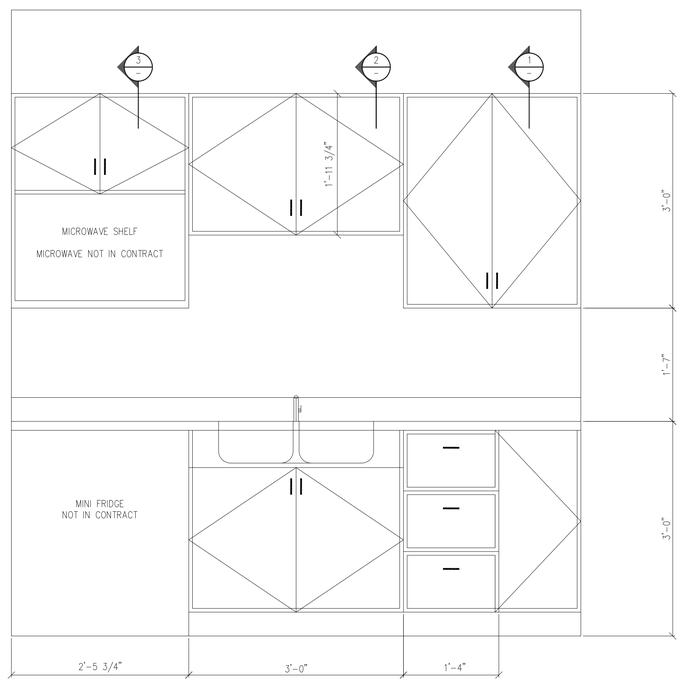




SURFACE MOUNTED BOLLARD DETAIL "B2"

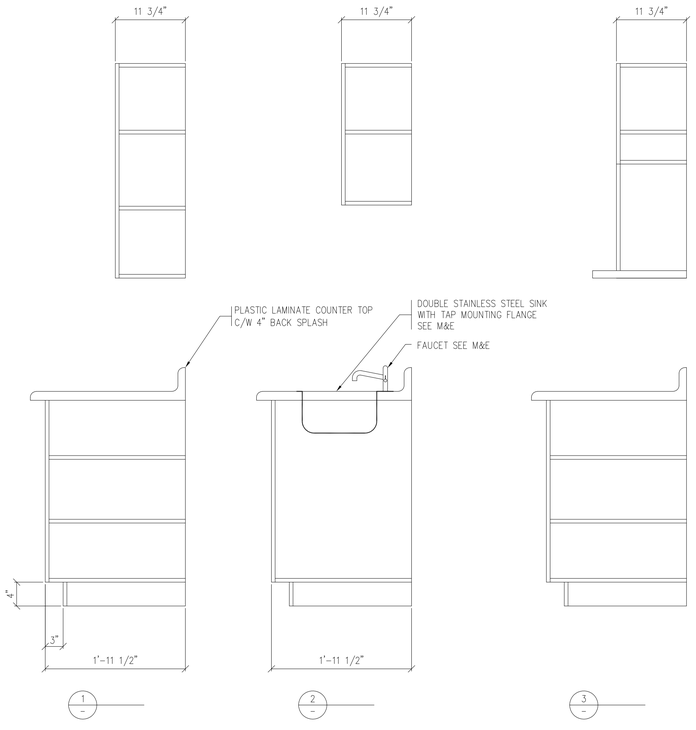
BOLLARD GENERAL NOTES:
1) ALL WELDING TO COMPLY w/ CSA CWB W47.1 & W59
2) PRIME PAINT ALL STEEL (U.N.O.)
3) CONTRACTOR TO FIELD CONFIRM ALL QUANTITIES

MATERIAL NOTES:
1) HSS TO BE CAN/CSA G40.21, 350W
2) CHANNELS, ANGLES = 300W (CAN/CSA G40.21)
2) PLATES, BARS = 300W (CAN/CSA G40.21)



CASE WORK KITCHEN ELEVATION

NOTES
1) CASE WORK TO BE COMMERCIAL GRADE
2) DIMENSIONS AS APPROXIMATE SITE CONFIRM ALL DIMENSIONS
3) CASE WORK TO BE BE PROVIDE COMPLETE WITH ALL HARDWARE
4) PROVIDE COMPLETE SHOP DRAWINGS FOR ALL ITEMS
5) COORDINATE CASEWORK WITH M&E REQUIREMENTS
6) ALL CABINETS TO HAVE ADJUSTABLE SHELVES ON RECESSED METAL PILASTERS
7) DRAWERS TO HAVE HEAVY DUTY DRAW SLIDES
8) PROVIDE SOLID BLOCKING IN WALLS AS REQUIRED TO SUPPORT AND SECURE CASE WORK



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LICENCED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO
W.T. THERRIAULT
Mar 25, 24

NORTHSHORE ENGINEERING & DRAFTING SERVICES
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705-495-0981

project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - WINDOW SCHEDULE AND DETAILS

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NTS	231979
date plotted:	
MAR 25 24	
date:	
NOV 10 23	
dwg no:	
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ROOM FINISH SCHEDULE

ROOM No	ROOM NAME	FLOORS		WALLS		CEILING		REMARKS
		MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	
101	ENTRANCE HALL	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB & R-GWB	PT	ACT	N/A	X
102	OFFICE	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	X
103	LUNCH ROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	X
104	MECHANICAL ROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	X
105	ACCESSIBLE WASHROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	ACT	N/A	PROVIDE TYPICAL WASHROOM ACCESSORIES INCLUDING MIRROR, TOILET PAPER DISPENSER, PAPER TOWEL DISPENSER, GRAB BARS ETC ALL ITEMS TO BE SUITABLE FOR ACCESSIBLE WASHROOM PROVIDE COMMERCIAL GRADE VANITY / SINK SUITABLE FOR ACCESSIBLE WASHROOM
106	WASHROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	GWB ON METAL STUD FRAMING DETAIL STUD DESIGN BY CONTRACTOR	PT	PROVIDE TYPICAL WASHROOM ACCESSORIES INCLUDING MIRROR, TOILET PAPER DISPENSER PAPER TOWEL DISPENSER ETC. PROVIDE COMMERCIAL GRADE VANITY / SINK
107	REST ROOM	FINISHED CONCRETE	MACHINE TROWEL HIGH FINISH C/W HARDENER AND SEALER	GWB	PT	GWB ON METAL STUD FRAMING DETAIL STUD DESIGN BY CONTRACTOR	PT	X
108	SHOP STORAGE	FINISHED CONCRETE	MACHINE TROWEL C/W HARDENER AND SEALER	PRE-FINISHED LINER PANEL (SEE WALL SCHEDULE)	N/A	EXPOSED STRUCTURE PAINTED, EXPOSED ROOF DECK GALVANIZED	PT	X
109	MECHANICAL SHOP	FINISHED CONCRETE	MACHINE TROWEL C/W HARDENER AND SEALER	PRE-FINISHED LINER PANEL (SEE WALL SCHEDULE)	N/A	EXPOSED STRUCTURE PAINTED, EXPOSED ROOF DECK GALVANIZED	PT	X
110	MW OIL FUEL AND STORAGE	FINISHED CONCRETE	MACHINE TROWEL C/W HARDENER AND SEALER	PRE-FINISHED LINER PANEL (SEE WALL SCHEDULE)	N/A	EXPOSED STRUCTURE PAINTED, EXPOSED ROOF DECK GALVANIZED	PT	X

ROOM FINISH NOTE
1) CAULK AND SEAL ALL CORNERS AND EDGES AS REQUIRED
2) PROVIDE 4" RUBBER BASEBOARD IN OFFICE, HALL, WASHROOMS, LUNCH ROOM, REST ROOM AND MECHANICAL ROOM.

GWB - GYPSUM BOARD
R-GWB - RATED GYPSUM BOARD
PT - PAINT (1 PRIME, 2 TOP COATS)
ACT - ACOUSTICAL CEILING TILE ON METAL FRAMING COMMERCIAL GRADE

WALL SCHEDULE

INTERIOR PARTITIONS WALL

P1
1/2" GYPSUM BOARD
3 5/8" 22GA METAL STUDS @ 1'-4"O.C.
1/2" GYPSUM BOARD

P1a
AS PER P1 WITH SOUND PROOFING INSULATION

P2
5/8" TYPE X GYPSUM BOARD
3 5/8" 20 GA METAL STUDS @ 1'-4"O.C.
5/8" TYPE X GYPSUM BOARD
18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C
PRE-FINISHED METAL LINER PANEL
PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
FINISH: WHITE (QC 28317) BY AGWAY (SHOP/STORAGE ROOM SIDE)
1 HOUR FIRE RATED

P2a
AS PER P2 WITH SOUND PROOFING INSULATION

P2b
PRE-FINISHED METAL LINER PANEL
PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
FINISH: WHITE (QC 28317) BY AGWAY
18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C
5/8 TYPE X GYPSUM BOARD
3 5/8" 20 GA METAL STUDS @ 1'-4"O.C.
5/8 TYPE X GYPSUM BOARD
18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C
PRE-FINISHED METAL LINER PANEL 7/8" CORRIGATED BY AGWAY
1 HOUR FIRE RATED

P3
AS PER P2 WITH 6" 22 GA STUDS @ 1'-4"O.C.
1 HOUR FIRE RATED

EXTERIOR WALLS

W1
PRE-FINISHED METAL SIDING VICWEST CL435 OR APPROVED EQUAL
COLOUR SLATE BLUE
ON 18 GA METAL Z-GIRTS (2 1/2" DEEP) @ 4'-0" O.C
2" OF SM INSULATION
5/8" DENSECLAD EXTERIOR SHEETING
6" 18GA METAL STUD @ 1'-4" O.C
(DETAILED STUD DESIGN BY CONTRACTOR)
6" BATT INSULATION
6 mil POLY VAPOR BARRIER(TAPE AND SEAL ALL JOINT)
INTERIOR FINISH 1/2" GYPSUM BOARD, TAPE AND
PAINTED WITH ONE COAT PRIMER AND 2 TOP COATS PAINT
OFFICE, LUNCH ROOM WASHROOMS REST AREA, MECHANICAL ROOM.
OR
PRE-FINISH METAL LINER PANEL
PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
FINISH: WHITE (QC 28317) BY AGWAY (AT MECH SHOP AND STORAGE ROOMS)
ON 18 GA METAL Z-GIRTS (1" DEEP) @ 4'-0" O.C

W1a
AT STRUCTURAL BRACING
AS PER W1 WITH ADDITION OF 3 5/8" METAL STUD @ 1'-4"
1/2" GYPSUM BOARD

WALL AND PARTITION NOTES

1) EXTEND ALL FRAMING UNDERSIDE OF ROOF DECK OR STRUCTURE
2) PROVIDE DEFLECTION TRACK AT TOP OF ALL PARTITIONS
3) PARTITIONS IN SHOP AND MW OIL FUEL STORAGE AREA TO BE CONSIDERED WIND LOADED (DETAILED DESIGN BY CONTRACTOR)
4) GYPSUM BOARD ON OFFICE, WASHROOMS, LUNCH ROOM, PARTITIONS TO MIN 6" ABOVE CEILING
   ALL OTHER PARTITION WALLS TO HAVE GYPSUM BOARD INSTALLED FULL HEIGHT
5) TAPE AND PAINT ALL GYPSUM BOARD WITH ONE COAT PRIMER AND 2 TOP COATS PAINT
6) CAULK AND FIRE STOP TOP AND END OF ALL FIRE RATED PARTITION WALLS
7) PROVIDE BLOCKING IS WALLS AS REQUIRED TO SUPPORT MISC ITEM INCLUDING MILL WORK, WASHROOM ACCESSORIES ETC.

CLADDING & COLOUR SPEC:

METAL WALL PANELS
VERTICAL PREFORMED METAL CLADDING
1. PRODUCT: VICWEST CL435 OR APPROVE EQUAL
2. COLOUR FINISH:SLATE BLUE

INTERIOR METAL CLADDING
1. PRODUCT: 24-GAUGE 7/8" CORRUGATED BY AGWAY
2. FINISH: WHITE (QC 28317) BY AGWAY

SHEET METAL FLASHINGS AND TRIMS
PREFINISHED SHEET STEEL
1. BASE METAL THICKNESS: 22 GAUGE
2. FINISH: TYPE 1 & TYPE 2 TRIMS TO BE SLATE BLUE
3. FINISH: TYPE 3 TRIMS TO BE BLUE

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project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
ARCH - ROOM FINISH SCHEDULE AND WALL/PARTITION SCHEDULE

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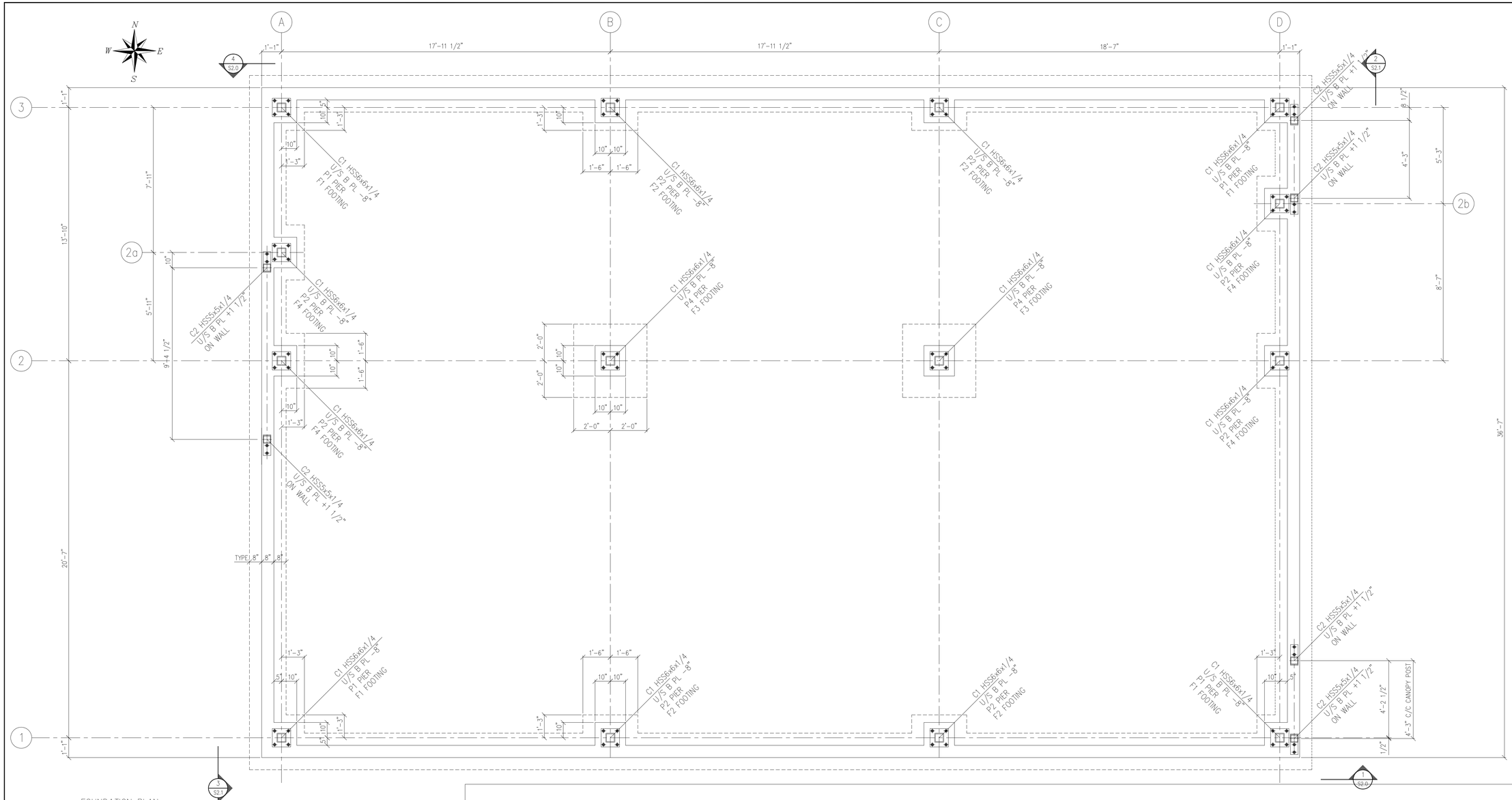
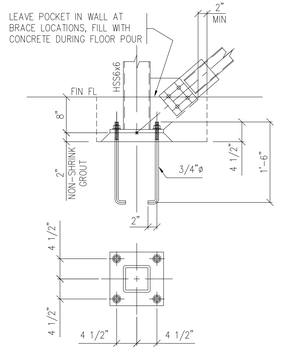
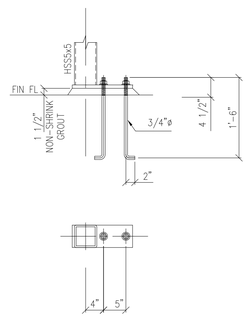


FOUNDATION PLAN

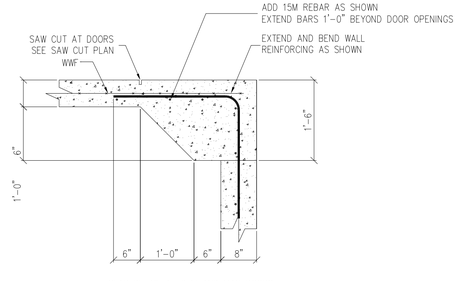
NOTE
1) U/S OF ALL FOOTING @ 6'-6" BELOW FINISHED FLOOR (REFER TO GEOTECHNICAL REPORT BY ENGLOBE)
2) U/S OF COLUMN BASE PLATE (BUILDING COLUMNS) -8" BELOW FINISHED FLOOR
3) U/S OF COLUMNS BASE PLATE FOR COLUMNS SUPPORTING CANOPIES + 1 1/2" FROM FINISHED FLOOR
4) SEE THIS DRAWING FOR BASE PLATE DETAILS
5) ALL COLUMNS TO HAVE 1/4" CAP PL.



COLUMN BASE FOR TYPE C1
BASE PL 1'-0"x1'-0"x3/4"



COLUMN BASE FOR TYPE C2(CANOPY COLUMNS)
BASE PL 5"x1'-1 1/2"x3/4"



SLAB DETAIL AT O/H AND MAN DOORS

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project
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HEARST MECHANICAL SHOP
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title
FOUNDATION PLAN

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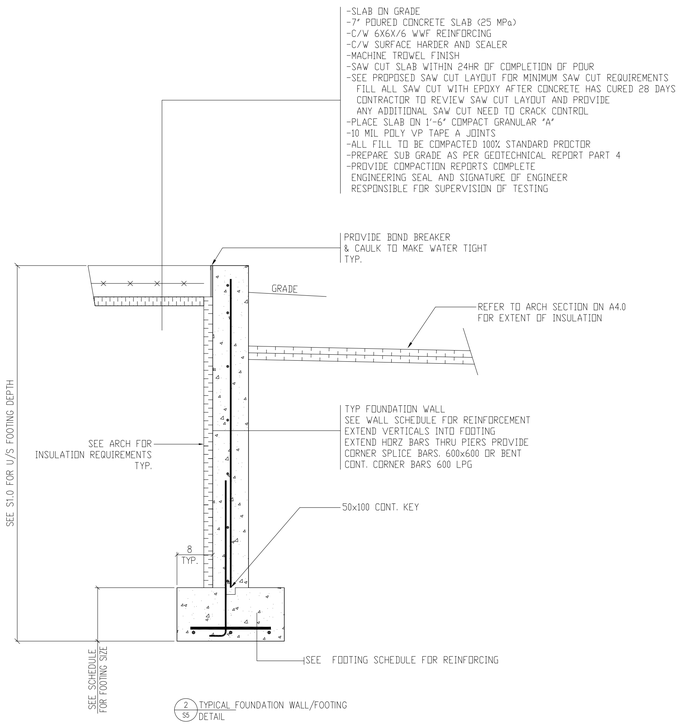
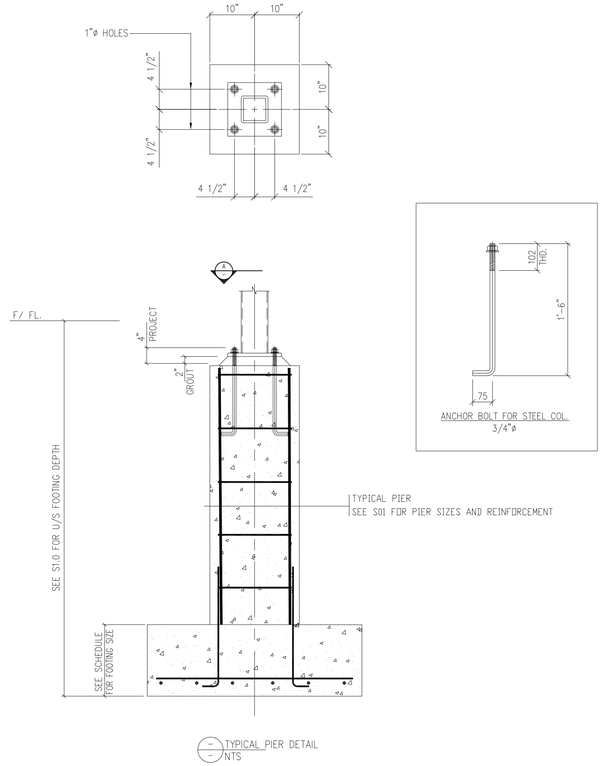


2/S5 TYPICAL FOUNDATION WALL/FOOTING DETAIL



TYPICAL PIER DETAIL
NTS

FOUNDATION INFORMATION

FOOTING SCHEDULE			
FOOTING	SIZE	REINFORCING	NOTES
F1	3'-0"x3'-0"x1'-0"	15M BOTH WAYS, 1 LAYER BTM (8" O.C.)	
F2	3'-0"x3'-0"x1'-0"	15M BOTH WAYS, 1 LAYER TM (8" O.C.)	
F3	4'-0"x4'-0"x1'-4"	15M BOTH WAYS, 1 LAYER TM (8" O.C.)	
F4	3'-0"x3'-0"x1'-0"	15M BOTH WAYS, 1 LAYER TM (8" O.C.)	
WALL	2'-0"Wx1'-0"H	(3) 15M CONT. BARS - 1 LAYER BTM	PROVIDE 15M TRANSVERSE BARS @ 1'-0" O.C.

WALL AND PIER SCHEDULE			
PIER	SIZE	REINFORCING	NOTES
P1	1'-8"x1'-11"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
P2	1'-8"x1'-11"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
P3	1'-8"x1'-11"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
P4	1'-8"x1'-8"	6-20M BARS VERT. + 10 M STIRRUP @ 1'-0" O.C.	6-20M BARS WITH 9" HOOK IN FOOTING
WALL	8" THICK WALL	15M BARS VERT & HORIZ @ 1'-0" O.C. BOTH WAYS	15m BARS WITH 7" HOOK TO MATCH VERTICAL WALL BARS

FOUNDATION NOTES

NOTE ALL DIMENSIONS SHOWN FOR REFERENCE ONLY CONFIRM DIMENSIONS WITH ARCHITECTURAL DRAWINGS & EXISTING CONDITIONS
1) SEE GENERAL NOTES
2) SEE GEOTECHNICAL REPORT PART 4 FOR EXCAVATION, SITE PREPARATION, BACKFILL AND INSULATION
INCLUDING ADDITONAL EXCAVATION BELOW ENGINEERING FILL BELOW FOOTINGS
AND ENGLOBE TO REVIEW AND APPROVAL ALL SUBGRADE PREPARATION BEFORE INSTALLATION OF FOUNDATION SYSTEM.
3) ALL FOOTINGS TO BEAR ON ORIGINAL UNDISTURBED SOIL OR ENGINEERED FILL (CONFIRMED AND APPROVED BY GEOTECHNICAL SOILS CONSULTANT)
4) ALL EXISTING ORGANIC SOILS TO BE REMOVED, REFER TO ENGLOBE REPORT FOR DEPTHS
5) ALL FOUNDATION CONCRETE EXPOSED TO FREEZE THAW TO BE 32MPa.
6) ALL CONCRETE EXPOSED TO FREEZE THAW TO HAVE 6% ENTRAINMENT
7) REFERENCE STRUCTURAL STEEL SHOP DETAILS FOR ANCHOR BOLT AND INSERT PLACEMENT
8) ALL FOOTINGS TO BEAR 6'-0" BELOW GRADE (6'-6" BELOW T/O FIN FLOOR) ON 2'-0" OF COMPACT ENGINEERED FILL
(SEE GEOTECHNICAL REPORT FOR SOIL PREPARATION REQUIREMENTS)
9) WALL AND PIER FOOTINGS TO BE POURED MONOLITHIC
10) WALL FOOTING REINFORCING BARS TO PASS THRU PIER FOOTINGS
11) PLACE VERTICAL DOWEL IN FOOTING TO MATCH PIER AND WALL VERTICAL BARS SEE SECTION FOR HOOKS LENGTHS
12) COLD JOINTS IN WALL AND FOOTING TO BE STAGGERED MIN 1200mm AND PLACED NEAR MID SPAN BETWEEN PIERS
13) CENTER ALL FOOTINGS ON COLUMN & PIER CENTER LINES U.N.O ON PLANS
13) THICKEN FLOOR DRAIN AND CATCH BASIN AS REQUIRED
14) ALL PITS IN CONCRETE FLOOR SLAB TO BE REINFORCED WITH 10M BARS @ 300 BOTH WAYS (SEE SECTIONS)
15) SEE PLAN AND SECTION FOR DETAILS

SPECIAL NOTE
CONTRACTOR TO BACKFILL ALL WALLS FROM BOTH SIDES EQUALLY

BAR	LAP SPLICE	HOOK	BEND RADIUS
10M	1'-4"	5"	2 1/4"
15M	2'-0"	7"	3 1/2"
20M	2'-4"	9"	4 3/4"

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title FOUNDATION DETAILS

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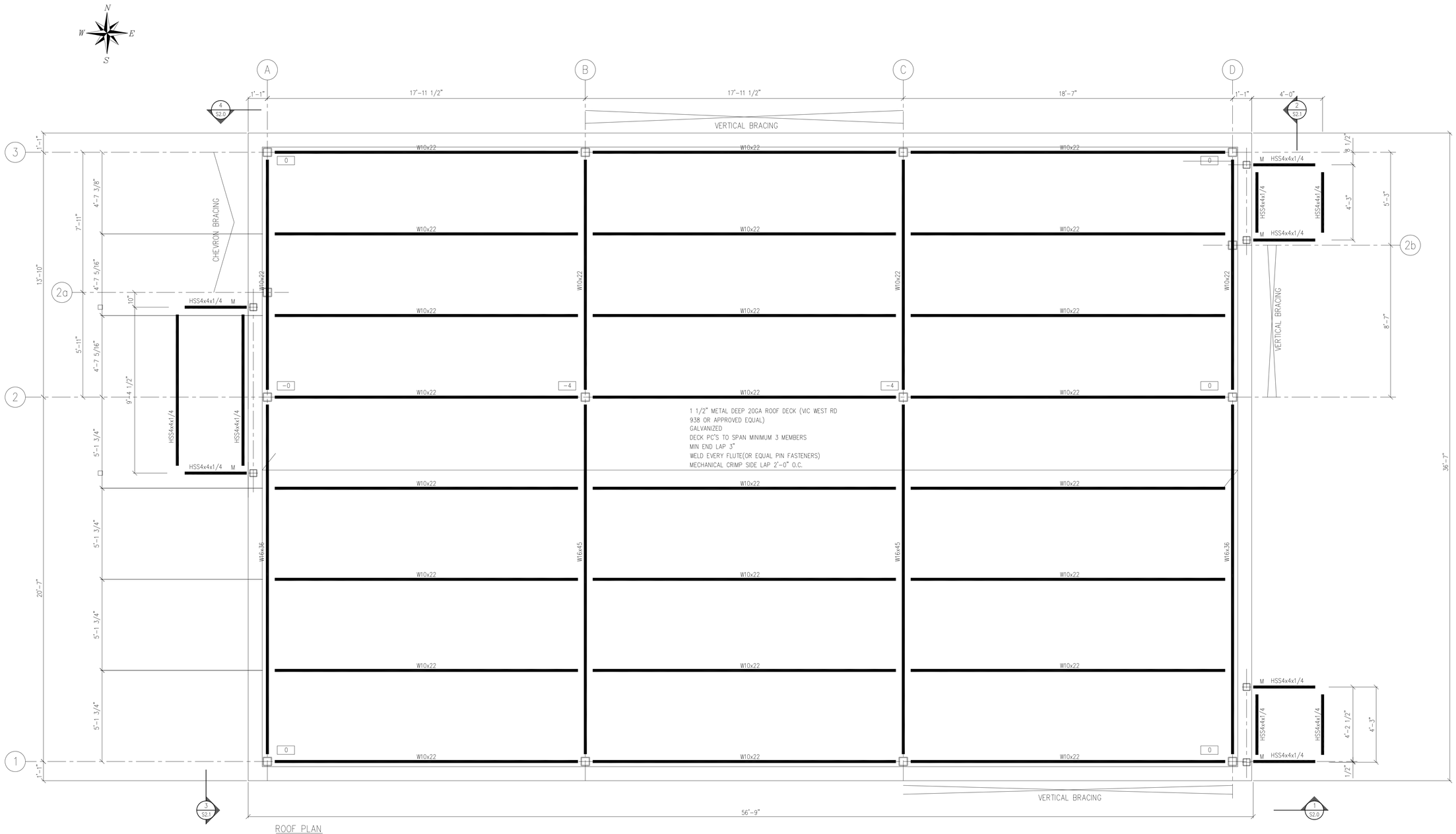

ROOF PLAN

1) TOP OF STEEL 15'-10" (PERIMETER)
2) SLOPE STEEL AS SHOWN -XXX
3) M=FULL MOMENT CONNECTION
4) PROVIDE CONTINUOUS EDGE ANGLE L3x3x1/4 AT PERIMETER

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title
STEEL ROOF PLAN

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date: NOV 10 23	
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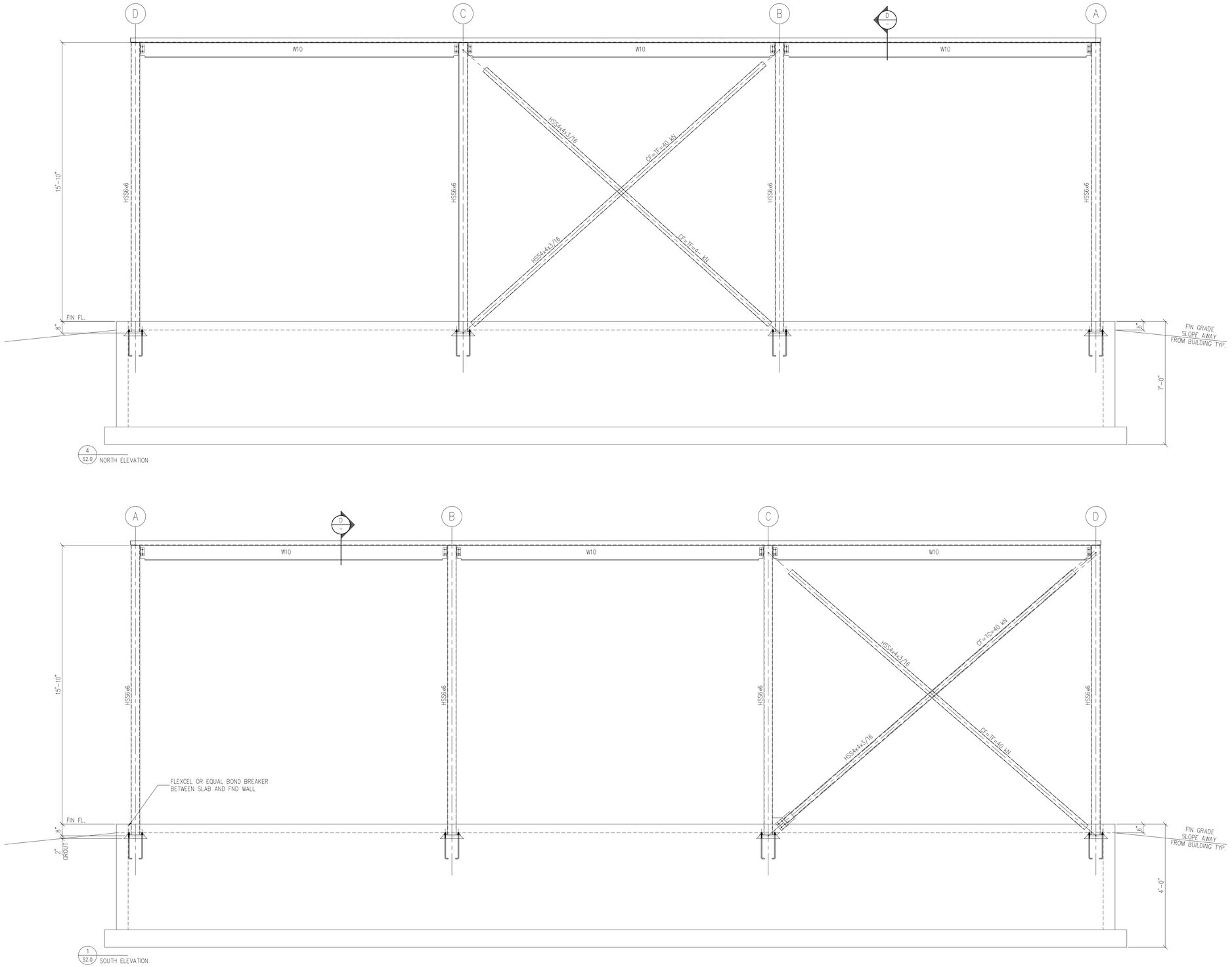

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title
STEEL ELEVATIONS

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TIM T	BM
scale:	project no:
NTS	231979
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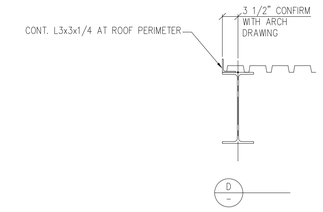
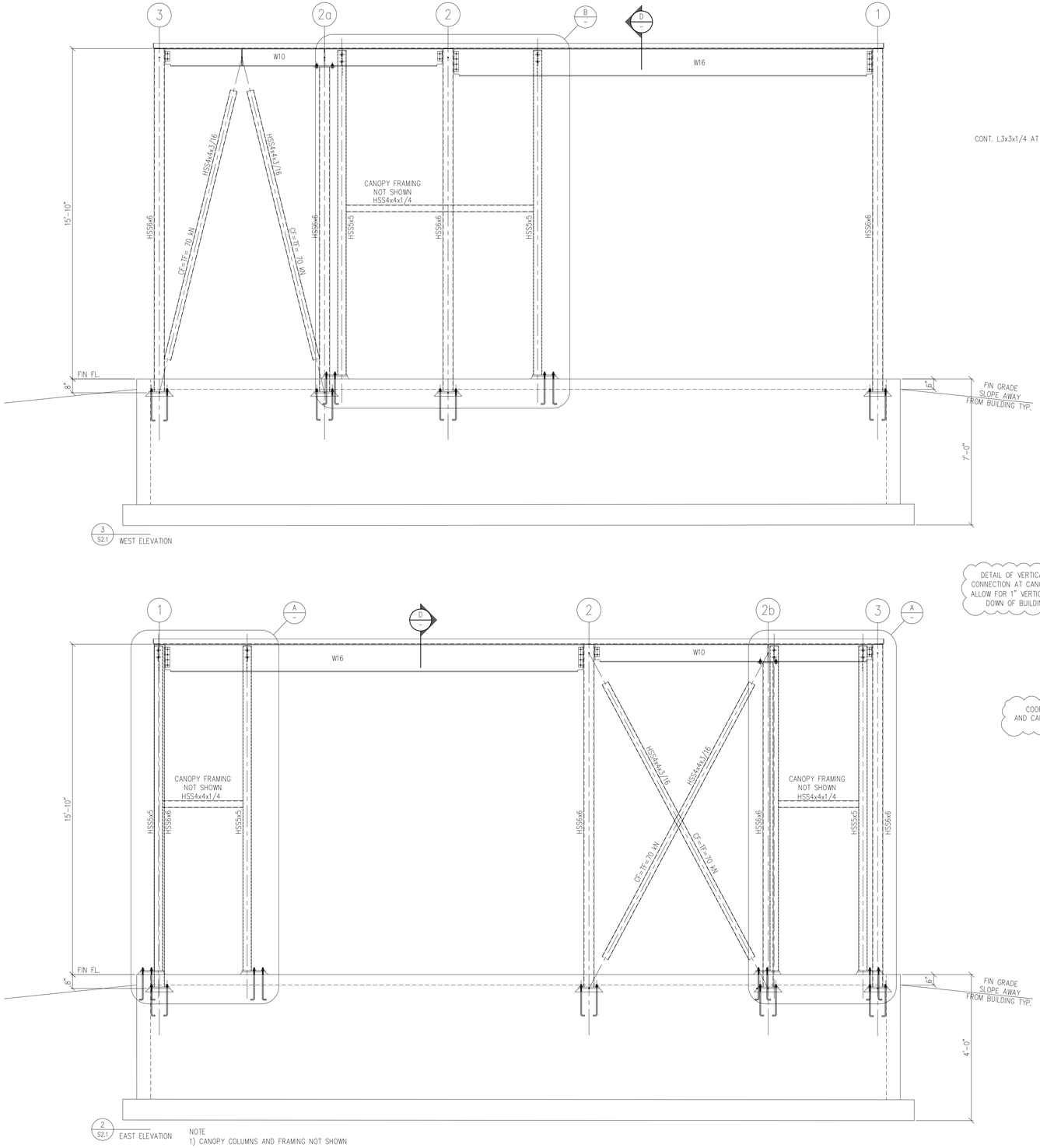
MAR 25 24	
date:	
NOV 10 23	

dwg no:
S2.0

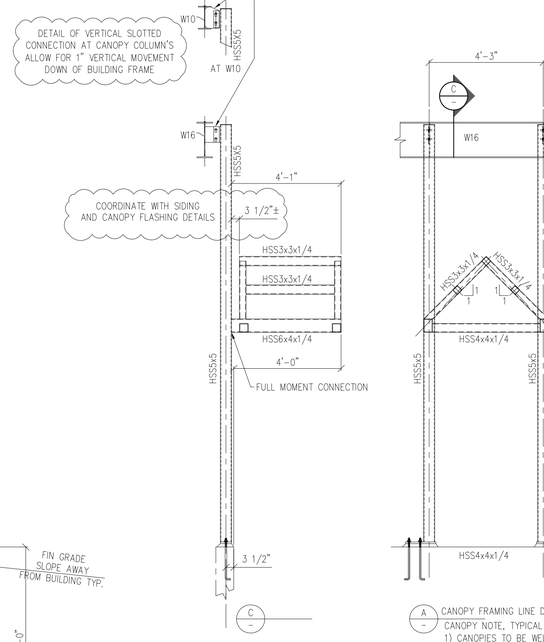
3
S2.1
WEST ELEVATION

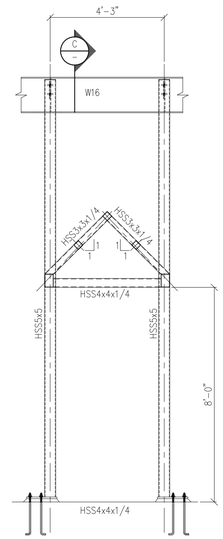


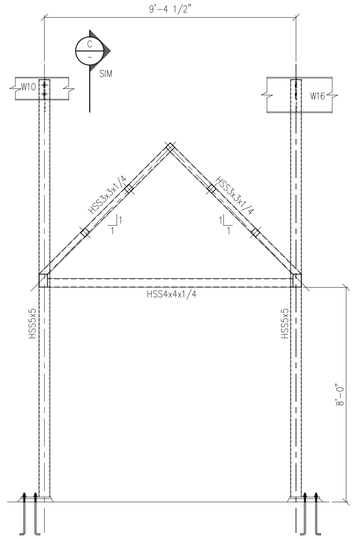


2
S2.1
EAST ELEVATION

NOTE
1) CANOPY COLUMNS AND FRAMING NOT SHOWN







A
CANOPY FRAMING LINE D

B
CANOPY FRAMING LINE A

CANOPY NOTE, TYPICAL ALL CANOPIES
1) CANOPIES TO BE WELDED CONSTRUCTION
2) PROVIDE 1/4" CAP PLATES AT END OF ALL PIECES AS REQUIRED

revision	date
0	MAR 25 24
FOR TENDER	

LICENSED PROFESSIONAL ENGINEER
W.T. THERRIAULT
Mar 25, 24
PROVINCE OF ONTARIO

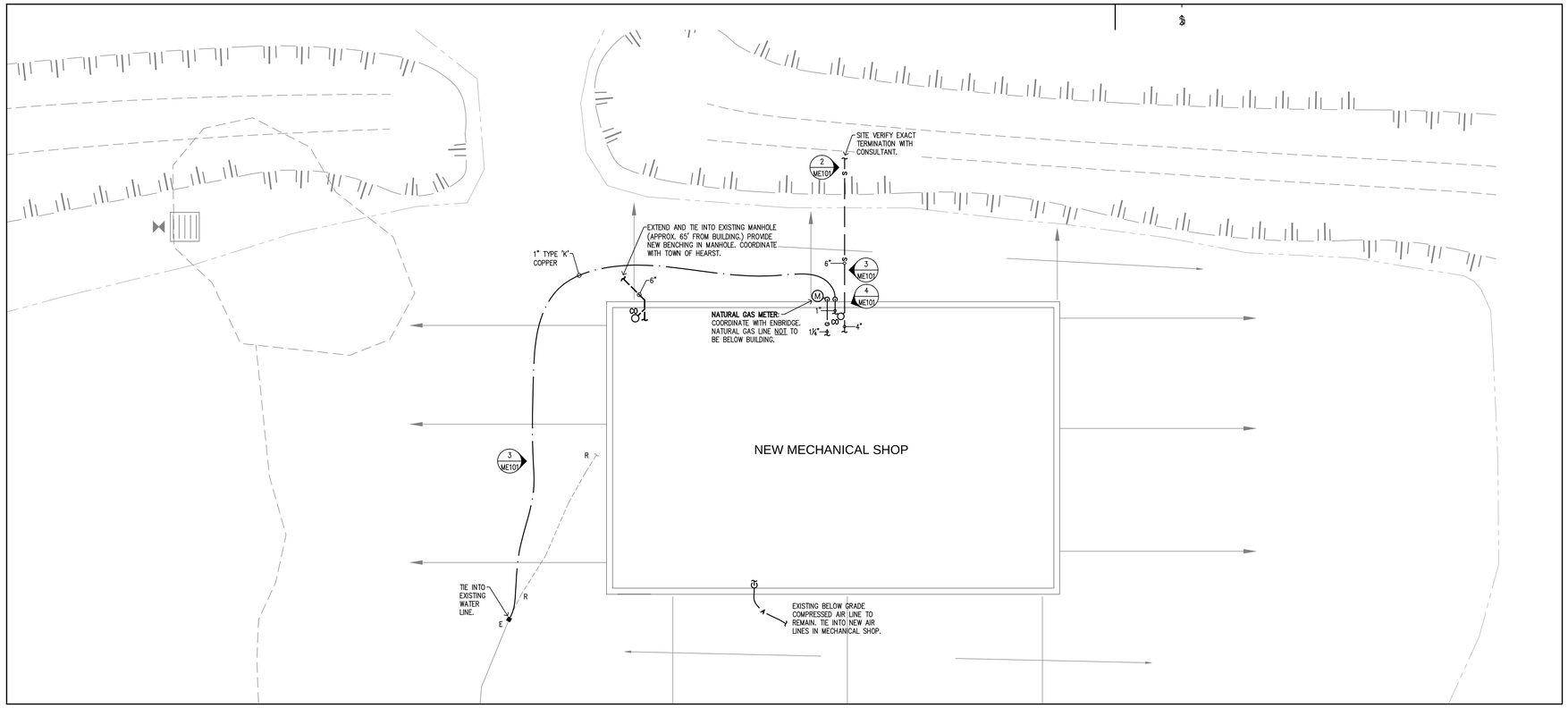
NORTHSHORE ENGINEERING
& DRAFTING SERVICES
184 McNaughton Ave.
NORTH BAY ONT.
705-495-0981

project
ONTARIO NORTHLAND
HEARST MECHANICAL SHOP
HEARST, ONTARIO

title
STEEL ELEVATIONS

drawn by:	checked by:
TIM T	BM
scale:	project no:
NTS	231979
date plotted:	
MAR 25 24	
date:	
NOV 10 23	

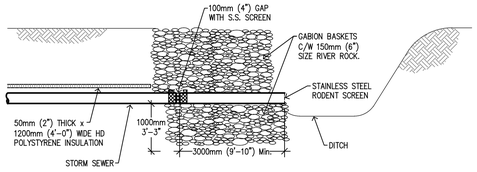
dwg no:
S2.1



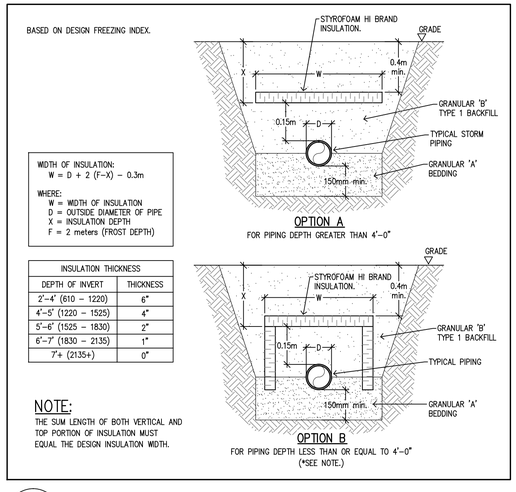
1 ME101 Plumbing and Gas - Site Plan
N.T.S.

MECHANICAL LEGEND

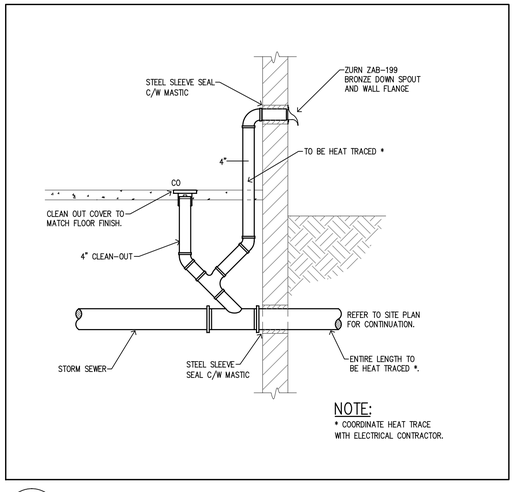
—— · ——	COLD WATER PIPING
— — —	SANITARY SEWER BELOW
— —S— —	STORM SEWER BELOW GRADE
——S——	STORM SEWER ABOVE GRADE
——G——	GAS LINE
	PIPE DROP
	COMBINATION PIPE RISE AND DROP
	CLEAN OUT AT FLOOR LEVEL
M	WATER OR GAS METER
	GATE VALVE
R	EXISTING DEVICE TO BE REMOVED



2 ME101 Storm Sewer Discharge Detail
NTS



3 ME101 Storm Sewer, Sanitary Sewer, and Water Line Insulation Detail
N.T.S.



4 ME101 Storm Emergency Overflow Detail
N.T.S.

ISSUED FOR TENDER	2024.03.20
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

LICENSED PROFESSIONAL ENGINEER
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T.KRAJCI
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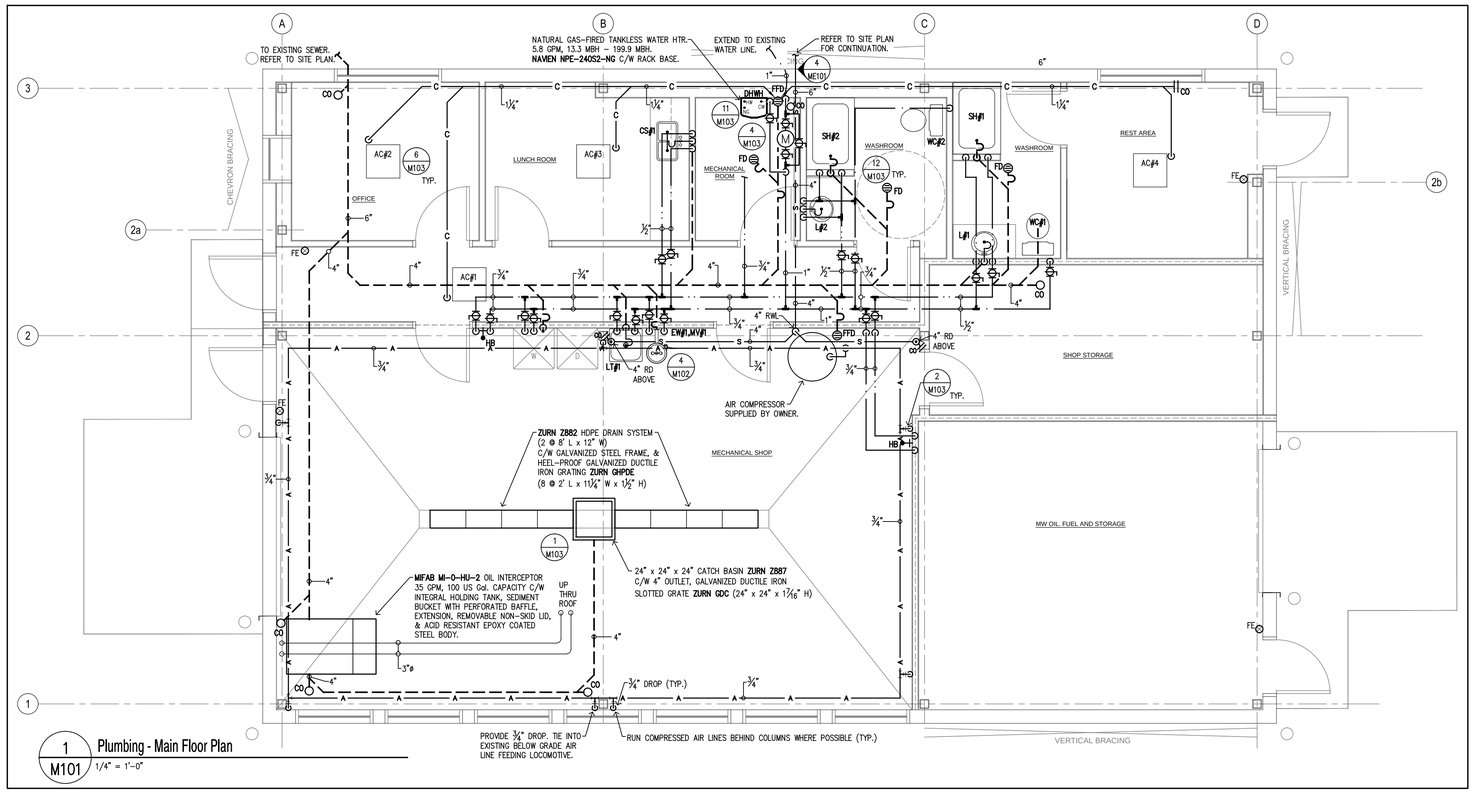
project
ONTC HEARST
MECHANICAL SHOP

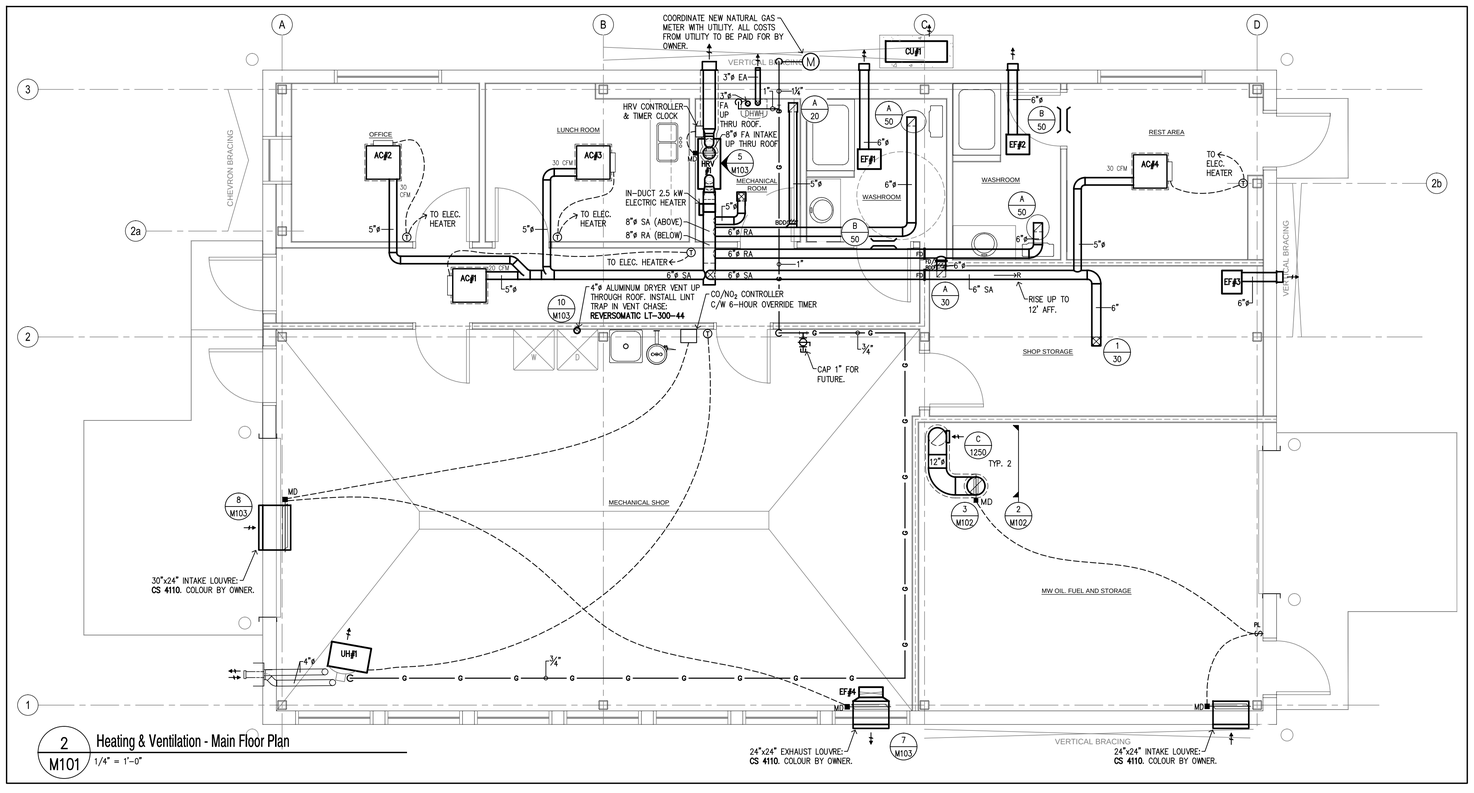
HEARST ONTARIO

title
MECHANICAL
PLUMBING & GAS
SITE PLAN, LEGEND, & DETAILS

drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: ME101
plotted: March 20, 2024	



1 M101 Plumbing - Main Floor Plan
1/4" = 1'-0"



2 M101 Heating & Ventilation - Main Floor Plan
1/4" = 1'-0"

PLUMBING GENERAL NOTES:

1. PROVIDE SYMMONS LAUNDRY MATE #W602 "WASHING MACHINE VALVE & DRAIN FIXTURE" AT WASHING MACHINE.
2. COORDINATE SANITARY AND STORM PIPING PENETRATIONS THROUGH STRUCTURAL FOUNDATION. PIPE SLEEVES THROUGH FOUNDATION WALLS TO BE 1.25x PIPE O.D. OR MIN. 50mm FILLED WITH SOFT FOAM INSULATION.
3. PRIME ALL FLOOR DRAINS TO COLD WATER PIPING AT NEAREST SINK OR TRAP PRIMER VALVE AS REQUIRED.
4. FIRE STOP ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES.
5. PENETRATIONS THROUGH MASONRY OR CONCRETE TO BE SLEEVED.
6. VERIFY ALL POINTS OF CONNECTION TO EXISTING PLUMBING SERVICES PRIOR TO ROUGH-IN.
7. EXTEND 1" CONDENSATE FROM HRV, AND EVAPORATORS, TO NEAREST DRAIN. PROVIDE FUNNEL FLOOR DRAIN C/W AIR GAP.
8. REFER TO SPECIFICATION FOR LEAD FREE FIXTURE, VALVES, SOLDER ETC.
9. DOUBLE CHECK VALVE ASSEMBLY SERVING FLUSHING SYSTEM TO BE MOUNTED 750mm TO 1500mm ABOVE FINISHED FLOOR. A CLEAR SPACE OF 750mm IN FRONT OF THE DOUBLE CHECK VALVE ASSEMBLY IS REQUIRED. PROVIDE 1¼" FUNNEL TYPE RELIEF DRAIN C/W 1" AIR GAP BELOW CHECK VALVE.
10. PVC MAY BE USED IN LIEU OF CAST AND COPPER FOR ABOVE GRADE DRAINAGE AND VENT. PVC-XFR, CAST OR COPPER MUST BE USED FOR DRAINAGE AND VENT LINES IN ALL CEILING SPACES.

MECHANICAL GENERAL NOTES:

1. FIRE STOP ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES.
2. NEW AND REUSED PENETRATIONS THROUGH MASONRY OR CONCRETE TO BE SLEEVED.
3. REMOVE ALL UNUSED EQUIPMENT, PIPING, DUCTWORK, ETC. CUT CAP AND MAKE SAFE.
4. PROVIDE CLEARANCE TO EQUIPMENT AS PER MANUFACTURERS RECOMMENDATIONS.
5. CO & NO2 CONTROLLERS TO BE FIELD VERIFIED. SUBMIT REPORT.
6. NEW THERMOSTATS, TEMPERATURE SENSORS, OPERATOR INTERFACE CONTROLLERS, ETC. TO BE INSTALLED AT MAXIMUM HEIGHT OF 47" (1200mm) ABOVE FINISHED FLOOR. COORDINATE ON SITE WITH ALL OTHER TRADES PRIOR TO ROUGH IN.
7. MOTORIZED DAMPER AT LOUVRES / EXTERIOR WALL / BUILDING PENETRATIONS TO BE LOW LEAK INSULATED TYPE EQUAL TO TAMCO 9000BF, PARALLEL BLADE. MOTORIZED DAMPERS IN INTERIOR SPACES AND/OR FLOW CONTROL APPLICATIONS TO BE LOW LEAK NON-INSULATED EQUAL TO TAMCO 1000, OPPOSED BLADE.

MECHANICAL LEGEND

- COLD WATER PIPING
- HOT WATER PIPING
- HOT WATER RECIRCULATION PIPING
- SANITARY SEWER BELOW
- SANITARY SEWER ABOVE
- STORM SEWER BELOW GRADE
- STORM SEWER ABOVE GRADE
- CONDENSER WATER SUPPLY
- COMPRESSED AIR PIPING
- GAS LINE
- CAPPED PIPING
- VENT THRU ROOF (SIZE AS INDICATED)
- UNIT HEATER
- PIPE DROP
- COMBINATION PIPE RISE AND DROP
- CLEAN OUT
- CLEAN OUT AT FLOOR LEVEL
- TRAP
- FLOOR DRAIN
- FUNNEL FLOOR DRAIN
- ROOF DRAIN
- HOSE BIB
- PUMP
- WATER OR GAS METER
- GATE VALVE
- THERMOSTAT, ELECTRIC
- BALANCING VALVE
- CHECK VALVE
- TRIPLE DUTY CHECK VALVE
- THERMOMETER
- BALL VALVE
- BACK FLOW PREVENTER
- DOOR GRILLE
- DUCT SECTION– POSITIVE PRESSURE
- DUCT SECTION– NEGATIVE PRESSURE
- DUCT WITH DIMENSIONS
- ACCOUSTICALLY LINED DUCT
- CHANGE OF ELEVATION– RISE(R), DROP(D)
- THERMALLY INSULATED DUCT
- DUCT TRANSITION
- TURNING VANES
- BACKDRAFT DAMPER– MULTI-BLADE WITH POSITION LOCKING
- MOTORIZED DAMPER
- FIRE DAMPER (PROVIDE ACCESS DOOR)
- EXHAUST/RETURN GRILLE OR REGISTER
- SUPPLY GRILLE OR REGISTER
- CEILING DIFFUSER, GRILLE OR REGISTER RECTANGULAR
- FIRE EXTINGUISHER
- AIR TERMINAL DESIGNATION X – TYPE, XX – AIR VOLUME (CFM)

ISSUED FOR TENDER	2024.03.20
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

LICENSED PROFESSIONAL ENGINEER
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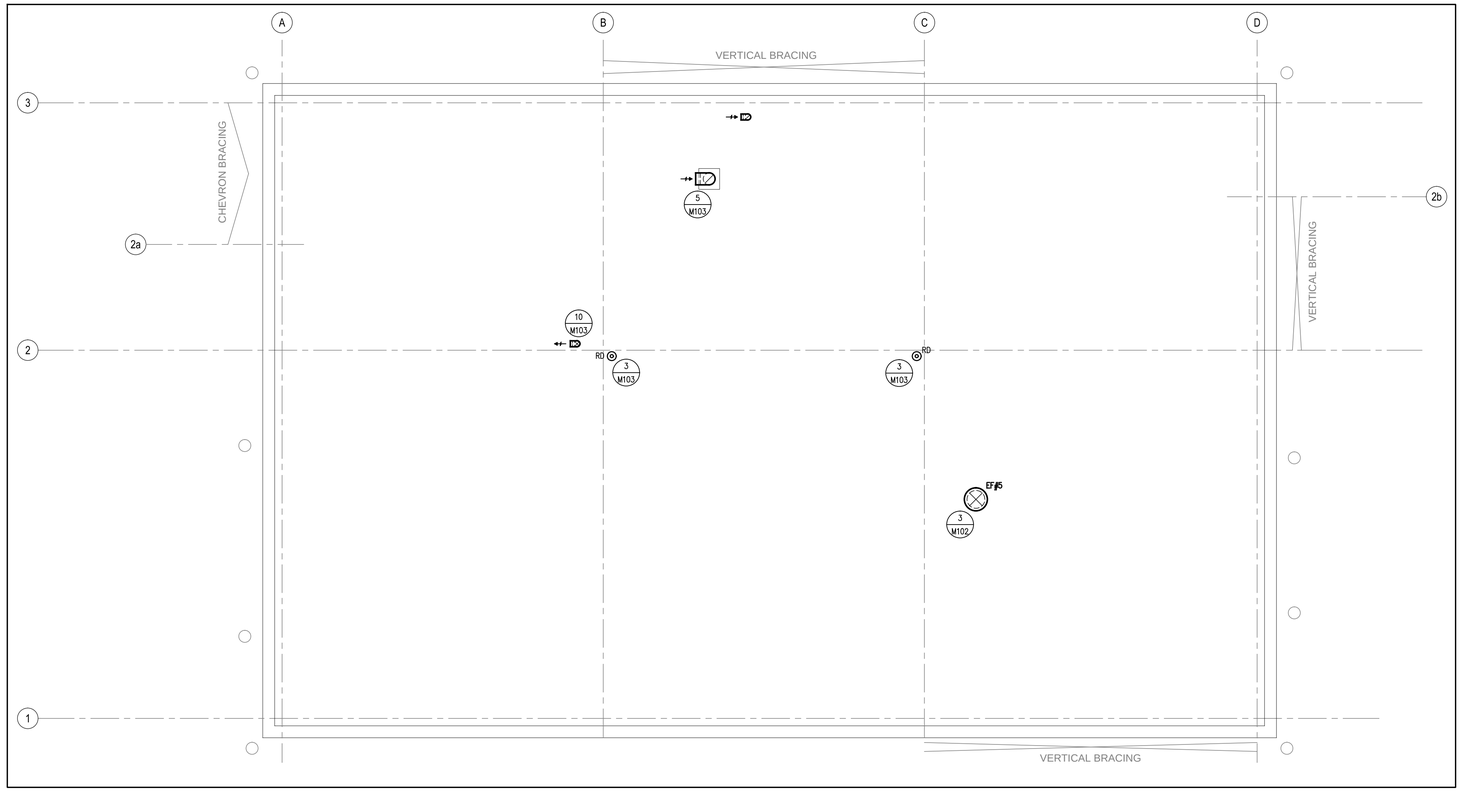
project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
MECHANICAL
PLUMBING & HVAC
FLOOR PLAN, LEGEND, & NOTES

drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: M101
plotted: March 20, 2024	



1 M102 Mechanical - Roof Plan
1/4" = 1'-0"

Unit Heater Schedule

No.	MODEL BY MODINE	AIR FLOW (CFM)	HEATING CAPACITY (IN / OUT)	MOTOR & POWER SUPPLY	NOTES
UH#1	HDS 75 AS0111FBAN	1160	75.0 MBH / 61.5 MBH	120V/SP/60Hz ½ HP	GAS-FIRED C/W REMOTE PROGRAMMABLE THERMOSTAT: **MODINE PRO1 T-715M**, 4"ø HORIZONTAL VENT KIT, VIBRATION ISOLATORS.

Heat Recovery Ventilator Schedule

No.	MODEL BY LIFEBREATH	ESP	SUPPLY AIR CFM	EXHAUST AIR CFM	FILTER	POWER SUPPLY	NOTES
HRV#1	267 MAX	0.5"	160	160	MERV 6 WASHABLE	120 V/SP/60Hz 2.1 A	C/W FAN (EXHAUST ONLY) DEFROST. WALL-MOUNT HRV CONTROLLER C/W 24/7 TIMER CLOCK IN MECHANICAL ROOM. **LIFEBREATH 99-DVPL03**. SET TIME CLOCK TO OPERATE FROM 7am TO 5pm. PROVIDE 2.5 kW - 208V/SP ELECTRIC REHEAT COIL C/W SCR CONTROLLER, DISCHARGE AIR TEMPERATURE SENSOR, AND REMOTE ADJUSTMENT MOUNTED IN CUSTODIAL ROOM.

Diffuser and Grille Schedule

NO.	DESCRIPTION	MODEL BY NAILOR	SIZE NECK/OVERALL	NOTES
1	ALUMINUM DOUBLE DEFLECTION GRILLE	51DH	6"x6"	C/W OBD
A	ALUMINUM RETURN GRILLE	5145H	6"x6	
B	ALUMINUM DOOR TRANSFER GRILLE	51DGD	12"x8"	
C	ALUMINUM CURVED SPIRAL DUCT GRILLE	51HC	8"x12" H	C/W OBD, ALUMINUM COLOUR

Exhaust Fan Schedule

No.	MODEL BY LOREN COOK	AIR FLOW (CFM)	ESP ("WC)	MOTOR & POWER SUPPLY	NOTES
EF#1	GC-148	100	0.25	120V/SP/60Hz 0.42 A	C/W FAN SPEED CONTROLLER (120V / 5A), **GEMINI** VIBRATION ISOLATION KIT, INTEGRAL BACKDRAFT DAMPER, & WHITE PLASTIC GRILLE. TERMINATE WITH WALL CAP C/W WIND GUARD AND DAMPER: **COOK WCR-6.**
EF#2	GC-148	100	0.25	120V/SP/60Hz 0.42 A	C/W FAN SPEED CONTROLLER (120V / 5A), **GEMINI** VIBRATION ISOLATION KIT, INTEGRAL BACKDRAFT DAMPER, & WHITE PLASTIC GRILLE. TERMINATE WITH WALL CAP C/W WIND GUARD AND DAMPER: **COOK WCR-6.**
EF#3	GC-148	100	0.25	120V/SP/60Hz 0.42 A	C/W FAN SPEED CONTROLLER (120V / 5A), **GEMINI** VIBRATION ISOLATION KIT, INTEGRAL BACKDRAFT DAMPER, & WHITE PLASTIC GRILLE. TERMINATE WITH WALL CAP C/W WIND GUARD AND DAMPER: **COOK WCR-6.**
EF#4	12XW40D17 (VF)	750	0.375	120V/SP/60Hz ¼ HP	DIRECT DRIVE ECM WALL FAN C/W FAN-MOUNTED SPEED CONTROL, MOTORIZED DAMPER, DISCONNECT, MOTOR-SIDE WIRE GUARD, WALL COLLAR, AND WEATHER HOOD.
EF#5	80C2B	400	0.375	120V/SP/60Hz ½ HP	ALL ALUMINUM SPARK-RESISTANT DOWNBLAST CENTRIFUGAL EXHAUST VENTILATOR C/W NEMA 3 DISCONNECT SWITCH, 24" HIGH ALUMINUM CURB WITH WELDED CAP CORNERS, ALUMINUM BIRDSCREEN, HINGED BASED KIT, & MOTORIZED DAMPER.

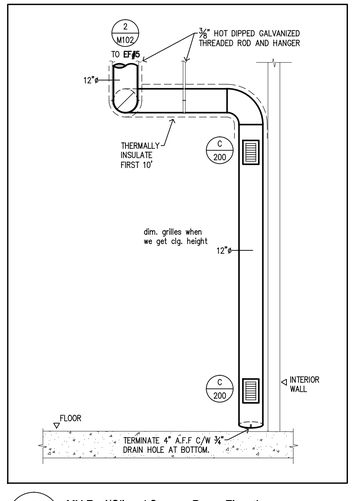
Plumbing Fixture Schedule

FIXTURE	MARKED	DRAIN	VENT	H.W.	C.W.	COMMENTS
WATER CLOSET	WC	4"	1-1/2"	----	1/2"	TO FLUSH TANK
COUNTER SINK	CS	1-1/2"	1-1/4"	1/2"	1/2"	
LAUNDRY TRAY	LT	1-1/4"	1-1/4"	1/2"	1/2"	
LAVATORY SINK	L	1-1/4"	1-1/4"	1/2"	1/2"	
FLOOR DRAIN	FD	3"	1-1/2"	----	1/2"	FROM PRIMER
HOSE BIBB	HB	----	----	3/4"	3/4"	

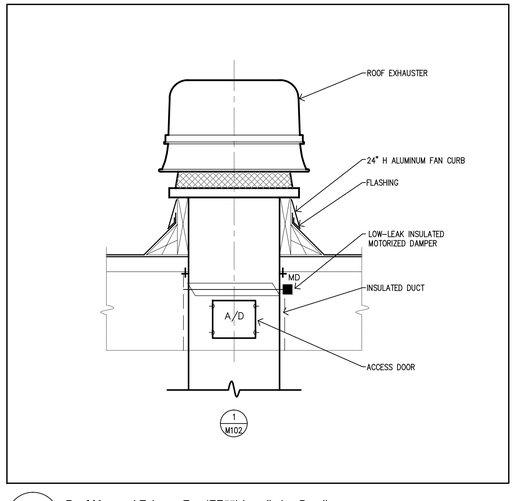
Air Conditioning Unit & Condensing Unit Schedule

No.	MODEL BY MITSUBISHI	COOLING CAPACITY (MBH)	HEATING CAPACITY (MBH)	POWER SUPPLY	WEIGHT (LBS)	DIMENSIONS (LxWxH)	NOTES
AC#1	SLZ-KF09NA1	9.00	11.0	208V/SP/60Hz MCA: 0.25A	31	24 13/32" x 24 13/32" x 9 27/32"	C/W CONDENSATE PUMP, & BACKLIT WALL-MOUNTED PROGRAMMABLE THERMOSTAT: **MITSUBISHI PAR-40MAAU.** LINK TO 2nd STAGE (BASEBOARD) HEAT VIA CONTROL INTERFACE: **MITSUBISHI MAC-334IF-E** C/W RELAY.
AC#2	SLZ-KF12NA1	12.0	13.0	208V/SP/60Hz MCA: 0.3A	31	24 13/32" x 24 13/32" x 9 27/32"	
AC#3	SLZ-KF12NA1	12.0	13.0	208V/SP/60Hz MCA: 0.3A	31	24 13/32" x 24 13/32" x 9 27/32"	
AC#4	SLZ-KF15NA1	14.1	18.0	208V/SP/60Hz MCA: 0.4A	31	24 13/32" x 24 13/32" x 9 27/32"	

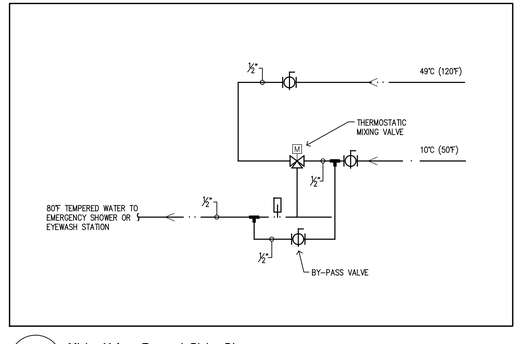
No.	MODEL BY MITSUBISHI	COOLING CAPACITY MBH	HEATING CAPACITY (@ -15°C)	SEER / EER	POWER SUPPLY	WEIGHT LBS	DIMENSIONS	NOTES
CU#1	MXZ-8C48NAHZ	48.0	54.0 MBH	20.0 / 12.2	208V/SP/60Hz/ MCA: 42	278	41 13/32" W x 14" D x 52 7/16" H	REFRIGERATION LINES SIZED BY UNIT MANUFACTURER. C/W DISCONNECT SWITCHES, STARTERS, CONTROL WIRING, AND R410A REFRIGERANT. HEATING OPERATION TO BE DOWN TO -25°C.



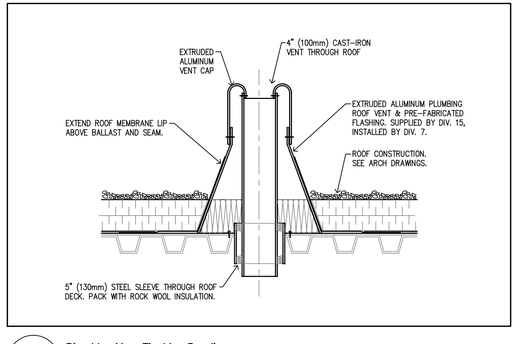
2 M102 MV Fuel/Oil and Storage Room Elevation
N.T.S.



3 M102 Roof Mounted Exhaust Fan (EF#5) Installation Detail
N.T.S.



4 M102 Mixing Valve - Eyewash Piping Diagram
N.T.S.



5 M102 Plumbing Vent Flashing Detail
N.T.S.

ISSUED FOR TENDER	2024.03.20
revision	date

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LICENSED PROFESSIONAL ENGINEER
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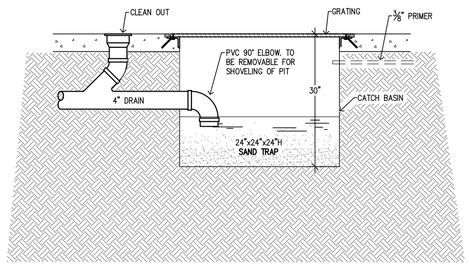
project
ONTC HEARST
MECHANICAL SHOP

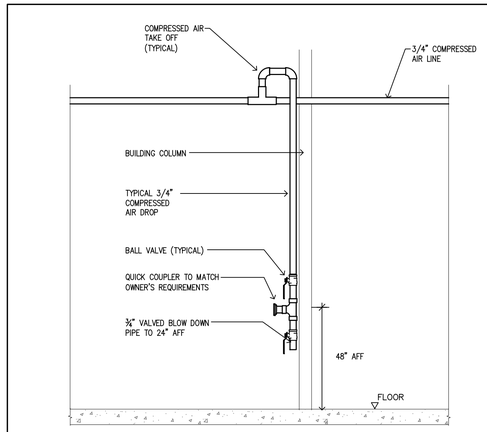
HEARST ONTARIO

title
MECHANICAL
PLUMBING & HVAC
ROOF PLAN, SCHEDULES & DETAILS

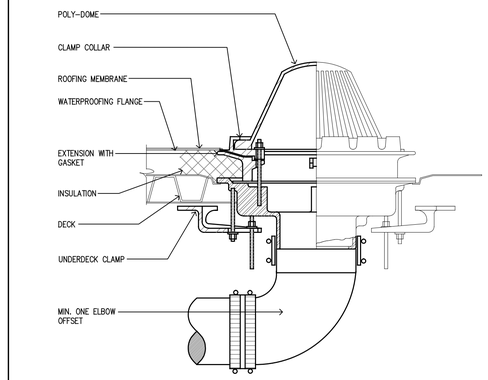
drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: M102
plotted: March 20, 2024	



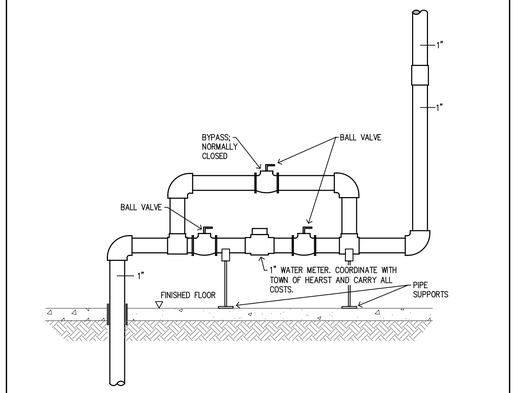
1 M103 **Sand Trap Details** N.T.S.



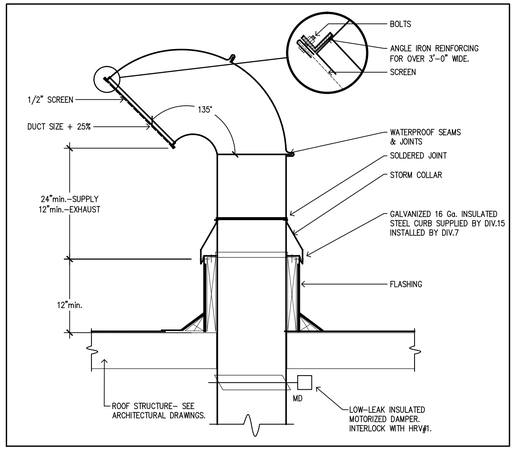
2 M103 **Compressed Air Drops (Typical)** N.T.S.



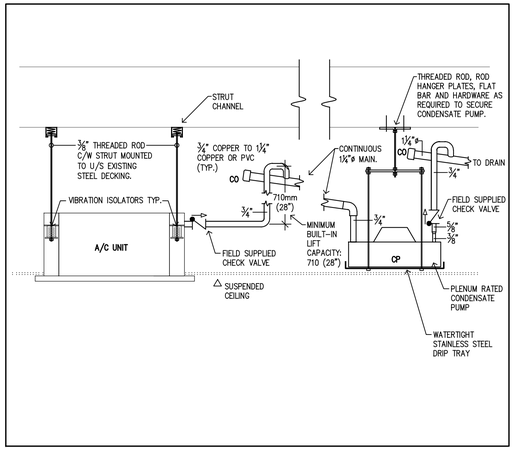
3 M103 **Standard Roof Drain Detail** N.T.S.



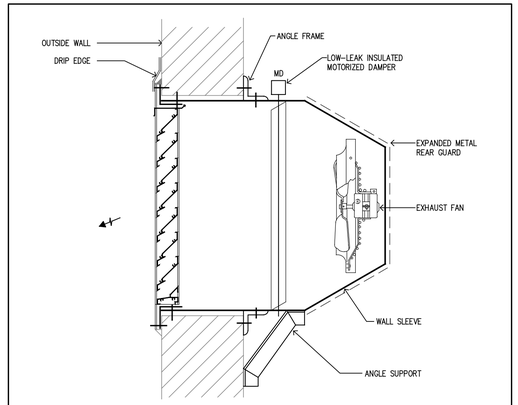
4 M103 **Water Meter Installation Detail** N.T.S.



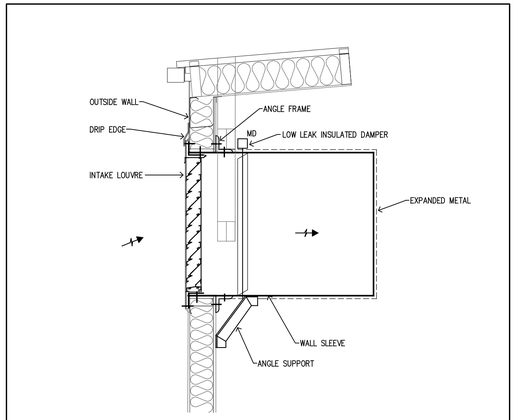
5 M103 **Intake / Exhaust Gooseneck Detail** N.T.S.



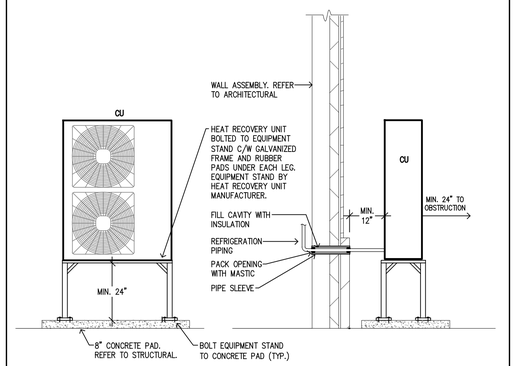
6 M103 **Typical Cassette A/C Unit & Condensate Pump Installation Detail** N.T.S.



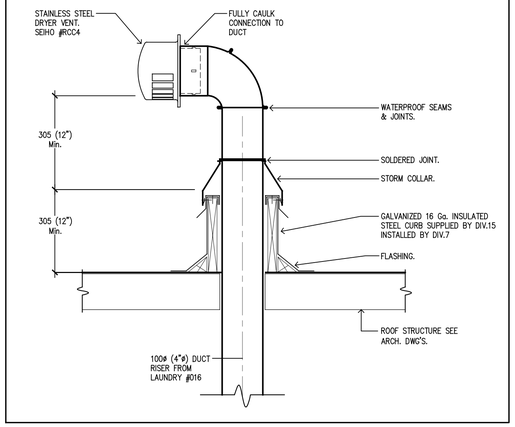
7 M103 **Exhaust Fan Mounting Detail (EF#4)** N.T.S.



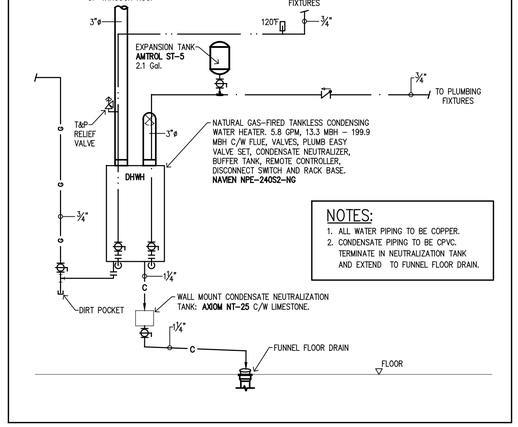
8 M103 **Intake Louvre Detail** N.T.S.



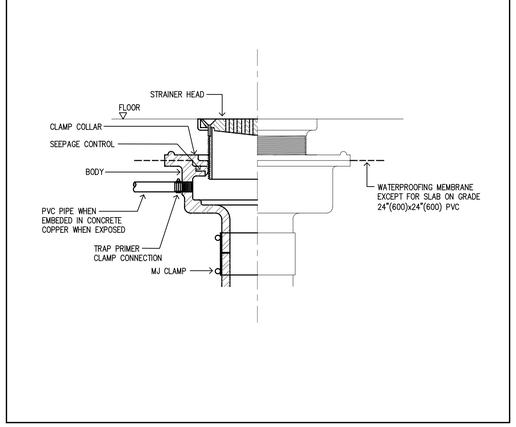
9 M103 **CU#1 Mounting and Refrigeration Piping Through Wall Detail** N.T.S.



10 M103 **Dryer Exhaust Gooseneck Detail** N.T.S.



11 M103 **DHWH#1 Piping Diagram** N.T.S.



12 M103 **Floor Drain Detail** N.T.S.

ISSUED FOR TENDER	2024.03.20
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

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project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
MECHANICAL
PLUMBING & HVAC
DETAILS

drawn by: AL	date: MARCH 2024
checked by: TK	project no: 6083D
scale: AS NOTED	dwg no: M103
plotted: March 20, 2024	

ELECTRICAL LEGEND

	LIGHTING FIXTURE, CLG MTD (TYPE AS NOTED), HATCHING DENOTES UNSWITCHED
X	WALL MOUNTED LIGHT FIXTURE (TYPE AS INDICATED), HATCHING DENOTES UNSWITCHED
X	STRIP LIGHTING FIXTURE (TYPE AS INDICATED)
$	120V WALL MOUNTED SWITCH UNLESS OTHERWISE SPECIFIED
$3	120V THREE WAY WALL MOUNTED SWITCH
$4	120V FOUR WAY WALL MOUNTED SWITCH
$D1	SINGLE ZONE CAT5 CONNECTED, 0-10V WALL MOUNTED DIMMER SWITCH WITH ON/OFF CONTROL
$LV	WALL MOUNTED CAT5 CONNECTED SWITCH WITH ON/OFF CONTROL
$PL	MOTOR RATED SWITCH WITH PILOT LIGHT
$M	MOTOR RATED SWITCH
	OCCUPANCY SENSOR- WALL MOUNTED - TYPE AS NOTED
	OCCUPANCY SENSOR- CEILING MOUNTED OR INTEGRATED - TYPE AS NOTED
P	PHOTOCELL CONTROL
	SINGLE REMOTE EMERGENCY LIGHTING HEAD WALL MOUNTED
	DUAL REMOTE EMERGENCY LIGHTING HEAD WALL MOUNTED
EEP/X	COMBINATION PICTOGRAM EXIT/EMERGENCY LIGHT
	PICTOGRAM EXIT LIGHT, WALL MOUNTED, SELF POWERED. WIRE TO EMERGENCY LTG CIRCUIT.
	PICTOGRAM EXIT LIGHT, WALL MOUNTED. WIRE TO EMERGENCY BATTERY PACK AS NOTED AND EXIT LTG CIRCUIT.
POW	UNDERGROUND ELECTRICAL SERVICE
COM	OVERHEAD COMMUNICATION SERVICE
O/H	OVERHEAD ELECTRICAL SERVICE
	DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE 5-20R 20A T-SLOT
	DUPLEX RECEPTACLE 5-20R 20A T-SLOT MOUNTED ABOVE COUNTER
	GROUND FAULT DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
	SPECIAL RECEPTACLE AS NOTED
	WELDING RECEPTACLE WITH DISCONNECT
EP/X	ELECTRICAL PANEL, SURFACE MOUNTED (DESIGNATION AS SHOWN)
OR	TRANSFORMER
JB	JUNCTION BOX MOUNTED IN CEILING SPACE COMPLETE WITH COVER PLATE
WAP	WIRELESS ACCESS POINT - PROVIDE A CAT6 CABLE, TERMINATED IN A OUTLET BOX LOCATED IN ACCESSIBLE CEILING FOR CONNECTION OF A WIRELESS NETWORK ADAPTER. CONFIRM EXACT LOCATION ON SITE PRIOR TO ROUGH-IN.
	SAFETY DISCONNECT SWITCH - UNFUSED
	SAFETY DISCONNECT SWITCH - FUSED
	DIRECT CONNECTION FOR EQUIPMENT
MD	MOTORIZED DAMPER
	MOTOR CONNECTION
	ELECTRIC BASEBOARD HEATER
	VOICE/DATA OUTLET C/W ONE DATA JACKS & 1 VOICE JACK AND A 21mm CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE.
	VOICE/DATA OUTLET C/W ONE DATA JACKS & 1 VOICE JACK AND A 21mm CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE. OUTLET TO BE MOUNTED ABOVE COUNTER
	OUTDOOR LIGHTING TIMER
	THERMOSTAT- LINE VOLTAGE
LV	THERMOSTAT- ELECTRONIC LOW VOLTAGE
ACU#X	AIR CONDITIONING UNIT (DESIGNATION AS SHOWN)
CU#X	CONDENSING UNIT (DESIGNATION AS SHOWN)
EF#X	EXHAUST FAN (DESIGNATION AS SHOWN)
HRV#X	HEAT RECOVERY VENTILATOR (DESIGNATION AS SHOWN)
UH#X	UNIT HEATER (DESIGNATION AS SHOWN)
GFI	GROUND FAULT DEVICE
AFF	CENTERLINE DEVICE MOUNTING HEIGHT ABOVE FINISHED FLOOR
AFG	CENTERLINE DEVICE MOUNTING HEIGHT ABOVE FINISHED EXTERIOR GRADE
C	MOUNTED ON CEILING
HK	HOUSEKEEPING DEVICE
WG	WIRE GUARD
	POWER POLE
R	EXISTING DEVICE TO BE REMOVED
E	EXISTING DEVICE TO REMAIN

PANEL DESIGNATION

DP201#2

- CIRCUIT NUMBER
- PANEL NUMBER
- VOLTAGE LEVEL
  - 20=208V
  - 40=480V
  - 60=600V
- PANEL TYPE
  - DP=DISTRIBUTION PANEL
  - BP=BRANCH PANEL

EXAMPLE: BP201#2 = BRANCH PANEL, 208V, PANEL 1, BREAKER 2.

ELECTRICAL GENERAL NOTES:

1. ENTIRE INSTALLATION SHALL BE IN ACCORDANCE WITH THE ONTARIO ELECTRICAL SAFETY CODE.
2. ELECTRICAL CONTRACTOR IS TO OBTAIN ALL APPROVALS FROM LOCAL ELECTRICAL SAFETY AUTHORITY PRIOR TO COMMENCING WORK.
3. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH NORTH SHORE ENGINEERING DRAWINGS. ENSURE ALL REQUIREMENTS ARE COORDINATED AND CARRIED.
4. ALL DEVICES SHOWN ARE NEW, UNLESS OTHERWISE NOTED.
5. FIRE STOP ALL PENETRATIONS THRU FIRE RATED ASSEMBLIES.
6. ALL WIRING TO BE CONCEALED WHERE POSSIBLE. IF NOT POSSIBLE, PROVIDE SURFACE MOUNTED METAL RACEWAY AND MATCHING SURFACE MOUNTED BOX. RACEWAY TO BE SAME COLOUR AS BACKGROUND SURFACE, AND BE RAN AS NEAT AS POSSIBLE, PARALLEL / PERPENDICULAR TO BUILDING LINES.
7. PROVIDE STAINLESS STEEL COVERPLATES FOR ALL WIRING DEVICES, INCLUDING NEW UN-USED WALL BOXES.
8. THE EXISTING BUILDING IS CURRENTLY LOCATED WITHIN A HIGH SEISMIC AREA. THE ELECTRICAL CONTRACTOR SHALL CARRY THE SERVICES OF A PROFESSIONAL SEISMIC ENGINEER TO PROVIDE A DETAILED DESIGN OF ALL SEISMIC CONTROL MEASURES. ELECTRICAL CONTRACTOR SHALL ALSO CARRY THE COST FOR THE SUPPLY AND INSTALLATION OF ALL SUCH SECURITY MEASURES. REFER TO SPECIFICATION SECTION 15071 FOR GENERAL REQUIREMENTS AND SEISMIC ENGINEER QUALIFICATIONS.

POWER GENERAL NOTES:

1. PROVIDE BONDING CONDUCTOR AND CONNECTION (AS PER OESC) FOR ALL PERMANENTLY CONNECTED EQUIPMENT. COORDINATE EXACT REQUIREMENTS ON SITE.
2. BRANCH CIRCUIT WIRING IN CONCEALED SPACES TO BE INSTALLED IN CONDUIT. REFER TO THE SPECIFICATIONS ON THE MAXIMUM LENGTH OF ARMOURED CABLES THAT CAN BE USED.
3. COORDINATE EXACT LOCATION OF ALL DEVICES ON SITE WITH MILLWORK, FURNITURE AND EQUIPMENT SHOWN ON ARCHITECTURAL PLANS, PRIOR TO ROUGH-IN.
4. ALL DRY-TYPE TRANSFORMERS ARE GENERAL PURPOSE TYPE, UNLESS OTHERWISE NOTED.
5. ENSURE A MINIMUM OF 1M CLEARANCE IS MAINTAINED IN FRONT OF ALL PANELS, DISCONNECT SWITCHES.
6. PROVIDE CLEAR LABELS ON ALL WIRING DEVICES INDICATING PANEL AND CIRCUIT NUMBERING, (FOR EXAMPLE PNL#A CCT 11.)
7. ALL VOICE / DATA OUTLETS TO BE COMPLETE WITH 27mm CONDUIT TO ACCESSIBLE CEILING SPACE, ALL CABLES TO BE PROVIDED BY ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.
8. ALL VOICE, DATA IN CEILING SPACE TO BE SUPPORTED BY J-HOOKS. REFER TO DIVISION 16 FASTENING AND SUPPORT SPECIFICATIONS FOR FURTHER DETAILS.
9. ALL VOICE AND DATA TO BE PULLED TO MECHANICAL ROOM 104 I.T. CABINET.
10. PROVIDE ROUGH-IN FOR 4 OUTSIDE SECURITY CAMERAS.

LIGHTING GENERAL NOTES:

1. DASHED LINES JOINING FIXTURES, SENSORS, AND SWITCHES INDICATE THE FIXTURES THAT ARE CONTROLLED BY EACH SENSOR AND SWITCH.
2. COORDINATE INSTALLATION OF EXIT SIGNS WITH CEILINGS TO ENSURE ADEQUATE HEIGHT IS MAINTAINED.
3. EMERGENCY LIGHTING SHALL BE INSTALLED IN SUCH A MANNER THAT IT WILL BE AUTOMATICALLY ACTUATED UPON FAILURE OF THE POWER SUPPLY TO THE NORMAL LIGHTING IN THE AREA COVERED BY THAT UNIT EQUIPMENT. PROVIDE VOLTAGE SENSING RELAY AS REQUIRED.
4. ALL LIGHTING FIXTURES SHALL BE INDEPENDENTLY SUPPORTED TO THE STRUCTURE BY PROVIDING TWO CHAINS INSTALLED AT EACH OPPOSITE CORNER. COORDINATE EXACT REQUIREMENTS ON SITE.
5. CONTRACTOR IS RESPONSIBLE FOR ALL CONTROLS TERMINATIONS, NO SPLICES ARE PERMITTED IN CONTROL WIRING.
6. POWER AND CONTROL CONDUCTORS MUST NOT SHARE THE SAME RACEWAY OR CONDUIT EXCEPT WHERE SPECIALIZED CABLE TYPES ARE USED THAT SUPPORT SUCH INSTALLATIONS.
7. LOW VOLTAGE CABLE MUST BE INSTALLED AT LEAST 12 INCHES FROM ALL LINE VOLTAGE CONDUCTORS EXCEPT TO CROSS OR MAKE TERMINATIONS CAT. 5 CABLES MUST BE KEPT AWAY FROM ALL EMF DEVICES SUCH AS BALLASTS OR TRANSFORMERS.

ELECTRICAL DRAWING NOTES:

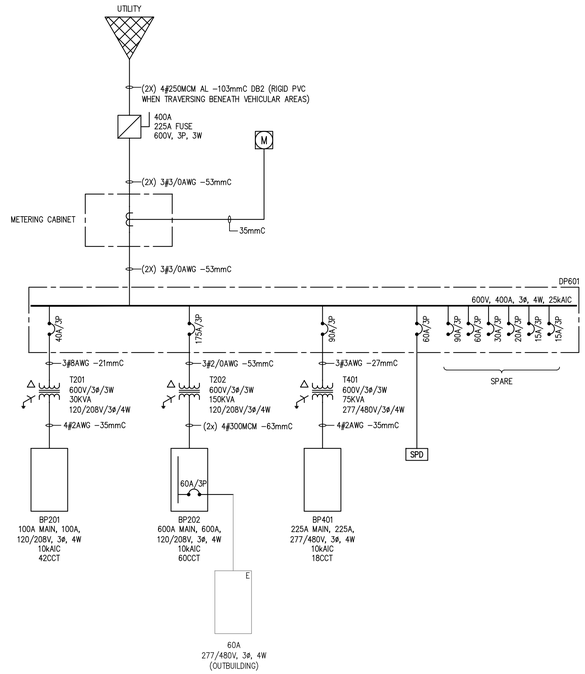
1. PROVIDE NEW 400A, 600V SERVICE FROM HYDRO POLE #11 AS SHOWN. COORDINATE ALL WORK WITH HEARST POWER. REFER TO ELECTRICAL SERVICE GENERAL NOTES.
2. PROVIDE METER BASE TO HEARST HYDRO STANDARDS & 35mmC FROM METER BASE TO METERING CABINET
3. PROVIDE 120V, 20A, 5-20R, GFI RECEPTACLE, C/W WEATHER-PROOF, LOCKABLE, RAIN-TIGHT WHILE-IN-USE CLEAR COVER, MARKED 'EXTRA DUTY', SUITABLE FOR GFI OUTLET, EQUAL TO LEVITON 5977-CL SERIES
4. SEISMIC RATED MOUNTING REQUIRED.
5. PROVIDE 19MM PLYWOOD BACKBOARD TO SUPPORT EQUIPMENT.
6. PROVIDE NEW I.T. RACK, HAMMOND MANUFACTURING MODEL# HWM2412U20BK OR APPROVED EQUAL. PROVIDE TWO 5R-20 RECEPTACLES TO BE INSTALLED BEHIND FOR IT RACK. MOUNT 86"AFF TO BOTTOM OF RACK SO THAT RACK CAN SWING OPEN ABOVE DOOR WAY.
7. FEED FROM EXHAUST FAN LOCATED IN SAME ROOM WITH 2#12AWG-16mmC
8. LOCATE UNDERGROUND FEED TO JIB CRANE, TIE INTO WEATHER PROOF JUNCTION BOX AND PROVIDE NEW FEED FROM JB TO PANEL BP202.
9. ALL LIGHT AND SENSOR WIRING, CONNECTORS AND BOXES IN THIS ROOM TO BE VAPOUR/WATER TIGHT.
10. LOCATE UNDERGROUND FEED TO OUTBUILDING PANEL, TIE INTO WEATHER PROOF JUNCTION BOX AND PROVIDE NEW FEED FROM JB TO PANEL BP202.
11. LIGHTS ARE TO BE FASTENED TO UNI-STRUT. UNI-STRUT SHALL BE HUNG BY 3/8" THREADED ROD USING BEAM CLAMPS TO BUILDING ROOF STRUCTURE. ALLOW ONE 10FT PIECE OF STRUT PER TWO FIXTURES.
12. PROVIDE 120V HAZARDOUS LOCATION ZONE 2 LIGHT SWITCH EQUAL TO EATON GHG273 SERIES.
13. PROVIDE 53mmC POWER CONDUIT WITH PULL CORD. PROVIDE 35mm COMMUNICATION CONDUIT WITH PULL CORD FROM COMMUNICATIONS BACKBOARD. COORDINATE ALL ELECTRICAL REQUIREMENTS WITH CHARGER MANUFACTURER INSTALLATION INSTRUCTIONS. PROVISION OF VEHICLE CHARGING STATION IS BY OWNER
14. WIRE SECOND RELAY CONTACT TO EXHAUST FAN
15. PROVIDE JUNCTION BOX FOR CONNECTION TO HEAT TRACE FOR STORM OVERFLOW PIPE. REFER TO DETAIL 4-ME101. PROVIDE FEED FROM PANEL BP201. PROVIDE HEAT TRACE SYSTEM, TO BE EQUAL TO SERGE BARL 8CCA, 8W/FT SELF-REGULATING HEATING CABLES, POWER CONNECTION KIT P/N PST-P-I, AND TEMPERATURE CONTROL P/N TLE-4X40. TEMPERATURE SENSOR BULB SHALL BE INSTALLED ON OPPOSITE SIDE OF HEATING CABLE ON PIPE. REFER TO INSTALLATION AND MAINTENANCE GUIDE FOR ALL INSTALLATION REQUIREMENTS.

SINGLE LINE LEGEND

- MOULDED CASE CIRCUIT BREAKER (MCCB)
- BUS DUCT
- TRANSFORMER, DELTA-WYE, SOLIDLY GROUNDED
- OUTLINE OF ENCLOSURE
- ELECTRICAL PANEL
- DISCONNECT SWITCH, FUSED
- M - HYDRO METER
- SPD - SURGE PROTECTION DEVICE

ELECTRICAL SINGLE LINE GENERAL NOTES:

1. ALL CABLES SHOWN ARE TO BE COPPER UNLESS OTHERWISE NOTED.
2. NOT ALL BREAKERS ARE SHOWN ON THIS SINGLE LINE DIAGRAM. REFER TO PANEL SCHEDULES FOR ALL BREAKERS AND ASSOCIATED LOADS.
3. CONDUIT CANNOT BE USED AS A GROUND. PROVIDE AN ADDITIONAL GROUNDING WIRE AS PER THE SPECIFICATIONS.
4. SPD ACCEPTABLE PRODUCT: INNOSYS POWER MODEL# TK-ST200-3Y600-LB. BREAKER FEEDING SPD SHALL BE SIZED BY SPD MANUFACTURER. SPD SHALL BE EXTERNALLY MOUNTED. CABLING MUST BE KEPT AS SHORT AS POSSIBLE WITH MINIMAL BENDS.



1 / E101 Power - Single Line Diagram
N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

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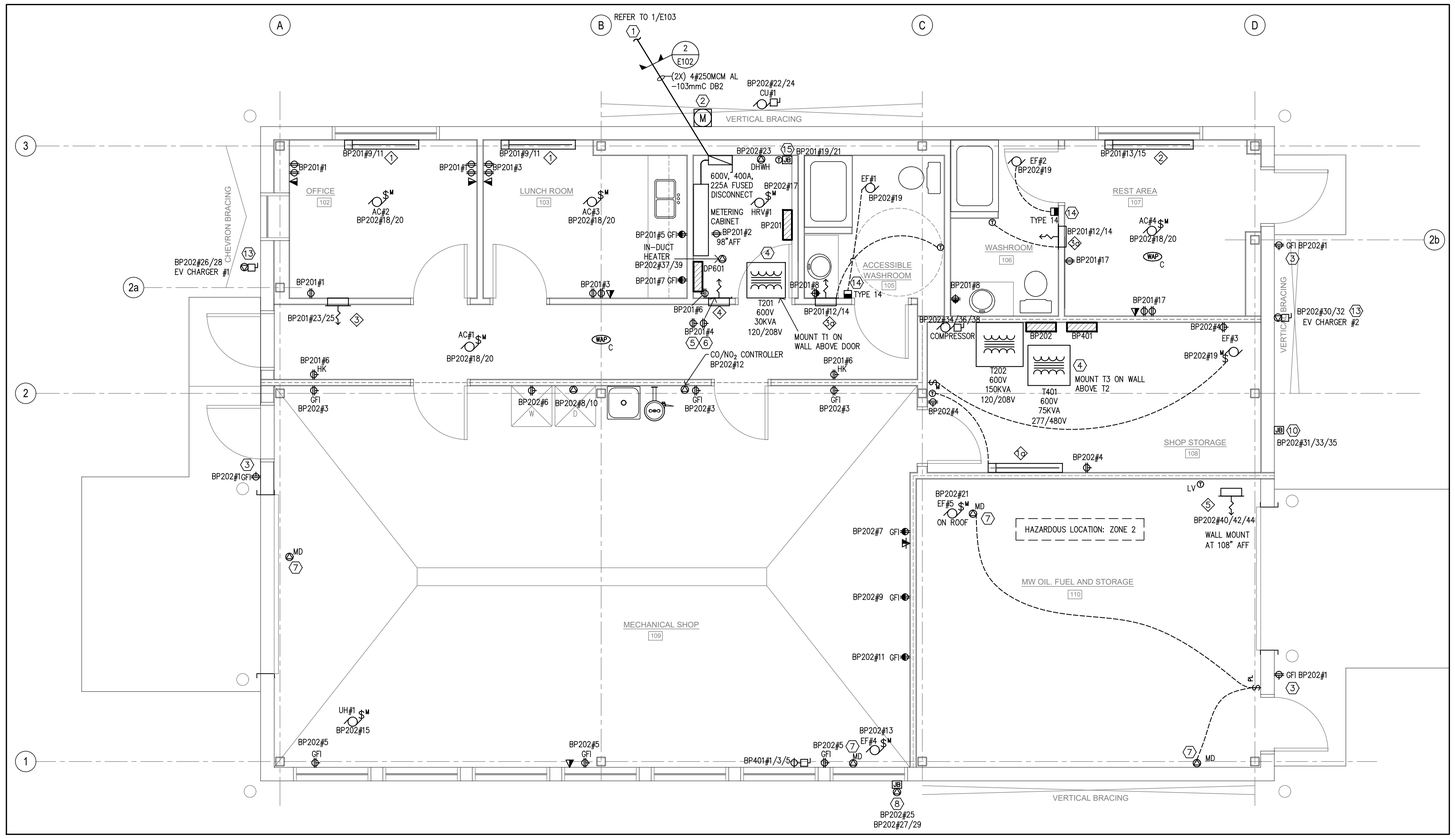
project
ONTC HEARST
MECHANICAL SHOP
HEARST ONTARIO

title
ELECTRICAL
POWER
NOTES & LEGEND
SINGLE LINE DIAGRAM

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E101
plotted: March 22, 2024	



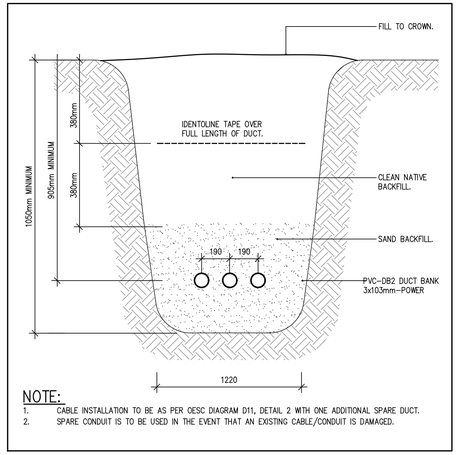
1 / E102 **Power - Main Floor Plan Proposed**

1/4" = 1'-0"

Electric Heater Schedule

No.	DESCRIPTION	MAKE & MODEL	CAPACITY (kW)	SIZE mm (in)	VOLTAGE	NOTES
1	BASEBOARD HEATER	OUELLET OFM1008	1.0	1206 (47½)	208V SP	C/W 24V RELAY
1a	BASEBOARD HEATER	OUELLET OFM1008	1.0	1206 (47½)	208V SP	C/W ELECTRONIC PROGRAMMABLE THERMOSTAT, 24V RELAY WITH TRANSFORMER
2	BASEBOARD HEATER	OUELLET OFM1258	1.25	1448 (57)	208V SP	C/W 24V RELAY
3	FORCED FAN HEATER	OUELLET OAWH04000-TAV	3.0	410 (16⅛) X 561 (22⅛)	208V SP	C/W 24V RELAY
3a	FORCED FAN HEATER	OUELLET OAWH02000-TAV	1.5	410 (16⅛) X 561 (22⅛)	208V SP	C/W ELECTRONIC PROGRAMMABLE THERMOSTAT, 24V RELAY WITH TRANSFORMER
4	FORCED FAN HEATER	OUELLET OAWH01500-TAV	1.0	410 (16⅛) X 561 (22⅛)	208V SP	C/W BUILT-IN THERMOSTAT
5	FORCED FAN HEATER	OUELLET OHX10038	10	663 (26 ⅛) X 483 (19) X 566 (22 ⅜)	208V 3PH	C/W EXPLOSTION PROOF ELECTRONIC PROGRAMMABLE THERMOSTAT (24V), CONTACTOR, TRANSFORMER, WALL MOUNT BRACKET, BUILT-IN DISCONNECT SWITCH

NOTES:
1. REMOTE THERMOSTAT: LOW VOLTAGE ELECTRONIC PROGRAMMABLE – OUELLET #OTH24-AFR.



NOTE:
1. CABLE INSTALLATION TO BE AS PER OESC DIAGRAM D11, DETAIL 2 WITH ONE ADDITIONAL SPARE DUCT.
2. SPARE CONDUIT IS TO BE USED IN THE EVENT THAT AN EXISTING CABLE/CONDUIT IS DAMAGED.

2 / E102 **Duct Bank Detail**

N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

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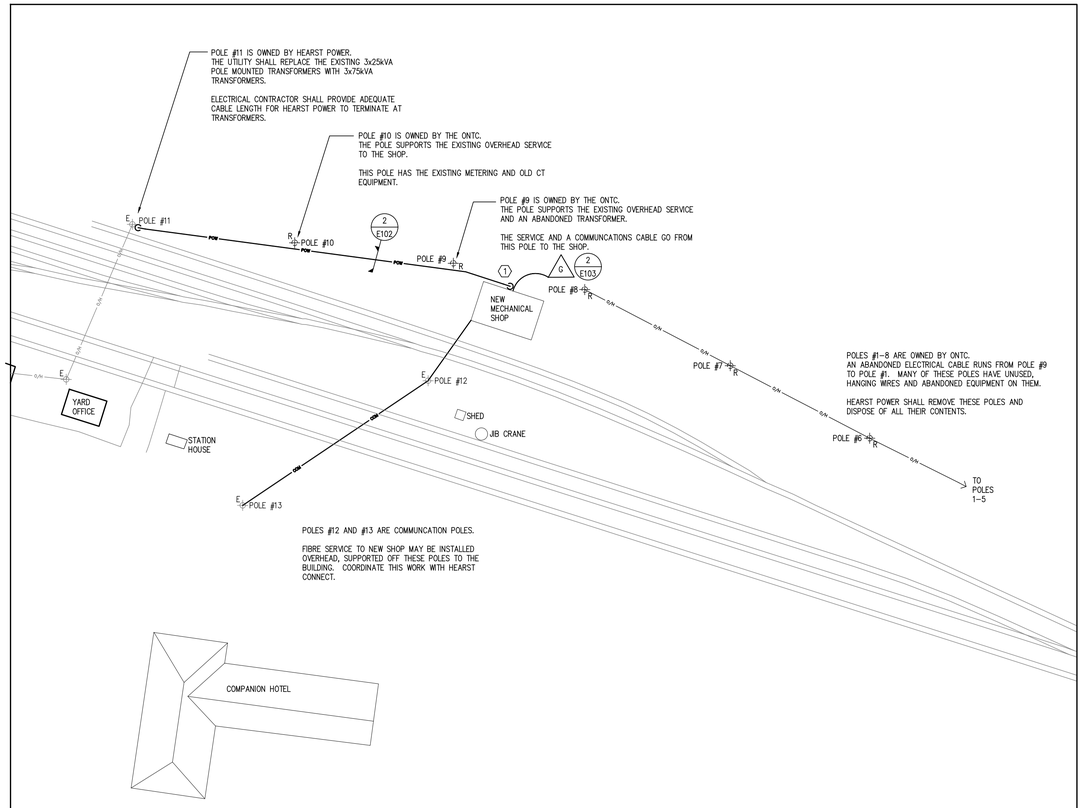
project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
ELECTRICAL
POWER
MAIN FLOOR PLAN

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E102
plotted: March 22, 2024	



1 E103 **Power - Site Plan - Removals & Proposed**

1/64" = 1'-0"

ELECTRICAL SERVICE GENERAL NOTES:

1. LOCAL HYDRO UTILITY IS HEARST POWER.

2. ALL ELECTRICAL WORK SHOWN IS BY ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.

3. CONFIRM EXACT REQUIREMENTS FROM LOCAL HYDRO UTILITY, PRIOR TO COMMENCING ANY SITE ELECTRICAL WORK.

4. ALL WORK THAT IS UNDER THE SCOPE OF LOCAL HYDRO UTILITY, INCLUDES:

4.1. POLE MOUNT TRANSFORMER(S);
4.2. PRIMARY PROTECTION, TERMINATION'S, CUTOUTS AND ARRESTERS;
4.3. PRIMARY CONNECTIONS AND PRIMARY TESTING;
4.4. SECONDARY CONNECTORS (UP TO / INCLUDING 500MCM)
4.5. APPLICATION FOR MUNICIPAL CONSENT.

ALL ASSOCIATED COSTS ARE BY CASH ALLOWANCE.

5. ALL REMAINING INCOMING ELECTRICAL SERVICE WORK THAT IS UNDER THE SCOPE OF THE ELECTRICAL CONTRACTOR INCLUDES:

5.1. SECONDARY DUCT BANK;
5.2. SECONDARY CABLES;
5.3. SECONDARY CONNECTORS OVER 500 MCM;
5.4. GROUNDING;
5.5. METER BASE TO HEARST POWER STANDARDS;
5.6. DEDICATED PHONE LINE FOR HYDRO METER;
5.7. ALL RELOCATION / REVISION TO UTILITIES
5.8. ESA INSPECTION.

6. SECONDARY DUCTS TO BE INSTALLED AS PER OESC DIAGRAM D11 DETAIL 2.

7. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF INCOMING HYDRO. ELECTRICAL CONTRACTOR TO CONTACT LOCAL UTILITIES DIRECTLY, ARRANGE FOR NEW SERVICE AND CONFIRM ALL REQUIREMENTS. PROVIDE UPDATE TO ENGINEER PRIOR TO COMMENCING ANY SITE ELECTRICAL WORK.

8. FOR ALL UNDERGROUND DUCT BANKS, PROVIDE CONTINUOUS RED PLASTIC MARKER TAPE(S) WITH BLACK LETTERS IDENTIFYING THE POWER LINES UNDERGROUND INSTALLATION WITH THE FOLLOWING CRITERIA: PLACED APPROXIMATELY HALF WAY BETWEEN THE INSTALLATION AND GRADE LEVEL INSTALLED COVERING THE WIDTH OF THE INSTALLATION AND, WHERE MULTIPLE MARKER TAPES ARE REQUIRED TO COVER THE WIDTH OF THE INSTALLATION, MARKER TAPES SHALL BE PERMITTED TO BE PLACED A MAXIMUM OF 600mm APART.

9. PROVIDE PULL CORDS IN SPARE CONDUITS AS SHOWN ON THE DRAWING.

10. ANY EXPOSED EXTERIOR CONDUIT ABOVE THE GROUND SHALL BE RIGID PVC TO PROTECT FROM MECHANICAL DAMAGE.

11. ALUMINUM CONDUCTORS ARE PERMITTED FOR SERVICE ENTRANCE ONLY. ALL UNDERGROUND WIRING TO BE RWU-90.

12. SECONDARY SERVICE ENTRANCE DUCT BANK TRAVERSING BENEATH VEHICULAR AREAS SHALL BE RIGID PVC.

13. COORDINATE TELEPHONE AND DATA SERVICE WITH HEARST CONNECT. CONTACT MARC DUFRESNE AT 705-372-8104.

ELECTRICAL DEMOLITION NOTES:

1. DISCONNECT CURRENT SERVICE FEEDS TO BUILDING AND MAKE SAFE. COORDINATE WITH HEARST POWER.

2. DISCONNECT FEEDS TO OUT BUILDING AND JIB CRANE. PULL BACK PAST NEW BUILDING AREA AND MAKE SAFE.

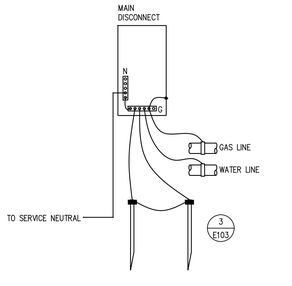
3. POLES #1-10 TO BE REMOVED BY HEARST POWER AND DISPOSE OF ABANDONED EQUIPMENT.

GROUNDING ROD DETAIL DRAWING NOTES:

1. NOT ALL DEVICES OR PANELS ARE SHOWN.

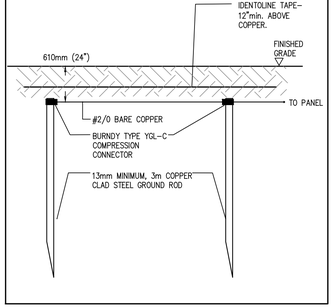
2. NOT ALL GROUNDING AND BONDING ARE SHOWN ON THIS SCHEMATIC. PROVIDE GROUNDING AND BOUNDING AS PER ONTARIO ELECTRICAL SAFETY CODE 2021.

3. SIZE ALL GROUNDING AND BONDING AS PER ONTARIO ELECTRICAL SAFETY CODE 2021 OESC).



2 E103 **Grounding Rod Detail**

N.T.S.



3 E103 **Service Equipment Ground Schematic**

N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

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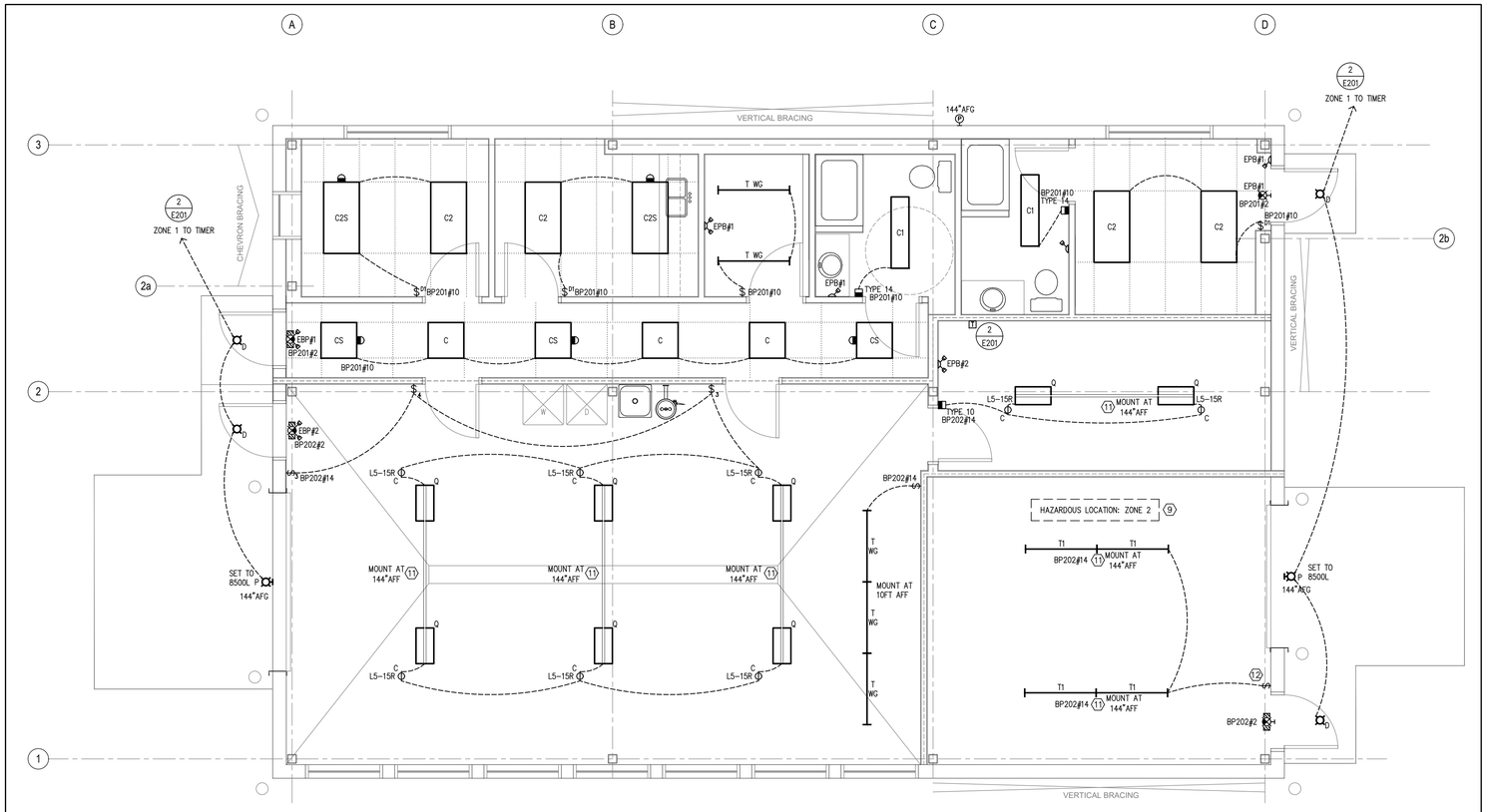
project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
ELECTRICAL
POWER
SITE PLAN

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E103
plotted: March 22, 2024	



1 E201 — Lighting - Main Floor Plan Proposed

1/4" = 1'-0"

Lighting Control Schedule

LOCATION(S)	ON	LIGHT LEVEL ON	OFF-DELAY	LIGHT LEVEL OFF	NOTES
OFFICE/LUNCHROOM	MANUAL	LAST SETPOINT	AUTO. – 10 MIN.	0%	
HALL	AUTO	100%	AUTO. – 30 MIN.	0%	
SHOP STORAGE	AUTO	100%	AUTO. – 10 MIN.	0%	
WASHROOMS	AUTO	100%	AUTO. – 10 MIN.	0%	
FUEL/STORAGE	AUTO	100%	AUTO. – 10 MIN.	0%	
MECH / SHOP	MANUAL	N/A	N/A	N/A	
CREW REST	MANUAL	N/A	N/A	N/A	

NOTES:

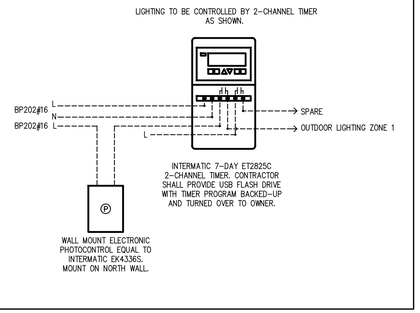
1. COORDINATE ALL SETTINGS WITH LIGHTING MANUFACTURER'S REPRESENTATIVE PRIOR TO ORDERING.
2. DASHED LINES JOINING FIXTURES, SENSORS, AND SWITCHES INDICATE THE FIXTURES THAT ARE CONTROLLED BY EACH SENSOR AND SWITCH. WHERE AN INTEGRATED SENSOR IS SHOWN CONTROLLING MORE THAN ONE FIXTURE, SOME MANUFACTURERS REQUIRE A SENSOR IN EVERY FIXTURE. A STANDALONE SENSOR IS ALSO ACCEPTABLE.

Lighting Schedule

FIXTURE TYPE	DESCRIPTION	LUMENS	COLOUR TEMP	WATTAGE	VOLTAGE	MOUNTING	DIMMING	CONTROLS	OPTIONS	ACCEPTABLE PRODUCTS
C	2X2 VOLUMETRIC TROFFER	4000	4000K	15.8	120V	RECESSED T-BAR	0-10V TO 1%	nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
CS	2X2 VOLUMETRIC TROFFER	4000	4000K	15.8	120V	RECESSED T-BAR	0-10V TO 1%	INTEGRAL PIR SENSOR & nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
C1	1X4 VOLUMETRIC TROFFER	3000	4000K	22.7	120V	RECESSED T-BAR	0-10V TO 1%	nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
C2	2X4 VOLUMETRIC TROFFER	3000	4000K	22.3	120V	RECESSED T-BAR	0-10V TO 1%	nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
C2S	2X4 VOLUMETRIC TROFFER	3000	4000K	22.3	120V	RECESSED T-BAR	0-10V TO 1%	INTEGRAL DUAL TECH SENSOR & nLIGHT WIRED	CURVED OPAL LENS WITHOUT TRIM	LITHONIA STACK PRIME SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
D	6" DOWNLIGHT	1200	5000k	14.5	120V	RECESSED SOFFIT	N/A	N/A	NEW CONSTRUCTION QUICK CONNECT LED HOUSING, SMOOTH TRIM KIT	JUNO E-SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
Q	1X2 HIGHBAY	12000	5000K	77	120V	SUSPENDED	N/A	N/A	SEMI DIFFUSE POLYCARBONATE LENS, THUN HANGER BRACKET, TWIST LOCK 120V CORDSET.	LITHONIA IBG SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
P	SINGLE HEAD AREA LUMINAIRE	2300/5300/8500	5000K	59	120V	WALL MOUNT	N/A	PHOTOCELL		LITHONIA TWR1 LED OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
T	4FT LED STRIP LIGHT	4000	5000K	30	120V	SUSPENDED	N/A	N/A	10' AIRCRAFT CABLE WITH HOOK, WIREGUARD	LITHONIA UFIT OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING
T1	4FT LED STRIP LIGHT	10000	5000K	79	120V	SUSPENDED	N/A	N/A	SMOOTH FROSTED POLYCARBONATE LENSE	STANPRO VX4-L SERIES OR APPROVED EQUAL FROM SIGNIFY OR COOPER LIGHTING

Emergency Lighting Schedule

DESCRIPTION	VOLTAGE	WATTAGE	LED HEADS	OPTIONS	ACCEPTABLE PRODUCTS
SINGLE REMOTE EMERGENCY LIGHTING HEADS	12V	7W	7W	COMPLETE ADJUSTABILITY, TWIST LOCK LAMP COLLAR	STANPRO M-LED SERIES
DUAL REMOTE EMERGENCY LIGHTING HEADS	12V	7W	2 X 7W	COMPLETE ADJUSTABILITY, TWIST LOCK LAMP COLLAR	STANPRO M-LED SERIES
COMBINATION PICTOGRAM EXIT/EMERGENCY LIGHT (EPB#1)	12V	72W	2 x 6W	COMPLETE WITH AUTO-TEST, LAMP DISCONNECT AND TIME DELAY	STANPRO-PRMS10720-2M6LAWH/AT LD TD SERIES
COMBINATION PICTOGRAM EXIT/EMERGENCY LIGHT (EPB#2)	12V	50W	2 x 6W	COMPLETE WITH AUTO-TEST, LAMP DISCONNECT AND TIME DELAY	STANPRO-PRMS10500-2M6LAWH/AT LD TD SERIES
RUNNING MAN PICTOGRAM EXIT SIGN (ZONE 2)	120/277/347V	2W	N/A	SELF POWERED 90 MIN. COLD WEATHER RATED	STANPRO RMRNX 1WH-IB/AT CW
RUNNING MAN PICTOGRAM EXIT SIGN	120/277/347V	2W	N/A	C22.2 RATED, EXTRUDED ALUMINUM, PROVIDE ADDITIONAL MOUNTING KITS IF APPLICABLE	STANPRO RMXL SERIES



2 E201 — Lighting Timer Relay Detail With Photocontrol

N.T.S.

ISSUED FOR TENDER	2024.03.22
revision	date

the Contractor shall check and verify all dimensions before proceeding with the work

A/B detail no. / sheet no. where detailed

LICENSED PROFESSIONAL ENGINEER — MAR 22/24 — R.D.MACVICAR — 100128434 — PROVINCE OF ONTARIO

PIOTROWSKI
Consultants Limited
1820 Bond St. North Bay, Ontario, P1B 4V6
Ph. 705-472-2536 Fx. 705-476-5105
Email - pcl@piotrowskiconsultants.ca

project
ONTC HEARST
MECHANICAL SHOP

HEARST ONTARIO

title
ELECTRICAL
LIGHTING
MAIN FLOOR PLAN
LIGHTING SCHEDULES

drawn by: SG	date: MARCH 2024
checked by: RM	project no: 6083D
scale: AS NOTED	dwg no: E201
plotted: March 22, 2024	

2023 REVIT MODEL (ARCH)

Ontario Northland

PART 4

REQUEST FOR PROPOSALS

FORM OF PROPOSAL

Note: Respondent is required to complete Part 4 in its entirety in order to be considered as having submitted a complete Proposal. Part 4 will be provided in Word format to Respondents who return Schedule 2-B – Participation Registration Form.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 1
PROPOSAL SUBMISSION FORM

RFP Number: RFP 2024 013
Description: New Hearst Mechanical Shop

Submitted To: ONTARIO NORTHLAND TRANSPORTATION COMMISSION

We,_____
(*Name of Respondent)*

having carefully examined, understood, and completed the Request For Proposals Documents as described in Section 2 – The RFP Documents, and Addendum No. _____ to No. _____ Inclusive, and having familiarized ourselves thoroughly with local conditions, hereby agree to supply the services associated with the New Hearst Mechanical Shop as outlined in our Proposal for a total price of:

$_____($_____) excluding HST

The price above includes any specified allowance and all taxes (excluding HST) except as may be otherwise provided in the RFP Documents, and to furnish all materials, labour, equipment and transportation to perform the entire Work described in the RFP Documents, in the manner prescribed therein, and in accordance with the specifications.

Include a breakdown of costs with this Proposal Form 1.

PRICING FOR CHANGE ORDERS / CHANGE DIRECTIVES:

Please quote overhead and profit percentage based on the following project cost ranges:

Project Costs	Overhead %	Profit %
$0 up to $9,999		
$10,000 up to $49,999		
$50,000 up to $99,999		
$100,000 up to 149,999		
$150,000 up to $200,000		
$200,000 and higher		

Please note that ONTC reserves the right to not accept the percentage values provided in the table above and any future change order markups will be reviewed and agreed upon by ONTC and contractor.

Please provide the hourly rate of pay for the following (add an additional page for any Positions not listed below):

Position	Hourly Rate
Project Manager	
Estimator	
Scheduler	
Geotechnical	
Civil	
Site Supper	
Carpentry	
Plumbing	
Electrical	

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 1 *cont'd*
PROPOSAL SUBMISSION FORM

Position	Hourly Rate
Mechanical	
Masonry/Concrete	
Roofing	
Removal and Disposal of designated substances and remediation of removal sites	

SEPRATELY PRICED ITEMS:

Please provide separate cost for the following items:

ITEM	COST
A. EXTERIORS	
A.1 SUBSTRUCTURE	
A.1.1 Foundation	
A.1.2 Excavation	
A.2 STRUCTURE	
A.2.1 Lowest Floor Constr.	
A.2.2 Upper Floor Constr.	
A.2.3 Roof Construction	
A.3 EXTERIOR ENCLOSURE	
A.3.1 Walls Below Grade	
A.3.2 Walls Above Grade	
A.3.3 Windows & Entrance	
A.3.4 Roof Covering	
A.3.5 Projections	
B. INTERIORS	
B.1 PARTITIONS & DOORS	
B.1.1 Partitions	
B.1.2 Doors	
B.2 FINISHES	
B.2.1 Floor Finishes	
B.2.2 Ceiling Finishes	
B.2.3 Wall Finishes	
B.3 FITTING & EQUIPMENT	
B.3.1 Fitting & Fixtures	
B.3.2 Equipment	
C. SERVICES	
C.1 MECHANICAL	
C.1.1 Plumbing & Drainage	
C.1.2 Fire Protection	
C.1.3 HVAC	
C.1.4 Controls	

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 1 *cont'd*
PROPOSAL SUBMISSION FORM

ITEM	COST
C.2 ELECTRICAL	
C.2.1 Services & Distribution	
C.2.2 Lighting, Devices, Heating	
C.2.3 Systems & Ancillaries	
D. SITE & ANCILLARY WORK	
D.1 SITE WORK	
D.1.1 Site Development	
D.1.2 Mechanical Site Services	
D.1.3 Electrical Site Services	
D.2 ANCILLARY WORK	
D.2.1 Demolition	
D.2.2 Alterations	
Z. GENERAL REQUIREMENTS & ALLOWANCES	
Z.1 GENERAL REQUIREMENTS	
Z.1.1 General Requirements	
Z.1.2 Fee	
Z.1.3 Permits & Insurance	
Z.2 ALLOWANCES	
Z.2.1 (list all cash allowances)	
Total Construction Costs	
Site service relocates	
Infrastructure upgrades	
Add any other Costs	
Total Project Cost	

Purchase is subject to budgetary approval of expenditures.

ONTC reserves the right in its sole discretion to sub-divide and/or bundle the Goods and/or Services which are the subject of this RFP and award one or any number of separate contracts for the Goods and/or Services.

Proposal Forms:

The information contained in the Proposal Forms, as listed in the Request for Proposals and attached hereto, forms an integral part of this Proposal.

Declarations:

We hereby declare that:

(a) We will execute the Agreement within ten (10) Working Days of receipt of the Final Agreement;

(b) We agree to perform and fully complete the Work on or before the agreed upon schedule;

(c) The Work is to start no later than the agreed upon start date in the schedule;

(d) Work is deemed to be complete when Work is substantially complete as defined in the *Construction Act* and the Contractor is demobilized from the site;

(e) The statutory holdback pursuant to the Construction Act will be 10%;

(f) We will provide the required evidence of insurance, as specified in the Ontario Northland – Supplementary Conditions – CCDC 2 - 2020 included in Part 5 of the RFP Documents, with our execution of the Agreement;

(g) For the General Liability Insurance, Ontario Northland Transportation Commission is to be included as an additional insured;

(h) Coverages and limits of insurances will be provided and maintained by all Subcontractors in accordance with subsection (f) above;

(i) No person, corporation or other legal entity other than the undersigned has any interest in this Proposal or in the proposed Contract for which this Proposal is made;

(j) This Proposal is irrevocable for a period of ninety (90) days from the Submission Deadline;

(k) It is understood and agreed that if this Proposal is accepted, we will not commence the Work until we have executed the Final Agreement and delivered it to ONTC and/or we are advised in writing by ONTC to proceed with the Work;

(l) All copies of plans and specifications and other said RFP Documents furnished to us for the purpose of this Proposal are the property of ONTC and shall be kept confidential and not divulged in any manner by us. They will not be used on other work by us and will be returned to the issuing office when requested or promptly when not bidding; and

(m) We have no right to reimbursement by ONTC for expenses, both direct and indirect, which may have been incurred by us in preparing this Proposal or otherwise participating in the RFP Process.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 1 *cont'd*
PROPOSAL SUBMISSION FORM

Signed and submitted for and on behalf of:

Contractor: _____
(Company Name)

_____
(Street Address or Postal Box Number)

_____
(City, Province and Postal Code)

Signature: _____
I have authority to bind the corporation.

Name and Title: _____

_____

Email: _____

Date at _____ this _____ day of _____, 2024

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 2
RESPONDENT'S GENERAL INFORMATION

The Respondent must complete this document and submit it as part of his Proposal.

Name *Please indicate the complete legal name of the firm*	
Tax Registration # (HST)	
Tax Registration # (GST)	
Tax Registration # (QST)	
Address	
Telephone Number	
Fax Number	
Web Address	
Please indicate any other name(s) under which the firm operates *(if applicable)*	

Owner ☐ Partnership ☐ Corporation ☐

Relationship *(if applicable)*

Parent Company	
Subsidiaries	
Affiliates	

Ontario Business ☐ Yes ☐ No

"Ontario Business": A supplier, manufacturer or distributor of any business structure that conducts its activities on a permanent basis in Ontario. The business either has a headquarters or a main office in Ontario or has at least 250 full-time employees in Ontario at the time of this RFP.

Canadian Business ☐ Yes ☐ No

"Canadian Business": A commercial enterprise that is incorporated pursuant to the laws of Canada and which has ongoing business activities in Canada.

Main Contact Person *(for the purposes of this Proposal)*

Name	
Title	
Telephone #	Fax #
E-mail address	

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 2 *cont'd*
RESPONDENT'S GENERAL INFORMATION

Indicate below your company/business' invoice terms:

_____

Does your company/business have the capability to handle Electronic Funds Transfers?
YES_____ NO_____

If yes, please provide the necessary banking information as part of your submission.

If available, please provide your Dunn & Bradstreet Reference Number:

_____

How many years of experience does your company have in the provision of goods or services proposed herein? ☐

Subcontractors

The Respondent must indicate where they will use subcontractors for specific services.

Description of Services	Subcontractor's Name	% Contract Value	Telephone Number

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 3
ACKNOWLEDGMENT TO COMPLY WITH PART 3 - REQUEST FOR PROPOSALS SPECIFICATIONS

Ontario Northland Transportation Commission (ONTC) is committed to procuring goods and services through a process that is conducted in a fair and transparent manner, providing equal opportunity to vendors.

ONTC endeavors to provide specifications that meet the requirements of the procurement without naming specific brands. However, there may be instances where a third-party consultant prepares a specification on behalf of ONTC, and a specific brand is named. In these instances, alternates may be used if deemed equal by ONTC and/or the third-party consultant. Respondents shall submit proposed deemed equals as a clarification item to be considered while the procurement remains open per the requirements of Part 1, Section 3, item 3.2 Questions and Communications Related to the RFP Documents.

Respondent acknowledges that they can fully comply with Part 3 – Request for Proposals Specifications.

(Check one) YES_____; NO_____

If the Respondent indicates “NO”, they shall provide details as an attachment to this Proposal Form 3, indicating how they will deviate from the requirements identified in Part 3 – Requests for Proposals – Specifications.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 4
REFERENCES

The Respondent must supply here the reference information of three (3) customers for which they have provided similar services within the last five (5) years. ONTC is **NOT** to be listed as a Reference.

Reference #1

Company name	
Location	
Description of services provided	
Start and end dates	
Value of the contract	
Contact person name and title	
Phone	E-mail

Reference #2

Company name	
Location	
Description of services provided	
Start and end dates	
Value of the contract	
Contact person name and title	
Phone	E-mail

Reference #3

Company name	
Location	
Description of services provided	
Start and end dates	
Value of the contract	
Contact person name and title	
Phone	E-mail

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 5
COMPLIANCE WITH CONTRACT DOCUMENTS

The Respondent may suggest changes to the Supplementary Conditions included in Part 5 of this RFP using the table below. ONTC does not have any obligation to accept any proposed changes to the Supplementary Conditions and will do so in its sole discretion. Significant material proposed changes to the Supplementary Conditions may impact the evaluation of the Respondent's proposal. ONTC will not accept any material changes to the clauses in the Supplementary Conditions relating to Confidentiality, Personal Information, Intellectual Property ownership and infringement, Indemnification, Limitation of Liability or rights of ONTC on termination. ONTC, as an Ontario Crown corporation, is unable to provide indemnities pursuant to s.28 of the *Financial Administration Act* (Ontario).

Exception	Contract, Schedule, Article, or Sub-Clause	Existing Wording	Respondent's Proposed Wording	Reason for Proposed Change
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 6
RESPONDENTS' MEETING REGISTRATION FORM

Reference Number: RFP 2024 013

Title: New Hearst Mechanical Shop

Submitted To: ONTARIO NORTHLAND TRANSPORTATION COMMISSION

Please confirm that you plan to attend the Respondents' Meeting by emailing a completed copy of this Registration Form to Brinda.ranpura@ontarionorthland.ca, prior to Wednesday, May 15, 2024, at 4:00 p.m.

Failure to submit this form by the time required may result in ONTC not being able to accommodate your attendance at the site. PROPOSALS SUBMITTED BY RESPONDENTS THAT FAILED TO ATTEND THE RESPONDENTS' MEETING WILL BE DECLARED NON-COMPLIANT AND WILL BE REJECTED.

Date of Meeting: Thursday, May 16, 2024

Time of Meeting: 1:00 p.m.

Location: Teams Conference Call

COMPANY NAME: _____

CONTACT NAME: _____

ADDRESS: _____

_____

TELEPHONE: _____

EMAIL: _____

NUMBER OF PERSONS ATTENDING: _____

ACCOMMODATION: ONTARIO NORTHLAND IS AN EQUAL OPPORTUNITY ORGANIZATION. ACCOMMODATION IS AVAILABLE FOR RESPONDENT'S WITH DISABILITIES THROUGHOUT THE PROCUREMENT PROCESS. IF ACCOMMODATION IS REQUIRED, PLEASE CONTACT brinda.ranpura@ontarionorthland.ca.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 7
HEALTH, SAFETY AND ENVIRONMENT

Respondents shall review the attached Health and Safety Policy Statement and include the following with their Proposal:

1. Submit a copy of the most recent version of your Health, Safety, and Environmental Protection Policy. **Provide evidence of compliance to Ontario's environmental requirements (e.g., recycling, waste management, etc.).**
2. Submit the attached Contractor Health and Safety Responsibility Agreement.
3. Submit the attached Contractor Safety Pre-Qualification Form and associated supporting documents.

Respondents must pass the Contractor Safety Pre-Qualification. Failure to pass will result in disqualification from the procurement process.

Ontario Northland

Effective Date: April 2016 Revised: May 2020	**Health and Safety Policy**

POLICY STATEMENT

Ontario Northland Transportation Commission (ONTC) / Nipissing Central Railway (NCR) is committed to providing a safe and healthy work environment for employees by upholding the highest levels of safety in all workplace operations.

To fulfill these commitments, we will adopt and adhere to the requirements of a safety management system (SMS) consisting of the following key components:

- Accountability
- Safety policy
- Compliance with health and safety legislation, regulations, standards, rules and other instruments
- Occurrence management including reporting of occurrences, investigations, implementation of corrective actions and close-out
- Identification, assessment and controlling of hazards and health and safety concerns
- Risk assessments
- Identification and correction of non-conformities
- Implementing and evaluating remedial/corrective actions
- Setting and communication safety targets and results
- Training
- Fatigue management
- Continuous improvement

As part of developing a safety culture, we will collectively strive to prevent accidents and incidents through a risk-based approach. Employees are required to report safety concerns immediately and can do so without fear of reprisal. We will adopt the latest in systems to improve the reporting, investigation, implementation of corrective actions, close-out, and trend analysis of accidents and incidents. We will communicate safety and encourage engagement at all levels of the organization, in tailgates, briefings and meetings.

The success of ONTC/NCR safety programs will be ensured through the collective and cooperative efforts of all, including management, employees, unions and Workplace Health and Safety Committees. All ONTC/NCR members will jointly participate in Safety, Health and Loss Prevention initiatives to ensure a safe and healthy workplace for all employees by reducing risk and preventing loss at every opportunity.

C Moore

President and CEO

CONTRACTOR HEALTH AND SAFETY RESPONSIBILITY AGREEMENT

In submitting this Proposal, I/We, on behalf of, _____

(legal name of company)

certify the following:

(a) I/We have a health and safety policy and will maintain a program to implement such policy as required by clause 25(2) (j) of the *Occupational Health and Safety Act*, R.S.O. 1990, c.O.1, as amended, (the "OHSA").

The requirements in (a) do not apply to employers with five (5) or less employees.

(b) With respect to the Services being offered in this Proposal, I/We and our proposed sub-contractor, acknowledge the responsibility to, and shall:

(i) fulfill all of the obligations under the OHSA and ensure that all work is carried out in accordance with the OHSA and its regulations.

(ii) ensure that adequate and competent supervision is provided as required under the OHSA to protect the health and safety of workers; and

(iii) provide information and instruction to all employees to ensure they are informed of the hazards inherent in the work and understand the procedures for minimizing the risk of injury or illness.

(c) I/We agree to take precautions reasonable in the circumstances for the protection of worker health and safety, as required under the OHSA.

Dated at _____ this ____ day of _____, 202__

An Authorized Signing Officer _____

(Key Contact)

(Title) _____

(Telephone Number) _____

(Firm's Name) _____

(Firm's Address) _____

Ontario Northland

Contractor Safety Pre-Qualification Form

1. Company Identification:				ONTC Use
Company Name:		Telephone:		
Mailing Address:		Fax:		
		E-mail:		
2. Form of Business:				
☐ Sole Proprietor	☐ Partnership:	☐ Corporation		
3. Officers:			Years with the Company	
President / CEO				
Vice President				
Treasurer				
Who is the manager most responsible for health and safety?				
Name:		Title:		
4. How many years has your business operated under its current name?				
5. Under Current Management Since (Date)				
6. Parent Company Information				
Parent Name:				
City:	Province / State:	Postal / Zip Code:		
Subsidiaries:				
7. Insurance Contact Information				
Title:	Telephone:	Fax:		

8. Insurance Carriers:	Type of Coverage:	Telephone	

9. Organization:				
Describe the nature of the work your company specialized in:				
☐		☐		
☐		☐		
☐		☐		
☐		☐		
☐		☐		

10. Health and Safety Performance

a)	Are any of the above services that you perform normally subcontracted to others?	☐ Yes	☐ No
b)	Can you provide a Workplace Safety & Insurance Clearance Certificate?	☐ Yes	☐ No
c)	Is your company experience rated (CAD-7, NEER)? If yes attach CAD-7 reports for the last 3 years and go to item e). If no, complete item d).	☐ Yes	☐ No
d)	Has an employee of your company suffered a fatal accident or "critical injury" as defined by the *Ontario Occupational Health & Safety Act*? Please provide for the last 3 years: i) total number of lost time accidents by rate group, ii) total number medical aid accidents, iii) total number of hours worked by each rate group	☐ Yes	☐ No
e)	Has your company ever been subjected to a Workwell Audit? If yes, what was your final score? ___	☐ Yes	☐ No
f)	Are there judgements, claims or suits pending or outstanding against your company?	☐ Yes	☐ No
g)	Have you received any regulatory (MOL, MOE, etc.) orders and/or prosecutions in the last 3 years? If yes, provide details of all prosecution and fines for the past 3 years on a separate sheet.	☐ Yes	☐ No
h)	Do you have involvement in provincial safety associations such as the Infrastructure Health & Safety Association (IHSA) and/or Workplace Safety & Prevention Services (WSPS)? If yes, please name:	☐ Yes	☐ No

_____

_____

11. Health and Safety Program and Procedures:

a)	Do you have a written health and safety policy? If yes, include a copy.	☐ Yes	☐ No
b)	Do you have a written health and safety program?	☐ Yes	☐ No
c)	If so, are the following elements addressed?	☐ Yes	☐ No
	i. Participation by all levels in the organization	☐ Yes	☐ No
	ii. Accountabilities & responsibilities for managers, supervisors and employees	☐ Yes	☐ No
	iii. Adequate resourcing for meeting health and safety requirements	☐ Yes	☐ No
	iv. Hazard identification and control	☐ Yes	☐ No
	v. Health and safety performance measurement and evaluation	☐ Yes	☐ No
	vi. Corrective actions implementation	☐ Yes	☐ No

12. Health and Safety Program: Does the health and safety program include procedures and practice documents such as:

a)	Hazardous Energy Control, Lock-out – Tag-out	☐ Yes	☐ No
b)	Confined Space Entry	☐ Yes	☐ No
c)	Working at Heights, Fall Protection	☐ Yes	☐ No
d)	Personal Protective Equipment (PPE)	☐ Yes	☐ No
e)	Portable / Electric Power Tools	☐ Yes	☐ Yes

f)	Vehicle Safety	☐ Yes	☐ No	
g)	Compressed Gas Cylinders	☐ Yes	☐ No	
h)	Electrical Equipment Grounding Assurance	☐ Yes	☐ No	
i)	Powered Industrial Vehicles (forklifts, cranes, etc.)	☐ Yes	☐ No	
j)	Heavy Construction Equipment (excavators, backhoes, bulldozers, etc.)	☐ Yes	☐ No	
k)	Excavation and Trenching	☐ Yes	☐ No	
l)	Housekeeping	☐ Yes	☐ No	
m)	Accident / Incident Reporting and Investigation	☐ Yes	☐ No	
n)	Hazard / Unsafe Condition Identification, Reporting and Communication	☐ Yes	☐ No	
o)	Workplace Hazardous Materials information System (WHMIS)	☐ Yes	☐ No	
p)	Emergency Action Plan / Evacuation Plan	☐ Yes	☐ No	
q)	Spill Response / Reporting	☐ Yes	☐ No	
r)	Respiratory Protection	☐ Yes	☐ No	
s)	Designated Substances Management	☐ Yes	☐ No	
t)	Waste Staging / Disposal	☐ Yes	☐ No	
u)	Traffic Control	☐ Yes	☐ No	
v)	Hearing Conservation	☐ Yes	☐ No	

13. Do you have a policy/procedure for terminating contracts of subcontractors who do not comply with the requirements of the *Occupational Health & Safety Act,* associated regulations and / or company safety rules?	☐ Yes	☐ No	
14. Do your employees read, write and understand English to the degree that they can safely perform their tasks without the aid of an interpreter? (*If no, provide a description of your plan to assure that they can safety perform their tasks*)	☐ Yes	☐ No	
15. Do you have personnel certified in Emergency First Aid and CPR on site? If yes, provide copies of certificates of training for site personnel proposed for the project?	☐ Yes	☐ No	
16. Do you have First Aid kits available to your staff?	☐ Yes	☐ No	
17. Does your company use a formalized Health and Safety Plan for conducting large projects?	☐ Yes	☐ No	
18. Does the company conduct pre-placement medical examinations?	☐ Yes	☐ No	
19. Is task-adequate PPE provided to workers?	☐ Yes	☐ No	
20. Are employees trained in PPE care, use and maintenance?	☐ Yes	☐ No	
21. Do you have a corrective actions process for addressing individual health and safety performance deficiencies	☐ Yes	☐ No	

Ontario Northland

Contractor Safety Pre-Qualification Form

22. Equipment and Manuals:			
a. Do you conduct inspections on operating equipment (e.g. excavators, cranes, forklifts, vehicles, etc.) as per regulatory requirements?	☐ Yes	☐ No	
b. Do you maintain operating equipment in compliance with regulatory requirements?	☐ Yes	☐ No	
c. Do you maintain applicable pre-use inspection and maintenance certification records for operating equipment?	☐ Yes	☐ No	
d. Are records available upon request	☐ Yes	☐ No	
23. Subcontractors			
a. Do you use health and safety performance criteria in the selection of contractors?	☐ Yes	☐ No	
b. Do you require your subcontractor to have a written health and safety program?	☐ Yes	☐ No	
c. Are your subcontractors included in	☐ Yes	☐ No	
health and safety orientation	☐ Yes	☐ No	
health and safety meetings	☐ Yes	☐ No	
workplace inspections	☐ Yes	☐ No	
health and safety audits	☐ Yes	☐ No	
d. Does the company have a policy for the termination of contracts of subcontractors who do not comply with the Occupation Health and Safety Act, regulations under the Act, contractor rules, programs, protocols policies or procedures?	☐ Yes	☐ No	
e. Does the company have a progressive discipline policy for employees and subcontractors?	☐ Yes	☐ No	
24. Health and Safety Training			
a. Are you aware for the regulatory training requirements for your employees?	☐ Yes	☐ No	
b. Have your employees received the required health and safety training?	☐ Yes	☐ No	
c. Do you have specific health and safety training for supervisors?	☐ Yes	☐ No	
d. Do you keep records of health and safety training for employees?	☐ Yes	☐ No	
e. Are records of health and safety training available on request?	☐ Yes	☐ No	
25. Job Skills			
a. Have employees been trained in appropriate job skills?	☐ Yes	☐ No	
b. Are employee job skills certified where required by regulation or industry standard?	☐ Yes	☐ No	
c. Are certificates available upon request?	☐ Yes	☐ No	
26. Health and Safety Supervision			
a. Does the company have a health & safety coordinator?	☐ Yes	☐ No	
b. Who is the highest ranking safety professional in the company			

I agree that the above information is true and correct to the best of my knowledge. I also agree to follow all terms and conditions of the Contractor Safety Program at all times while performing work for ONTC. I understand that supporting documentation may be requested for due diligence verification purposes.

Name: (Please print) _____ Title: _____

Signature: _____ Date: _____

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 8
SCHEDULE OF MATERIALS

SCHEDULE OF MATERIALS - VARIATIONS (AND SOURCES)

VARIATIONS:

MATERIALS SOURCES:
(ADD WHERE REQUIRED)

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 9
LIST OF EQUIPMENT

List all Equipment, owned or controlled by the Respondent for use on the Work. Such list shall show for each Unit the description of the Unit, capacity, condition, age, present location, the owner's name and all-inclusive hourly rental rates. Such equipment shall be subject to inspection by ONTC to verify the stated information.

ONTC reserves the right to perform random site inspections in order to ensure the Successful Respondent's equipment used to perform the Work coincides with the information provided below. Any deviations may be subject to the terms of the Final Agreement. Any changes to this proposed list of equipment requires prior approval of ONTC.

Quantity	Description	Capacity	Condition	Age	Location	Owner	Hourly Rental Rate

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 10
SCHEDULE AND PROPOSED APPROACH

CONSTRUCTION SCHEDULE

Respondents shall include a construction schedule with their Proposal. The construction schedule shall be in Gantt chart format, showing all activities of the Work and the critical path. The construction schedule shall reflect the milestone dates listed below.

Request for Proposal Close	Monday, June 03, 2024
Shop Drawings / Work Plan Submissions	Prior to mobilization
Mobilization to site	June 2024
Completion of the Work	December 31, 2024

Do you agree to complete the Work by December 31, 2024?

Respondent confirms that they will complete the Work by December 31, 2024.

(Check one) YES_____; NO_____

ONTC has established the date for Completion of the Work with consideration for Northern Ontario weather conditions and strict project timelines. As such, and subject to ONTC's sole discretion, a failure to confirm that the work will be completed by the identified date may result in disqualification of the Proposal.

PROPOSED APPROACH

The Respondent shall provide a written narrative plan on their proposed approach for the project, demonstrating their ability to complete the project on budget and on schedule within the timelines identified. Evidence of a thorough review of the RFP Documents and consideration for scheduling above grade work prior to the winter season should be apparent in the Respondent's Schedule and Proposed Approach.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 11
SCHEDULE OF PROGRESS PAYMENTS

Indicate below, the estimate of the monthly progress billings (gross before holdback) for the duration of the Agreement.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 12
LIST OF PERSONNEL

List the names of the Principal Personnel who will be assigned to the Work and **include their resumes.** This information shall be for the use of ONTC in assessing the Proposal. In the event of a Subcontractor(s) being listed as Principal Personnel, the Respondent shall also include their resume(s).

Name	Position	Experience

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 13
CURRENT LABOUR AGREEMENTS

List the current labour agreements the Respondent or each partner in a joint venture has in force covering this type of work in the Province in which the Work is to be performed.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 14
CONTRACTOR'S QUALIFICATION STATEMENT

1. The Respondent shall include a company profile.

   In the event that the Respondent is using a subcontractor(s) for a portion(s) of the scope of work associated with this RFP, they shall also include with this Proposal Form 14, a company profile for each subcontractor.

2. The Respondent shall supply a minimum of three (3) project descriptions for projects of a similar nature and scope. The project descriptions shall include:

   a) Company/Client
   b) Name of contact and contact details
   c) Project Name
   d) The scheduled project start and end date
   e) The actual start and end date
   f) The project value of the Respondent's scope of work for the project at the beginning of the project
   g) The project value of the Respondent's scope of work for the project at the end of the project
   h) Detailed description of the Respondent's scope of work for the project. The description should detail if subcontractors were used to complete part of the scope.
   i) Outcomes of the project (i.e., completed on schedule and on budget etc.)

   ONTC may, in its sole discretion, confirm the Respondent's experience in the projects identified by contacting the named contacts above, in addition to the references provided as part of Proposal Form 4.

3. The Respondent shall describe their experience with the climatic and environmental requirements in Northern Ontario.

4. The Respondent shall describe how and when you will use local workforce, local vendors, local manufacturers, local contractors, and local apprentices/trainees to achieve the project goals and provide the requested services, with emphasis on the local benefit to ONTC's areas of operation.

5. The Respondent shall describe their organization's diversity programs.

ONTC will consider all information submitted in the Respondent's Proposal when evaluating the Respondent's experience.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 15
CLAIMS

Submit an up to date list of outstanding, pending or anticipated claims, proceedings, liens or other legal claims, actions or proceedings.

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PART 5

REQUEST FOR PROPOSALS

CCDC 2 – 2020 SUPPLEMENTARY CONDITIONS

ONTARIO NORTHLAND - SUPPLEMENTARY CONDITIONS – CCDC 2 – 2020 – REVISED 12 APR 2024

AMENDMENTS TO THE AGREEMENT BETWEEN OWNER AND CONTRACTOR

1. ARTICLE A-1 THE WORK

1.1 In Article A-1.3, delete all of the words after "Contract Documents" and replace them with the following:

"attain Substantial Performance of the Work by the __ day of _____ in the year 20__, and attain Ready-for-Takeover by the __ day of _____ in the year 20__.".

2. ARTICLE A-3 CONTRACT DOCUMENTS

2.1 Add the following to the list of Contract Documents in Article A-3.1:

- "Special Provisions, if any
- ONTC Special Supplementary Conditions, if any
- ONTC Supplementary Conditions to CCDC 2 - 2020
- Addenda to the Request for Proposals ("RFP")
- Schedule 2-A to the RFP - RFP Data Sheet
- RFP PART 4 – FORM 8 SCHEDULE OF MATERIALS, if Accepted.
- Technical Specifications
- Contract Drawings
- Contractor's Proposal in Part 4 of the RFP in response to the RFP

3. ARTICLE A-4 CONTRACT PRICE

3.1 Delete paragraph 4.4 and replace it with the following:

"The Contract Price shall remain fixed for the duration of the Contract Time, subject only to adjustments as provided for in the Contract Documents. For certainty, the Contractor assumes all risks in connection with cost increases for Products, Labour, and Construction Equipment prescribed by the Contract Documents for the performance of the Work, and the Contractor assumes all responsibility for liabilities and additional costs that may arise as a result of the Contractor's inclusion of any Product, Construction Equipment, Supplier, or Subcontractor in its calculation of the Contract Price."

4. ARTICLE A-5 PAYMENT

4.1 Delete paragraph 5.1 in its entirety, including all subparagraphs thereunder and replace it with the following:

"5.1 Subject to the provisions of the Contract Documents and the Construction Act, the Owner shall:

.1 make progress payments to the Contractor on account of the Contract Price when due together with such Value Added Taxes as may be applicable to such payments,

.2 upon Substantial Performance of the Work, as certified by the Consultant, and upon the expiry of the holdback period that follows the publication of the certificate of Substantial Performance of the Work, as stipulated in the Construction Act, there being no claims for lien registered against the title to the Place of the Work and no written notices of lien delivered to the Owner, pay the Contractor the unpaid balance of the holdback, together with such Value Added Taxes as may be applicable to such payment, less any amount stated in any Notice of Non-Payment that is published by the Owner in accordance with the Construction Act, and

.3 after Ready-for-Takeover has been achieved in accordance with the Contract Documents and the Work is complete, there being no claims for lien registered against the title to the Place of the Work and no written notices of lien delivered to the Owner, pay the Contractor the unpaid balance of the Contract Price in accordance with GC 5.5. – FINAL PAYMENT, together with such Value Added Taxes as may be applicable to such payment."

4.2 Delete Article A-5.2 in its entirety and replace it with the following:

"Interest on late payments, if any, will be in accordance with the Construction Act."

5. ARTICLE A-6 RECEIPT OF AND ADDRESSES FOR NOTICES IN WRITING

5.1 Delete the text of ARTICLE A-6 RECEIPT OF AND ADDRESSES FOR NOTICES IN WRITING (retaining the provisions setting out the addresses of the Owner, Contractor and Consultant) and replace it with the following:

"6.1 Notices in Writing between the parties or between them and the Consultant shall be considered to have been received by the addressee on the date of receipt if delivered by hand or by commercial courier during normal business hours or if sent during normal business hours by e-mail during the transmission of which no indication of failure of receipt is communicated to the sender, and addressed as set out below. Such Notices in Writing will be deemed to be received by the addressee on the next Working Day if sent by e-mail after normal business hours or if sent by overnight commercial courier. Such Notices in Writing will be deemed to be received by the addressee on the fifth Working Day following the date of mailing, if sent by pre-paid registered post, when addressed as set out below. An address for a party may be changed by Notice in Writing to the other party setting out the new address in accordance with this article."

6. ARTICLE A-9 CONFLICT OF INTEREST

6.1 Add new Article A-9 as follows:

"**ARTICLE A-9 CONFLICT OF INTEREST**

9.1 The *Contractor*, all of the *Subcontractors,* and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services where such activity or the provision of such services creates a Conflict of Interest (actually or potentially, in the sole opinion of the *Owner*) with the provision of the *Work* pursuant to the *Contract*.

9.2 The *Contractor* shall disclose to the *Owner*, in writing, without delay, any actual or potential situation that may be reasonably interpreted as either a Conflict of Interest or a potential Conflict of Interest, including the retention of any *Subcontractor* or *Supplier* that is directly or indirectly affiliated with or related to the *Contractor*."

7. ARTICLE A-10 TIME OF THE ESSENCE / LIQUIDATED DAMAGES

7.1 Add new ARTICLE A-10 TIME OF THE ESSENCE/LIQUIDATED DAMAGES as follows:

10.1 It is agreed that one of the reasons the *Contractor* was selected by the *Owner* for this *Contract* is the *Contractor*'s representation and warranty that it will attain Substantial Performance of the Work and Ready-for-Takeover within the Contract Time stated in Article A-1.3 of this Contract. The Contractor acknowledges that it has been advised by the Owner that it is critical to the Owner that Substantial Performance of the Work and Ready-for-Takeover is achieved within the Contract Time. The Contractor agrees that time is of the essence in the performance of the Contractor's obligations under this Contract.

10.2 The Contractor further acknowledges its understanding that the Owner is responsible and must account to the Government of Ontario, its customers and passengers and the residents of Northern Ontario. A failure by the Contractor to attain Substantial Performance of the Work and Ready-for-Takeover within the Contract Time will result in damages to the Owner and to the Government of Ontario, its customers and passengers and the residents and businesses in Northern Ontario, which would be difficult or impractical to quantify but would nevertheless have a significant negative impact on the Owner and its ability to provide the services the Owner is obliged to provide to the residents and businesses in Northern Ontario.

10.3 Given the significance of the requirement for the Contractor to achieve Substantial Performance of the Work and Ready-for-Takeover, as described in Article A-10.2, the Contractor further acknowledges and agrees that, without limiting the Owner's entitlement to any additional or other damages, if it fails to achieve Substantial Performance of the Work and Ready-for-Takeover within the Contract Time, the Owner will incur substantial damages and the extent of such damages shall be incapable or very difficult of accurate measurement. Nonetheless, the parties acknowledge that as of the effective date of this Contract, the amount of liquidated damages set forth in subparagraph 10.4 below represents a good faith estimate on the part of the parties as

to the actual potential damages that the Owner would suffer because of late completion of the Project. It is expressly acknowledged and agreed by and between the parties that the amount of such liquidated damages does not include any penalty. Notwithstanding the foregoing, where the Project is delayed beyond the Contract Time, the Owner shall be entitled to (i) the liquidated damages as calculated pursuant to Article A-10.4, or (ii) in the event that the Contractor claims that this liquidated damages provision is invalid or unenforceable and the Contractor prevails on such a defence, the damages arising from the delay suffered by the Owner including, without limitation, consequential, special, incidental, and indirect damages, costs and other expenses incurred or suffered by the Owner.

10.4 The Owner shall require that the Contractor pay to the Owner (or have deducted from Contract payments) liquidated damages at the per diem rate set out in the Contract Documents for each calendar day of delay beyond the prescribed date for Ready-for-Takeover until Ready-for-Takeover is achieved and certified, pursuant to the terms of the Contract. If there is no per diem rate set out in the Contract Documents, the Contractor shall pay to the Owner the Administration Costs incurred by the Owner as a result of the delay.

10.5 Liquidated damages will be assessed as incurred and reflected as deductions from amounts that may be due under any applications for payment pending at the time that such liquidated damages are assessed. All liquidated damages not deducted from payments prior to final payment shall be deducted from the final payment to be made by the Owner to the Contractor pursuant to GC 5.5 FINAL PAYMENT and any amount of liquidated damages in excess of the final payment amount, shall be paid by the Contractor to the Owner, within 30 days following a written demand by the Owner for such payment.

10.6 The liquidated damages payable under this paragraph are in addition to and without prejudice to any other remedy, action or any other alternative claim that may be available to the Owner."

AMENDMENTS TO THE DEFINITIONS

8. DEFINITIONS

8.1 Add the following new definitions:

Acceptance and *Accepted* means the *Owner* and the *Consultant* acknowledges that the work for a *Submittal* has been completed and that the *Submittal* on its face conforms to the requirements of the *Contract Documents*. *Acceptance* does not mean confirmation by the *Owner* or the *Consultant* that the *Submittal* does not contain errors or omissions, defects, deficiencies or deviations from the Contract Documents. Wherever the words "acceptance" and "accepted" are used in the Contract Documents, they shall have the meaning set out in this definition even if the words are not capitalized.

Administration Costs means those costs and expenses incurred by the Owner as a result of carrying out a process or activity due to a delay in the performance of the Work by the Contractor and include:

(a) additional fees payable by the Owner to the Consultant on a per diem basis according to the Consultant's personnel rates;

(b) the Owner's personnel costs associated with the delay, in an amount solely determined by the Owner; and

(c) any additional costs or loss of revenue incurred by the Owner due to the delay.

Adjudication means construction dispute interim adjudication as defined under the *Construction Act*.

The *Arbitration Act* means the *Arbitration Act*, 1991, S.O. 1991, c. 17, as amended.

As-Built Drawings means a set of drawings that are marked-up during construction by the *Contractor* that show how the structures and other parts of the *Work* were actually constructed versus how the structures and other parts of the Work were originally designed and "*As-Built Record Drawings*" means the *As-Built Drawings* prepared by the *Contractor* following completion of the *Work* that are *Submitted* to the *Owner* with the *Close-Out Documentation.*

Authority Having Jurisdiction or AHJ means the federal, provincial or municipal entity that is responsible for enforcing codes, standards and regulations relating to building construction, has the power to pass regulations to direct, specify and govern elements or activities of construction projects such as codes, safety, health or standards of manufacture or installation.

Close-out Documentation has the meaning given in GC 5.5.1.2.

Confidential Information means all information of the Owner that is confidential by its nature or in the circumstances in which it is received, including without limitation Personal Information and all confidential information in the custody or control of the Contractor, regardless of whether it is identified as confidential or not, which comes into the knowledge, possession or control of the Contractor in connection with this Agreement, but Confidential Information does not include information that:

.1 is or becomes generally available to the public without fault or breach by the Contractor, but only after that information becomes generally available to the public;

.2 the Contractor can demonstrate to have been rightfully obtained by the Contractor without any obligation of confidence from a third party who had the right to transfer or disclose it to the Contractor free of any obligation of confidence;

.3 the Contractor can demonstrate to have been rightfully known to or in the possession of the Contractor, free of any obligation of confidence, when disclosed; or

.4 is independently developed by the Contractor without the use of any of the Owner's Confidential Information.

Conflict of Interest includes, but is not limited to, any situation or circumstance where the interests, conduct, other commitments or relationships of a Contractor, a Contractor's family member or an officer, director or employee of the Contractor could or could be perceived to, directly or indirectly, compromise, impair or be in conflict with the interests of the Owner.

Construction Act means the *Construction Act*, R.S.O. 1990, c. C.30, as amended, including all regulations passed under it that are enforceable as of the date of execution of this Contract. For certainty, the first procurement process for the Project (i.e., the "improvement" as that term is defined in the *Construction Act*) was commenced on or after October 1, 2019 and Parts I.1 (Prompt Payment) and II.1 (Construction Dispute Interim Adjudication) of the *Construction Act* apply to this Contract.

Construction Schedule or construction schedule means the schedule for the performance of the Work provided by the Contractor pursuant to GC 3.4 – CONSTRUCTION SCHEDULE, including any amendments to the Construction Schedule made pursuant to the Contract Documents.

Dispute means all unresolved claims, disputes or controversies of any kind arising out of or in connection with this Contract or the carrying out of the Work.

Environmental Contaminants means any substance, material or waste defined, regulated, listed or prohibited by Environmental Laws;

Environmental Laws means all applicable federal, provincial, territorial, municipal and local laws, statutes, ordinances, by-laws and regulations, judgments, decrees, common laws and principles thereof, and orders, directives and decisions rendered or issued by any governmental authority relating to Environmental Contaminants or the protection of human health, natural resources or the environment;

Estimate means a calculation of the quantity or cost of the Work or part of it depending on the context.

Excess Soil means "excess soil" as that term is defined under section 3 of the *Excess Soil Regulation*.

Excess Soil Regulation means O. Reg. 406/19: On-Site and Excess Soil Management to the Environmental Protection Act, R.S.O. 1990, c. E.19, as amended.

Extended Warranty means the extended warranties described in the *Specifications* and *Extended Warranty Period* means the period or periods described in the *Specifications*;

Force Majeure means an event or a cause beyond the control of a party, which may include war, interference by civil or military authorities, civil insurrection, local or national emergency, blockade, seizure, riot, sabotage, vandalism, terrorism, earthquake, flood, act of God, accident, fire, nuclear or other explosion, disease, epidemic, pandemic, quarantine restriction, strike, lockout or other labour disturbance, governmental embargo, or changes to any acts, orders, legislation, regulations, directives, or priorities of any government or other public authority; provided such event is not caused by the affected party's negligence, default, failure to exercise reasonable diligence, bankruptcy or insolvency. A Force Majeure event or cause does not include an inability to pay or a lack of financial resources unless it is due to a failure of the province to approve the appropriation from the Consolidated Revenue Fund for the Project.

Impact Assessment Reports means the impact assessment reports, if any, listed in the RFP related to the Fisheries Act; Navigable Waters Act; Lakes and Rivers Improvement Act; heritage reviews; Endangered Species Act and Species at Risk Act; terrestrial resources (vegetation, wildlife, other features); socio-economic impacts and Indigenous consultations.

Intellectual Property means any improvement, invention or discovery, whether or not patented or patentable, any technical data, know-how or trade secret, any design, any computer software or any work subject to copyright, whether or not such design or copyright is registered or registrable and all Intellectual Property rights contained, embedded or disclosed in the *Work.*

Notice of Non-Payment means a notice of non-payment of holdback (Form 6) or a notice of non-payment (Form 1.1) under the *Construction Act*, as applicable to the circumstances.

Payment Period or 'payment period' means the fixed segments of time for which the *Contractor* shall be entitled to claim payment for *Work* performed during such period, as agreed upon by the *Owner* and the *Contractor* at the first pre-construction meeting. To be effective, such agreement must be in writing or reflected in the final and approved pre-construction meeting minutes. In the event that the *Owner* and the *Contractor* do not fix the segment of time for each *Payment Period* at the first pre-construction meeting, then each *Payment Period* shall be a one (1) month period during which *Work* was performed, with the start and end dates of each *Payment Period* deemed to be the first (1st) calendar day of the applicable month and the last calendar day of the same month, respectively.

Personal Information means information that relates to an identifiable individual or that identifies or may identify an individual as defined in section 2 of the *Freedom of Information and Protection of Privacy Act,* R.S.O. 1990, *c.*F.31, as amended.

Pre-Invoice Submission Meeting has the definition given to it under GC 5.2.1.

Proper Invoice means a "proper invoice" as that term is defined in Section 6.1 of the *Construction Act* that complies with the minimum requirements set out in Schedule A to the Supplementary Conditions.

Proper Invoice Submission Date is the date referenced in GC 5.2.2.

Restricted Period (Adjudication) means the (inclusive) period of time between November 15 in one calendar year to January 2 in the next calendar year, in any given year throughout the duration of the Contract.

Restricted Period (Proper Invoice) means the (inclusive) period of time between December 10 to December 28 in any given year throughout the duration of the Contract.

RFP means the procurement documents used by the *Owner* for the procurement of the *Contractor* for the *Project*.

Statutory Declaration means the "Ontario Northland Statutory Declaration of Progress Payment Distribution by Contractor" form, attached to the Supplementary Conditions as Schedule "B".

Submittal(s) means all documentation prepared by the *Contractor* and submitted to the *Owner* and/or the *Consultant* for review and *Acceptance* in accordance with the *Contract Documents*.

Third-Party Property Owner means the owner, tenant or other person having the right to use a property.

Warranty Period means the period during which the *Contractor* provides a warranty for the *Work* described in GC 12.3.

Waste Management Plan means the plan to be submitted by the *Contractor* to the *Owner* and the *Consultant* described in GC 3.11.1 and *Waste Management Report* has the meaning described in the Specifications."

8.2 Delete the definition of "*Contract Price*" and replace it with the following:

"*Contract Price* is the amount payable by the Owner to the Contractor for Work to be completed under the Contract in accordance with the method and manner of payment stipulated in the Contract Documents and the lump sum price submitted by the Contractor in its proposal as stipulated in Article A-4.1 as amended by any Change Orders."

8.3 At the end of the definition of "Drawings", add the following words "and a Waste Management Plan."

8.4 Delete the definition of "*Payment Legislation*".

8.5 Amend the definition of *Ready-for-Takeover* by deleting all the words after "as verified" and replacing them with "and approved by the Owner."

AMENDMENTS TO THE GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

9. GC 1.1 CONTRACT DOCUMENTS

9.1 Where a General Condition or paragraph of the General Conditions of the Stipulated Price Contract is deleted by these Supplementary Conditions, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused.

9.2 Delete paragraph 1.1.3 and replace it with the following:

"1.1.3 "The Contractor shall review the Contract Documents and shall report promptly to the Consultant any error, inconsistency or omission the Contractor may discover. Such review by the Contractor shall comply with the standard of care described in paragraph 3.12.1 of the Contract. Except for its obligation to make such review and report the result, the Contractor does not assume any responsibility to the Owner or to the Consultant for the accuracy of the Contract Documents. Provided it has exercised the degree of care and skill described in this paragraph 1.1.3 , the Contractor shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the Contract Documents which the Contractor could not reasonably have discovered. If the Contractor does discover any error, inconsistency or omission in the Contract Documents, the Contractor shall immediately notify the Owner and shall not proceed with the work affected until the Contractor has received corrected or missing information from the Consultant. If the Contractor finds discrepancies in and/or omissions from the Contract Documents or has any doubt as to the meaning or intent of any part thereof, the Contractor must immediately notify the Consultant by means of a written Request for Information ("RFI") and the Consultant will provide written instructions or explanations. Neither the Owner nor the Consultant will be responsible for oral instructions."

9.3 Delete paragraph 1.1.4 and replace it with the following:

"1.1.4 Notwithstanding the foregoing, errors, inconsistencies and/or omissions shall not include lack of reference on the drawings or in the specifications to labour and/or Products that are required or normally recognized within respective trade practices as being necessary for the complete execution of the Work. The Contractor shall not use RFIs, issued during execution of the Work, in and of themselves to establish a change and/or changes in the Work pursuant to Part 6 – CHANGES IN THE WORK. In the event an RFI or the cumulative effect of RFIs leads to what the Contractor considers to be a change in the Work, then the procedure under Part 6 – CHANGES IN THE WORK shall be followed."

9.4 Delete paragraph 1.1.5.1 in its entirety and replace it with new 1.1.5.1:

"the order of priority of documents, from highest to lowest, shall be:

- Special Provisions, if any
- ONTC Special Supplementary Conditions, if any
- ONTC Supplementary Conditions to CCDC 2
- Agreement between the Owner and the Contractor
- Definitions
- General Conditions
- Addenda to the Request for Proposals ("RFP")
- Schedule 2-A to the RFP - RFP Data Sheet
- Schedule 3-A to the RFP - Scope of Work
- Contractor's Proposal in Part 4 of the RFP in response to the RFP
- Technical Specifications
- Working Blocks
- Contract Drawings"

9.5 Add a new subparagraph 1.1.5.6 as follows:

".6 Schedules of Division 01 - General Requirements of the Specifications shall form part of and be read in conjunction with the technical specification section as listed in the table of contents of the specifications."

9.6 Add a new sentence to the end of paragraph 1.1.9 as follows:

"The Specifications are divided into divisions and sections for convenience but shall be read as a whole and neither such division nor anything else contained in the Contract Documents will be construed to place responsibility on the Consultant to settle Disputes among the Subcontractors and Suppliers in respect to such divisions."

9.7 Delete paragraph 1.1.10 in its entirety and substitute new paragraph 1.1.10:

"All *Submittals* and *Intellectual Property* rights produced by or resulting from the Work, including all Specifications, Drawings, models and copies thereof, shall vest in the Owner and are the sole and absolute property of the Owner as and when created. The Contractor hereby irrevocably assigns and conveys and agrees to assign and convey, without further consideration, all right, title and interest in and to the Intellectual Property rights produced or resulting from the Work, in perpetuity and throughout the world, to the Owner and its successors and assigns. This paragraph 1.1.10 shall survive termination of the *Contract*."

9.8 Add new paragraphs 1.1.12, 1.1.13, 1.1.14, 1.1.15, 1.1.16, and 1.1.17 as follows:

"1.1.12 The Owner shall provide the Contractor, without charge, an electronic version of the Contract Documents.

1.1.13 If an item is shown on one document, and it can be reasonably inferred that it was intended to include work not shown on other related documents, the Contract Price shall nevertheless include for the cost of the item of work, unless the Consultant agrees otherwise.

1.1.14 Where a provision in the Contract is made for the giving or issuing of any Notice in Writing, consent, Acceptance, approval, certificate or determination by any person, unless otherwise specified such Notice in Writing, consent, Acceptance, approval certificate or determination shall be in writing and shall not unreasonably be withheld or delayed.

1.1.15 The Contractor shall keep one copy of the current Contract Documents, Supplemental Instructions, Contemplated Change Orders, Change Orders, Change Directives, reviewed Shop Drawings, reports and records of meetings at the Place of Work in good order and available to the Owner and the Consultant.

1.1.16 The Contractor shall keep one copy of current standards and manufacturers' literature specified in the Contract Documents at the Place of Work in good order and available to the Consultant and the Owner for the duration of the Work.

1.1.17 The Drawings are, in part, diagrammatic and are intended to convey the scope of the Work and indicate general and appropriate locations, arrangement and sizes of materials. The Contractor shall obtain more

accurate information about the locations, arrangement and sizes from study and coordination of the drawings and shall become familiar with conditions and spaces affecting these matters before proceeding with the Work. Where site conditions require minor changes in indicated locations and arrangements, the Contractor shall make such changes at no additional cost to the Owner."

10. GC 1.2 LAW OF THE CONTRACT

10.1 Delete paragraph 1.2.1 in its entirety and substitute new paragraph 1.2.1:

"This Contract shall be governed by and constituted in accordance with the laws in force in the Province of Ontario excluding any conflict of laws principles. The parties hereby irrevocably attorn to the exclusive jurisdiction of the courts of the Province of Ontario for any legal proceedings arising out of this Contract or the performance of the obligations hereunder."

11. GC 1.4 ASSIGNMENT

11.1 Delete paragraph 1.4.1 in its entirety and substitute new paragraph 1.4.1:

"Neither party to the Contract shall assign the Contract or a portion thereof without the written consent of the other, which consent, in the case of the Owner, is at the sole discretion of the Owner. In the event of an assignment of the Contract by the Contractor, such assignment shall require prior written consent of the Owner and shall not relieve the Contractor from its obligations and liabilities hereunder."

12. GC 2.1 AUTHORITY OF THE CONSULTANT

12.1 Amend GC 2.1.2. by deleting the words "the Owner, the Consultant and the Contractor" and replacing them with "the Owner and the Consultant."

13. GC 2.2 ROLE OF THE CONSULTANT

13.1 Amend paragraph 2.2.4 by adding the words "Within 7 calendar days of receipt of the Contractor's Proper Invoice," at the beginning of the paragraph.

- and -

Add to the end of the paragraph the following words "If the Consultant determines that the amount payable to the Contractor differs from the amount stated in a Proper Invoice, the Consultant shall immediately notify the Owner as provided in paragraph 5.3.1.1 and prepare a draft of the applicable Notice of Non-Payment for the amount in dispute."

13.2 Amend paragraph 2.2.5 by adding to the beginning of the paragraph:

"Except as provided otherwise in the agreement between the Consultant and the Owner,"

13.3 Amend paragraph 2.2.12 by adding the following to the end of that paragraph:

"The Supplemental Instruction is not a change in the Contract Documents. If, in the opinion of the Contractor, the Supplemental Instruction requires an adjustment in the Contract Price or in the Contract Time, it shall, within 3 Working Days after receipt of a Supplemental Instruction provide the Consultant and the Owner with Notice in Writing to that effect. Failure to provide the Notice in Writing within the time stipulated in this paragraph 2.2.12 shall be deemed an acceptance of the Supplemental Instruction by the Contractor without adjustment in the Contract Price or Contract Time."

13.4 Delete paragraph 2.2.18 in its entirety and replace it with the following:

"The *Consultant* shall provide the *Contractor* with editable CAD *Drawings* (the "*Consultant Supplied Drawings*") for the sole purpose of the *Contractor* developing the *As-Built Drawings* and the *As-Built Record Drawings* following submission by the *Contractor* of the release form provided by the *Consultant.* The *Contractor* shall maintain the integrity of the *Consultant Supplied Drawings* and shall ensure that no edits are made to the *Consultant Supplied Drawings*. The *Contractor* may save a copy of the *Consultant Supplied Drawings* to a new file *(the*

"Duplicate Drawing File") and make edits to the *Duplicate Drawing File* as required to complete the *As-Built Drawings* and the *As-Built Record Drawings*."

14. GC 2.3 REVIEW AND INSPECTION OF THE WORK

14.1 Add new paragraph 2.3.8 as follows:

"Where inspection and testing services are specified, the service provider employed for such services shall be the service provider named by the Owner."

14.2 Add new paragraph 2.3.9 as follows:

"Where standards of performance are specified and the Work does not comply with the specified standard of performance, the deficiency in the Work shall be corrected as directed by the Consultant. Subsequent testing to ensure that the standard of performance has been attained (including re-testing by Owner), shall be carried out at the Contractor's expense and shall not be paid from the cash allowances described in GC 4.1."

15. GC 2.4 DEFECTIVE WORK

15.1 Add new paragraphs 2.4.1.1, 2.4.1.2, 2.4.1.3 and 2.4.1.4 as follows:

".1 Without limiting the foregoing, the Contractor shall rectify, in a manner acceptable to the Owner and the Consultant, all defective work and deficiencies throughout the Work, whether or not they are specifically identified by the Consultant.

.2 The Contractor shall prioritize the correction of any defective work which, in the sole discretion of the Owner, adversely affects the day to day operations of the Owner.

.3 All such corrections of defective work and deficiencies shall be at the *Contractor*'s expense.

.4 If the Contractor fails to do the work to correct the defective Work or deficiencies, the Owner may carry out such remediation work by its own forces or by other Contractors and the Owner shall be entitled to recover from the Contractor the costs thereof or may deduct the same from any monies due or that become due to the Contractor."

15.2 Add new paragraph 2.4.4 as follows:

"2.4.4 Neither the acceptance of the *Work* by the *Consultant* or the *Owner*, nor any failure by the *Consultant* or the *Owner* to identify, observe or warn of defective *Work* or any deficiency in the *Work* shall relieve the *Contractor* from the sole responsibility for rectifying such defect or deficiency at the *Contractor's* sole cost, even where such failure to identify, observe or warn is negligent."

16. GC 2.5 EMERGENCY SITUATIONS

16.1 Add new GC 2.5 EMERGENCY SITUATIONS as follows:

".1 The Consultant or the Owner has the right to determine the existence of an emergency situation and, when such an emergency situation is deemed to exist, the Consultant may instruct the Contractor to take action to remedy the situation. If the Contractor does not take timely action or, if the Contractor is not available, the Consultant may direct others to remedy the situation. Any such action or direction taken by the Owner shall not relieve the Contractor of its responsibilities as the "constructor" pursuant to the Occupational Health and Safety Act (Ontario).

.2 If the emergency situation was the fault of the Contractor, the remedial work shall be completed at the cost of the Contractor and with no additional cost to the Owner and the Owner shall be entitled to seek reimbursements for all costs associated with the remedial work including the cost of work done by third parties.

.3 If the emergency situation was not the fault of the Contractor, the Owner shall pay for the remedial work."

17. GC 3.1 CONTROL OF THE WORK

17.1 Add new paragraph 3.1.3 as follows:

"Prior to commencing individual procurement, fabrication and construction activities, the Contractor shall verify, at the Place of the Work, all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the Work and shall further carefully compare such field measurements and conditions with the requirements of the Contract Documents. Where dimensions are not included or exact locations are not apparent, the Contractor shall immediately notify the Consultant in writing and obtain written clarification from the Consultant before proceeding with any part of the affected work."

17.2 Add new paragraph 3.1.4 as follows:

"The Contractor shall perform the work in a good and workmanlike manner, using new materials, in accordance with all applicable laws and current best practices and standards in the construction industry at the Place of Work. The Contractor acknowledges that both time and quality are of the essence and the Contractor will perform the Work or cause the Subcontractors and Suppliers to perform the Work in accordance with the Construction Schedule, as amended from time to time, and in an expeditious and professional manner.

18. GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

18.1 Delete paragraph 3.2.2.1 in its entirety.

18.2 Add new paragraph 3.2.3.5 as follows:

"Subject to GC 9.4 – CONSTRUCTION SAFETY, for the Owner's own forces and for other contractors, assume overall responsibility for compliance with all aspects of the applicable health and safety legislation of the Place of the Work, including all of the responsibilities of the "Constructor" under the *Occupational Health and Safety Act* (Ontario)."

18.3 Add new paragraph 3.2.3.6 as follows:

"provide for the co-ordination of the activities and work of *Other Contractors* and *Owner's* own forces with the *Work* of the *Contract.*"

19. GC 3.4 CONSTRUCTION SCHEDULE

19.1 Delete paragraph 3.4.1 in its entirety and substitute the following:

"3.4.1 The *Contractor* shall:

.1 within 10 *Working Days* from the date of *Contract* award, prepare for the *Owner's* and *Consultant's* review and *Acceptance*, a construction schedule, including identification of the critical path of the *Work,* the schedule of operations, the proposed methods of construction and sequence of *Work*, and the time the *Contractor* proposes to complete the various items of *Work* within the *Contract Time*. The schedule shall be designed to ensure conformity with the *Contract Time*. The schedule will be in a Gannt chart format in either .pdf or excel format and include:

(a) activity sequences and durations;

(b) process for obtaining any required permits;

(c) work block planning and track protection requested;

(d) special allocation of labour and *Products*;

(e) processing of *Shop Drawings* and samples;

(f) delivery of *Products* involving long lead time procurement;

(g) usage and occupancy requirements of the *Owner* of those portions of the *Work* having usage or occupancy priority;

(h) *Substantial Performance of the Work*, and *Ready-for-Takeover* reflecting that such milestones will be achieved by no later than the dates specified in Article A-1.3; and

(i) any other schedule requirements set out in the Contract Documents.

If the construction schedule submitted by the *Contractor* is not *Accepted* by the *Owner* and the *Consultant*, the *Contractor* shall make revisions to the construction schedule until it is accepted by the *Owner* and the *Consultant*. Once Accepted by the Owner and the Consultant, the schedule submitted by the Contractor shall become the "*Construction Schedule*." Notwithstanding any other terms of this *Contact*, the *Contractor* shall not be entitled to receive any payment from the *Owner* until a construction schedule has been submitted by the *Contractor* and *Accepted* by the *Owner* and the *Consultant*. The *Owner* may, at its sole discretion, not issue an order to commence work until the schedule has been received and Accepted.

.2 during performance of the Work and in accordance with the controls and reporting requirements in the *Contract Documents*, provide for the *Consultant's* and *Owner's* review and *Acceptance*, progress reports updating the *Construction Schedule*, reporting on the progress achieved, percentage of completion, schedule status and financial status with areas of immediate concern highlighted. If the schedule is affected by approved *Change Orders*, the *Contractor* shall submit an updated *Construction Schedule*, if requested by the *Consultant*, within 7 *Working Days* of the request. This updated schedule shall show how the *Contractor* proposes to perform the balance of the *Work*, so as to complete the *Work* within the *Contract Time*.

.3 provide progress reports with each application for payment, in the form provided by the Owner attached as Schedule C, for review and approval, including an update of the Construction Schedule referred to in paragraph 3.4.1."

19.2 Add new paragraphs 3.4.2 and 3.4.3 as follows:

"3.4.2 If,

.1 at any time it should reasonably appear to the Owner or the Consultant that the actual progress of the Work is behind schedule or is likely to become behind schedule, based on critical path methodology, and Notice in Writing of such opinion is given to the Contractor; or

.2 the Contractor becomes aware of or notices a slippage in the Construction Schedule,

then the Contractor shall take appropriate steps to cause the actual progress of the Work to conform to the Construction Schedule and shall produce and present to the Owner and the Consultant, for their review and Acceptance, within 5 Working Days after becoming aware of the schedule slippage, a recovery plan demonstrating how the Contractor will achieve the recovery of the Construction Schedule.

3.4.3 The *Contractor* is responsible for performing the *Work* within the *Contract Time*. Any schedule submissions revised from the *Accepted* baseline *Construction Schedule* or *Accepted* revised Construction Schedule pursuant to GC 3.4 CONSTRUCTION SCHEDULE, during construction are deemed NOT to be approved extensions to the *Contract Time.* Revisions to the *Construction Schedule* shall not be made without the prior written *Acceptance* of the *Owner*. All requests by the *Contractor* for a revision to the *Construction Schedule* that includes an extension to the *Contract Time* or adjustment to the date(s) for *Substantial Performance of the Work* or *Ready-for-Takeover* must be approved by the *Owner* through an executed *Change Order.*"

20. GC 3.5 SUPERVISION

20.1 Amend paragraph 3.5.1 by adding at the end of that paragraph:

"…, and upon the Contractor obtaining the Owner's written consent, which consent will not be unreasonably withheld."

20.2 Add new paragraph 3.5.3 as follows:

"Notwithstanding paragraph 3.5.2, the representative of the Contractor attending a meeting with one or more of the Owner, the Owner's representative and the Consultant shall be deemed to have authority to act on behalf of the Contractor and bind the Contractor in matters related to this Contract."

20.3 Add new paragraph 3.5.4 as follows:

"The Owner may, at any time during the course of the Work, request the replacement of the appointed Contractor's representative(s), where the grounds for the request involve conduct on the part of the Contractor's representative(s) which jeopardizes the safety of the Owner's operations or the Work or the proper progress of the Work. Immediately upon receipt of the request, the Contractor shall make arrangements to appoint an Acceptable replacement. The Contractor shall indemnify and hold the Owner harmless from and against any damages, costs, expenses, claims, injuries and other liabilities suffered by the Owner arising from the conduct of the representative that is being replaced."

21. GC 3.6 SUBCONTRACTORS AND SUPPLIERS

21.1 Add new paragraph 3.6.1.4:

"ensure the Subcontractors and Suppliers, while working on the Owner's property, are aware of and comply with the Owner's policies, including its Fit for Duty Policy, and with the Ontario Northland Operating Manual, including the Current Summary Bulletin, the current Ontario Northland Time Table, C.R.O.R. 2022 Infrastructure Special Instructions, Dangerous Goods and Ontario Northland General Operating Instructions, as applicable."

21.2 Delete paragraph 3.6.2 in its entirety and substitute new paragraph 3.6.2

"The Contractor shall not change Subcontractors or Suppliers identified in the Contract Documents without the prior written approval of the Owner which approval will not be unreasonably withheld."

21.3 Delete paragraphs 3.6.3 and 3.6.4 in their entirety and replace them with "Intentionally Left Blank".

21.4 Add new paragraph 3.6.7 as follows:

"The responsibility as to which Supplier and/or Subcontractor provides the specific labour, Products and services for each item of work rests solely with the Contractor, within and in accordance with the requirements and limitations listed in the Contract Documents with respect to approval of Suppliers and/or Subcontractors permitted to perform work on the Project."

22. GC 3.7 LABOUR AND PRODUCTS

22.1 Amend paragraph 3.7.1 by adding the words, "..., agents, Subcontractors and Suppliers …" after the word "employees".

22.2 Amend paragraph 3.7.2 by adding the following words at the beginning of the paragraph: "Except as otherwise provided in the Technical Specifications" and adding the following sentence at the end of that paragraph:

"The Contractor represents and warrants that the Products supplied by the Contractor in accordance with the Contract are not subject to any conditional sales contract and are not subject to any security rights obtained by any third party which may subject any of the Products to seizure and/or removal from the Place of the Work."

22.3 Add new paragraph 3.7.4 as follows:

"Upon receipt of a Notice in Writing from the Consultant, the Contractor shall take action to rectify any situation involving its employee, agent, Subcontractor or Supplier whose work is unsatisfactory to the Consultant or the Owner or who are considered by the Consultant or the Owner to be unskilled or otherwise objectionable. If after giving sufficient warning the Contractor is not able to reasonably rectify such situation, then such employee, agent, Subcontractor or Supplier shall be dismissed from the Place of the Work and the Contractor shall indemnify and hold the Owner and the Consultant harmless from and against any damages, costs, expenses, claims, injuries and other liabilities suffered by the Owner or the Consultant arising from the dismissal of such employee, agent, Subcontractor or Supplier."

22.4 Add new paragraph 3.7.5 as follows:

"The Contractor is responsible for the safe on-site storage of Products and their protection (including Products supplied by the Owner and other contractors to be installed under the Contract) in such ways as to avoid dangerous conditions or contamination to the Products or other persons or property and in locations at the Place of the Work identified by the Contractor and Accepted by the Owner and the Consultant. The Owner shall provide all relevant information on the Products to be supplied by the Owner or other contractors."

22.5 Add new paragraph 3.7.6 as follows:

"The Contractor shall not employ any persons to perform Work whose labour affiliation, or lack thereof, is incompatible with other labour employed in connection with the Work. Any costs arising from labour disputes, as a result of the employ of any such person by the Contractor, its Subcontractors or Suppliers shall be at the sole expense of the Contractor."

22.6 Add new paragraph 3.7.7 as follows:

"The Contractor and the Owner and its representatives shall cooperate and shall take all reasonable and necessary actions to maintain stable and harmonious labour relations with respect to the Work at the Place of the Work, including cooperation to attempt to avoid work stoppages, trade union jurisdictional disputes and other labour disputes."

23. GC 3.8 SHOP DRAWINGS

23.1 Delete paragraph 3.8.7 and replace it with the following:

"3.8.7 The *Consultant* will review and return *Shop Drawings* in accordance with the schedule agreed upon in 3.8.2, or, in the absence of such schedule, with reasonable promptness. If, for any reason, the *Consultant* cannot process them within the agreed-upon schedule or with reasonable promptness, the *Consultant* shall notify the *Contractor* and they shall meet to review and develop a revised schedule for processing such *Shop Drawings* that is *Acceptable* to the *Owner*. The *Contractor* shall update the *Shop Drawings* schedule to correspond to changes in the *Construction Schedule*. Changes in the *Contract Price* or *Contract Time* may be made only in accordance with GC 6.1, GC 6.2 and GC 6.3"

22.2 Add new paragraphs 3.8.8, 3.8.9, 3.8.10 and 3.8.11 as follows:

3.8.8 The *Contractor* shall provide *Shop Drawings* and *Submittals* in the form specified, or if not specified, as directed by the *Consultant*. *Shop Drawings* provided by the *Contractor* to the *Consultant* shall indicate by stamp, date and signature of the person responsible for the review that the *Contractor* has reviewed each one of them. Certain *Specifications* sections require the *Shop Drawings* to bear the seal and signature of a professional engineer. Such professional engineer must be registered in the jurisdiction of the Place of the Work and shall have expertise in the area of practice reflected in the *Shop Drawings*.

3.8.9 *Shop Drawings* which require approval of any *Authority Having Jurisdiction* shall be provided to such authority by the *Contractor* for the authority's approval.

3.8.10 The *Contractor* shall provide revised *Shop Drawings* to correct those which the *Consultant* rejects as inconsistent with the *Contract Documents*, unless otherwise directed by the *Consultant*. The *Contractor* shall notify the *Consultant* in writing of any revisions to the *Shop Drawings* other than those requested by the *Consultant*.

3.8.11 Reviewed *Shop Drawings* shall not authorize a change in the *Contract Price* and/or the *Contract Time*."

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24. GC 3.9 USE OF THE WORK

24.1 Add new GC 3.9 – USE OF THE WORK as follows:

"**GC 3.9 USE OF THE WORK**

3.9.1 The Contractor shall confine Construction Equipment, Temporary Work, storage of Products, waste products and debris, and operations of employees and Subcontractors to limits indicated by laws, ordinances, permits, or the Contract Documents and shall not unreasonably encumber the Place of the Work.

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

3.9.3 The Owner shall have the right to enter or occupy the Place of the Work in whole or in part for the purpose of placing fittings and equipment, or for other use before Ready-for-Takeover, if, in the opinion of the Consultant, such entry and occupation does not prevent or substantially interfere with the Contractor in the performance of the Contract within the Contract Time. Such entry or occupation shall neither be considered as acceptance of the Work or in any way relieves the Contractor from its responsibility to complete the Contract."

25. GC 3.10 CUTTING AND REMEDIAL WORK

25.1 Add new GC 3.10 – CUTTING AND REMEDIAL WORK as follows:

"**GC 3.10 CUTTING AND REMEDIAL WORK**

3.10.1 The Contractor shall perform the cutting and remedial work required to make the affected parts of the Work come together properly. Such cutting and remedial work shall be performed by specialists familiar with the Products affected and shall be performed in a manner to neither damage nor endanger the Work.

3.10.2 The Contractor shall coordinate the Work to ensure all cutting and remedial work required is kept to a minimum."

26. GC 3.11 CLEANUP

26.1 Add new GC 3.11 – CLEANUP as follows:

"**GC 3.11 CLEANUP**

3.11.1 The Contractor shall comply with all requirements for cleanup at the Place of the Work as specified in the Contract Documents. The Contractor shall provide to the Owner for approval a Waste Management Plan, and a waste reduction plan if required by Environmental Laws, for the waste products, debris and any Excess Soils generated by the Work, which plan shall comply with all Environmental Laws and the Specifications. The costs of disposing of all waste products and debris, including products and debris containing Environmental Contaminants, and Excess Soil resulting from the Work is included in the Contract Price.

3.11.2 Before applying for Substantial Performance of the Work, the Contractor shall remove waste products and debris and shall leave the Place of the Work clean and suitable for use or occupancy by the Owner. All products, tools, Construction Equipment and Temporary Work not required for the performance of any remaining Work shall be removed by the Contractor.

3.11.3 As a condition precedent to final payment, the Contractor shall remove any remaining products, tools, Construction Equipment, Temporary Work, waste products and debris from the Place of the Work to the satisfaction of the Owner.

3.11.4 In performing work to correct deficiencies or work under warranty following Ready-for-Takeover of the Work, the Contractor shall maintain the Place of the Work in a tidy condition and shall immediately remove waste products and debris.

3.11.5 The Contractor shall comply with all Environmental Laws in disposing of the waste products, debris and Excess Soil resulting from the Work. The Contractor shall assume all liability and responsibility for any waste products, debris and Excess Soil, including any such materials containing Environmental Contaminants, which are removed from the Place of the Work by the Contractor and during the transportation of the waste products, debris and Excess Soils to the appropriate waste disposal site. The Contractor shall submit landfill weigh bills from a waste disposal site as proof that all waste has been disposed of at a certified waste disposal site. The Contractor shall submit a *Waste Management Report*

as part of the *Close-Out Documentation* described in paragraph 5.5.1.2 to be submitted with the application for verification of *Ready-For-Takeover*.

3.11.6 In the event that the Contractor fails to remove waste and debris as provided in this GC 3.11, then the Owner or the Consultant may give the Contractor twenty-four (24) hours' Notice in Writing to meet its obligations respecting clean up. Should the Contractor fail to meet its obligations pursuant to this GC 3.11 within the twenty-four (24) hour period next following delivery of the notice, the Owner may remove such waste and debris and deduct from payments otherwise due to the Contractor, the Owner's costs for such clean up, including a reasonable mark-up for Administration Costs."

27. GC 3.12 PERFORMANCE BY CONTRACTOR

27.1 Add new GC 3.12 – PERFORMANCE BY CONTRACTOR as follows:

"**GC 3.12 PERFORMANCE BY CONTRACTOR**

3.12.1 In performing its obligations, duties and responsibilities under this Contract, the Contractor shall exercise the degree of care, skill and diligence that would normally be exercised by an experienced, skilled and prudent contractor supplying similar services for similar projects. The Contractor acknowledges and agrees that, throughout this Contract, the Contractor's obligations, duties and responsibilities shall be judged, evaluated and interpreted in accordance with this standard. The Contractor shall exercise the same standard of care in respect of any Products, Subcontractors, Suppliers, personnel or procedures which it may recommend to the Owner or employ on the Project.

3.12.2 The Contractor further represents, covenants and warrants to the Owner that:

.1 The personnel and Subcontractors it assigns to the Project are appropriately experienced;

.2 It has a sufficient staff of qualified and competent personnel to replace its designated supervisor and project manager, subject to the Owner's approval, in the event of death, incapacity, removal or resignation; and

.3 there are no pending, threatened or anticipated claims that would have a material effect on the financial ability of the Contractor to perform its work under the Contract."

3.12.3 The Owner has a Vendor Performance Policy which requires the Owner to complete an evaluation of the Contractor's performance of its obligations under this Contract. The performance evaluation of the Contractor for the supply of these Services will be used in the assessment of the Contractor's proposals in response to future procurements. The performance evaluation may also result in the Contractor being disqualified from submitting proposals in response to future procurements in accordance with the terms of the policy. The policy can be found at http://ontarionorthland.ca/en/requests-tenders."

28. 3.13 EXCESS SOIL MANAGEMENT

28.1 Add new GC 3.13 – EXCESS SOIL MANAGEMENT as follows:

"**GC 3.13 EXCESS SOIL MANAGEMENT**

3.13.1 The *Contractor* shall be solely responsible for the proper management of all *Excess Soil* at the *Place of the Work* and for performance of the *Work* in compliance with the rules, regulations and practices required by the *Excess Soil Regulation* until such time as *Ready-for-Takeover* is achieved. Without restricting the generality of the previous sentence, the *Contractor's* responsibility under this GC 3.13 includes the testing, designation, transportation, tracking, temporary and/or final placement, record keeping, and reporting of all *Excess Soil* in connection with the *Work* all in compliance with the *Excess Soil Regulation.*

3.13.2 The *Contractor* shall indemnify and save harmless the *Owner*, their agents, officers, directors, administrators, governors, employees, consultants, successors and assigns from and against the consequences of any and all infractions committed by the *Contractor,* or those for whom it is responsible at law, under the *Excess Soil Regulation*, or any environmental protection legislation, including the payment of legal fees and disbursements on a substantial indemnity basis."

29. GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

29.1 Delete GC 5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER in its entirety including all paragraphs thereunder and replace it with "Intentionally left blank."

29.2 **GC 5.2 APPLICATIONS FOR PAYMENT**

29.3 Delete paragraph 5.2.1 in its entirety and substitute new paragraph 5.2.1:

"5.2.1 On a *Working Day* that is not more than 10 calendar days after the end of each *Payment Period*, a representative of the *Contractor*, *Owner*, and the *Consultant* shall attend a meeting to discuss and review the *Work* completed during the *Payment Period*, including quantities, if applicable (the "**Pre-Invoice Submission Meeting**"). The *Contractor* shall bring with it to the *Pre-Invoice Submission Meeting* the following:

.1 a draft of its anticipated application for payment for the applicable *Payment Period*;

.2 the schedule of values submitted in accordance with GC 5.2.4, and approved by the *Consultant* in accordance with GC 5.2.5;

.3 *Subcontractor* and *Supplier* invoices and supporting materials;

.4 receipts for reimbursable expenses (where expressly permitted by the *Contract*, if at all);

.5 accounts and records documenting the cost of performing the *Work* attributable to any *Change Order* or *Change Directive*;

.6 any visual documentation (photos, videos, diagrams) evidencing the progress of the *Work*; and

.7 any other documents reasonably required by the *Contract Documents*, the *Owner* or *Consultant*."

29.4 Delete paragraph 5.2.2 in its entirety and substitute new paragraph 5.2.2:

"5.2.2 Within 5 calendar days following the *Pre-Invoice Submission Meeting*, the *Contractor* shall deliver to the *Owner*, with a copy to the *Consultant*, its application for payment that complies with the requirements of GC 5.2.6 for *Work* performed during a *Payment Period* (the "**Proper Invoice Submission Date**"), provided that if the fifth (5th) calendar day following the *Pre-Invoice Submission Meeting* falls on a calendar day that is not *Working Day*, the *Proper Invoice Submission Date* shall be deemed to fall on the next *Working Day*. However, the following shall apply to the delivery of all *Contractor* applications for payment:

.1 If the *Contractor* fails to deliver its application for payment, at the interval prescribed in GC 5.2.2, subject to written approval by the *Owner*, the *Contractor* shall not be entitled to submit its application for payment until the next prescribed interval. Should the *Owner* decide to accept an application for payment submitted after the applicable *Proper Invoice Submission Date* (which the *Owner* is under no obligation to do), such acceptance shall not be construed as a waiver of any of the *Owner*'s rights, or as a waiver or release of the *Contractor*'s obligations to strictly comply with the requirements prescribed in this GC 5.2 – APPLICATIONS FOR PAYMENT;

.2 If an application for payment is delivered by the *Contractor* to the *Owner* on a day that is prior to an eligible *Proper Invoice Submission Date*, the application for payment will not be considered or reviewed by the *Owner* or the *Consultant* until the earliest eligible *Proper Invoice Submission Date* as identified in GC 5.2.2, at which point the application for payment will be deemed to have been received by the *Owner* and the *Consultant* for the purpose of review and evaluation;

.3 Notwithstanding any other provision of this *Contract*, the *Contractor* shall not deliver an application for payment for consideration as a *Proper Invoice* by the *Owner*, during the *Restricted Period (Proper Invoice)*;

.4 The *Owner* and the *Contractor* hereby consent to the giving and receiving of *Proper Invoices* electronically and in accordance with the requirements of this GC 5.2 – APPLICATIONS FOR PAYMENTS."

29.5 Amend paragraph 5.2.3 by adding the following to the end of that paragraph:

"but no amount claimed shall include Products delivered to the Place of the Work unless the Products are free and clear of all security interests, liens, and other claims of third parties, subject to claims for lien pursuant to the *Construction Act*."

29.6 Amend paragraph 5.2.4 by deleting the words "the Consultant, at least 15 calendar days" and replacing them with "the Owner and the Consultant, at least 30 calendar days"

- and -

add the words "in a form acceptable to the Owner," after the words "Contract Price".

29.7 Amend paragraph 5.2.5 by adding the words "or the Owner" after the words " as the Consultant"

- and -

In the second line of paragraph 5.2.5, delete the second word "Consultant" and substitute "Owner".

29.8 Delete paragraph 5.2.6 in its entirety and substitute new paragraph 5.2.6:

"5.2.6 Each application for payment submitted pursuant to GC 5.2.2 shall:

.1 be in a form prescribed, or otherwise approved in writing, by the *Owner*;

.2 include all of the requirements for a *Proper Invoice* prescribed by the *Construction Act* and the *Contract Documents*;

.3 be delivered to the *Owner* and to the *Consultant* in the same manner as a *Notice in Writing*; and

.4 unless otherwise directed in writing by the *Owner*, by email to pay.inv@ontarionorthland.ca and to the Owner's representative listed in Article A-6."

29.9 Amend paragraph 5.2.8 by adding the following new sentence at the end of that paragraph:

"Any Products delivered to the Place of the Work but not yet incorporated into the Work shall remain at the risk of the Contractor notwithstanding the title has passed to the Owner pursuant to GC 13.1 – OWNERSHIP OF MATERIALS."

29.10 Add new paragraph 5.2.9 as follows:

"5.2.9 The Contractor shall prepare and maintain current *As-Built Drawings* which shall consist of the Drawings and Specifications revised by the Contractor during the Work, showing changes to the Drawings and Specifications, which current *As-Built Drawings* shall be maintained by the Contractor and made available to the Consultant for review with each application for progress payment. The Owner reserves the right to retain a reasonable amount for the value of the *As-Built Drawings* not presented for review."

29.11 Add new paragraph 5.2.10 as follows:

"5.2.10 Upon receipt of an application for payment submitted for payment by the *Contractor* in accordance with GC 5.2 - APPLICATIONS FOR PAYMENT, the *Owner* and the *Consultant* will assess whether all of the requirements for a *Proper Invoice* are satisfied and, if the application for payment does not meet the requirements, the *Owner* or the *Consultant*, as applicable, will return the application for payment to the *Contractor* with reasons setting out why the application for payment does not meet the requirements for a *Proper Invoice* and the *Contractor* may resubmit the application for payment with all required information within 3 *Working Days* of the *Contractor's* receipt of the *Owner's* or *Consultant's* reasons. For clarity,

.1 if an application for payment does not include all of the requirements for a *Proper Invoice* required by GC 5.2.6.2, it shall not be considered a "Proper Invoice" for the purposes of the *Construction Act* and the *Owner* shall have no obligation to make a payment and the time periods set out in GC 5.3 - PAYMENTS and in Section 6.4 of the *Construction Act* shall not apply until the *Contractor* has submitted an application for payment that includes all information required by GC 5.2.6.2;

.2 if the *Contractor* fails, refuses, or neglects to resubmits its application for payment within 3 *Working Days* after it is returned in accordance with this GC 5.2.10, the *Contractor* shall be deemed to have failed to deliver its application for payment and GC 5.2.2.1 shall apply;

.3 where the *Contractor* disagrees with the *Owner's* or the *Consultant's* assessment that some of the of the requirements for a *Proper Invoice* required by GC 5.2.6.2 are missing from its application for payment, nothing in this GC 5.2.10 shall prevent the Contractor from resubmitting the same application for payment without any additional or new information; and

.4 the *Owner* reserves the right, in its sole, absolute and unfettered discretion, to waive an error or minor irregularity in any application for payment delivered by the *Contractor* for the purposes of deeming an application for payment a "Proper Invoice" within the meaning of the *Construction Act*, but the *Owner* shall be under no obligation to exercise this right."

30. GC 5.3 PAYMENT

30.1 Delete paragraph 5.3.1 in its entirety and substitute new paragraph 5.3.1:

"5.3.1 After receipt by the Owner and the Consultant of an application for payment submitted by the Contractor in accordance with GC 5.2 – APPLICATIONS FOR PAYMENT:

.1 the *Consultant* will either:

(a) issue to the *Owner,* with a copy to the *Contractor*, a certificate for payment in the amount applied for in the *Proper Invoice*, or

(b) issue to the *Owner,* with a copy to the *Contractor,* a certificate for payment for an amount determined by the *Consultant* to be properly due to the *Contractor* after applying any credits, withheld amounts*,* or other set-offs which the *Consultant* has determined that the *Owner* is entitled to notwithstanding any notice of dispute or disagreement that the *Contractor* may have served, along with the *Consultant's* reasons why an amount other than what is claimed in the *Proper Invoice* is properly due to the *Contractor*, which finding the *Owner* may accept or amend prior to the *Owner* issuing a *Notice of Non-Payment*, if any, in accordance with GC 5.3.2;

.2 the *Owner* shall make payment to the *Contractor*, on account as provided in Article A-5,

(a) in the amount stated in the certificate for payment, or

(b) in the amount stated in the certificate for payment less such amount stated in the *Owner*'s *Notice of Non-Payment* issued pursuant to GC 5.3.2,

on the 28th calendar day after receipt of a *Proper Invoice*, unless such 28th calendar day lands on a day that is other than a *Working Day*, in which case payment shall be made on the next *Working Day* after such 28th day."

30.2 Add new paragraph 5.3.2 as follows:

"5.3.2 In the event that the application for payment delivered by the *Contractor* pursuant to GC 5.2 – APPLICATIONS FOR PAYMENT does not include the requirements for a Proper Invoice or if the Owner disputes the amount claimed as payable in the *Proper Invoice*, then the *Owner* shall within 14 calendar days of receipt of the application for payment, issue a *Notice of Non-Payment* (Form 1.1)."

30.3 Add new paragraph 5.3.3 as follows:

"5.3.3 Where the *Owner* has delivered a *Notice of Non-Payment*, as specified under GC 5.3.2, the *Owner* and the *Contractor* shall first engage in good faith negotiations to resolve the dispute. If within 10 calendar days following the issuance of a *Notice of Non-Payment*, the *Owner* and the *Contractor* cannot resolve the dispute, either party may issue a notice of adjudication in a form prescribed under the *Construction Act*, in which case the *Owner* and the *Contractor* will agree to submit the dispute to *Adjudication* as set out under PART 8 – DISPUTE RESOLUTION. The amounts disputed and described under the Notice of Non-Payment shall be held by the Owner until all disputed amounts of the relevant Proper Invoice have been resolved pursuant to PART 8 – DISPUTE RESOLUTION Any portion of the Proper Invoice which is

not the subject of the Notice of Non-Payment shall be payable within the time period set out in paragraph 5.3.1.2."

30.4 Add new paragraph 5.3.4 as follows:

"5.3.4 Without limitation, the Owner shall be entitled to deduct from or, set off against, any payment of the Contract Price and any other amounts payable by the Owner to the Contractor under the Contract:

.1 any amount expended by the Owner in exercising the Owner's rights under this Contract to perform any of the Contractor's obligations that the Contractor has failed to perform;

.2 any damages, costs or expenses (including, without limitation, reasonable legal fees and expenses) incurred by the Owner as a result of the failure of the Contractor to perform any of its obligations under the Contract; or

.3 any other amount owing from the Contractor to the Owner under this Contract."

30.5 Add new paragraph 5.3.5 as follows:

"5.3.5 The Contractor represents, warrants, and covenants to the Owner that it is familiar with its prompt payment and trust obligations under the *Construction Act* and will take all required steps and measures to ensure that it complies with the applicable prompt payment and trust provisions under the *Construction Act* including, without limitation, section 8.1 of the *Construction Act*. Evidence of the Contractor's compliance under this paragraph 5.3.5 will be made available to the Owner within 5 Working Days following receipt by the Contractor of a Notice in Writing making such request."

31. C 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK

31.1 Delete paragraph 5.4.2 in its entirety and replace it with the following:

"5.4.2 After the date of Substantial Performance of the Work is established, the Contractor and all Subcontractors who have completed their subcontracts shall complete on a commercially reasonable efforts basis within 30 days all deficient work including providing the required *Close-Out Documentation*, unless the reasons for any delay is Acceptable to the Owner. All deficient work not completed within the above time may be completed by the Owner and the cost of this work may at the option of the Owner be deducted from the Contractor's next application for payment, or otherwise recoverable upon written demand by the Owner to the Contractor."

31.2 Delete paragraph 5.4.3 and replace it with the following:

"5.4.3 Immediately following the issuance of a certificate of Substantial Performance of the Work, the Contractor shall publish the certificate referred to in paragraph 5.4.1.2 in the manner provided in the *Construction Act*. Failing valid publication by the Contractor within 3 Working Days following the issuance of the certificate, the Owner shall be at liberty to publish the certificate and back-charge the Contractor for its reasonable costs for doing so."

31.3 Delete paragraph 5.4.4 and replace it with the following:

"5.4.4 After publication of the certificate of the Substantial Performance of the Work, the Contractor shall submit an application for payment of the outstanding Construction Act holdback amount, which application for payment shall:

.1 include all of the requirements listed in Schedule A to these Supplementary Conditions, as applicable to the application for payment of the holdback amount; and

.2 include a statement that the Contractor has not received any written notices of lien or any claims for liens from any Subcontractor or Supplier.

After the receipt of a complete application for payment of the holdback amount from the Contractor, the Consultant will issue a certificate for payment of the holdback amount, provided that such amount is subject to and will only become due and payable in accordance with GC 5.4.5 and the Construction Act."

31.4 Delete paragraph 5.4.5 and replace it with the following:

"5.4.5 The *Construction Act* holdback amount shall become due and payable the day immediately following the expiration of the holdback period prescribed by the *Construction Act*, subject to the occurrence of any of the following:

.1 the preservation of a lien in respect of the *Project* that has not been satisfied, discharged or otherwise provided for in accordance with the *Construction Act*;

.2 receipt by the *Owner* of a written notice of lien that has not been satisfied, discharged or otherwise provided for in accordance with the *Construction Act*; or

.3 prior to the expiry of 40 calendar days following the publication of the certificate of *Substantial Performance of the Work,* the *Owner* publishes a *Notice of Non-Payment* of holdback in accordance with the *Construction Act,* setting out the amount of holdback that will not be paid, which may include non-payment to secure the correction of deficiencies and/or the completion of the *Work*."

31.5 Add new paragraph 5.4.7 as follows:

"5.4.7 Where the Construction Act allows for release of *Construction Act* holdback on subcontract work which is 100% complete prior to the release of holdback contemplated under GC 5.4.5, the *Contractor* may make application to the *Owner* and the *Consultant* by written request for a review by the *Consultant* to determine the date of completion of the subcontract and shall submit such supporting material as the *Consultant* may in its discretion require, including:

.1 Description of the scope of *Work* included in the subcontract.

.2 Declaration of Last Supply by the *Subcontractor* as prescribed in subsection 31(5) of *the Construction Act* (Form 7).

.3 Certificate of Completion of Subcontract as prescribed in subsection 33(1) of *the Construction Act* (Form 10).

.4 Workplace Safety & Insurance Board clearance certificate for the *Contractor*, the *Subcontractor* concerned, and any other *Subcontractors* and *Suppliers* who have provided any services to the *Subcontractor*.

.5 Statutory declaration by an officer of the *Subcontractor* in the form CCDC Document 9B - 2018.

.6 *Contractor's* written acknowledgement to the *Owner* that the requirements of the *Contract Documents* will not be altered by early release of the *Construction Act* holdback of the completed subcontracts.

.7 Confirmation by the bonding company that it has been notified of the intent to claim early release of holdback and does not object.

.8 Sufficient evidence to the *Owner's* reasonable satisfaction that, as of the date of the *Contractor*'s application, no claims for lien have been preserved against the *Place of the Work* that have not been vacated by the posting of security, discharged, or otherwise addressed in accordance with GC 5.8 – CONSTRUCTION LIENS."

32. GC 5.5 FINAL PAYMENT

32.1 Delete GC 5.5 – FINAL PAYMENT in its entirety and substitute the following:

"5.5.1 When *Ready-for-Takeover* has been achieved in accordance with GC 12.1 – READY-FOR-TAKEOVER and the Contractor considers the Work is complete, and after the *Contractor*, the *Owner*, and the *Consultant* have attended a *Pre-Invoice Submission Meeting* analogous to the requirement in GC 5.2.1, the Contractor may submit an application for final payment to the Owner and the Consultant and the Contractor shall:

.1 include all of the requirements set out in GC 5.2.1, including without limitation those requirements listed in Schedule A to these Supplementary Conditions that are specific to an application for final payment;

.2 ensure that all warranties, *Extended Warranties*, records, operation and maintenance manuals, data books, literature maintenance sheets, list of outstanding work and deficiency list, *Waste Management Report*, keys, Certificate of Clearance from WSIB, proof of publication of the certificate of *Substantial Performance of the Work* and the *As-Built Record Drawings* are submitted to the *Consultant (*collectively, the "**Close-Out Documentation**"). Such submissions shall constituent requirements for the *Proper Invoice* for final payment; and

.3 if applicable, (a) a certificate from the *Consultant* or written confirmation from the *Owner* that the deficiencies or incomplete *Work* waived by the *Owner* pursuant to GC 12.1.2 have been fully rectified as of the date of the *Contractor's* application for final payment, and/or (b) written confirmation, signed by the *Owner* and the *Contractor,* that the *Contract Price* has been reduced by a specified amount in exchange for the *Owner* releasing the *Contractor* of its obligation to rectify the certain outstanding deficiencies and/or incomplete *Work* waived by the *Owner* pursuant to GC 12.1.2, as detailed in such written confirmation."

5.5.2 After receipt by the Owner of an application for final payment submitted by the Contractor in accordance with paragraph 5.5.1:

.1 the *Consultant* will either:

(a) issue to the *Owner* with a copy to the *Contractor*, a certificate for payment in the amount applied for in the *Proper Invoice*, or

(b) issue to the *Owner,* with a copy to the *Contractor,* a certificate for payment for an amount determined by the *Consultant* to be properly due to the *Contractor* after applying any credits, withheld amounts*,* or other set-offs which the *Consultant* has determined that the *Owner* is entitled to notwithstanding any notice of dispute or disagreement that the *Contractor* may have served, along with the *Consultant's* reasons why an amount other than what is claimed in the *Proper Invoice* is properly due to the *Contractor*, which finding the *Owner* may accept or amend prior to the *Owner* issuing a *Notice of Non-Payment*, if any, in accordance with GC 5.3.2;

.2 the *Owner* shall make payment to the *Contractor*, on account as provided in Article A-5,

(a) in the amount stated in the certificate for payment, or

(b) in the amount stated in the certificate for payment less such amount stated in the *Owner*'s *Notice of Non-Payment* issued pursuant to GC 5.3.2,

on the 28th calendar day after receipt of a *Proper Invoice*, unless such 28th calendar day lands on a day that is other than a *Working Day*, in which case payment shall be made on the next *Working Day* after such 28th day."

5.5.3 In the event that the application for final payment delivered by the *Contractor* does not include the requirements of GC 5.5.1 (including the requirements for a *Proper Invoice*) or where the *Owner* disputes the amount claimed as payable in the *Proper Invoice*, then the *Owner* shall within 14 calendar days of receipt of the application for payment, issue a *Notice of Non-Payment*. Where the Owner has delivered a Notice of Non-Payment, as specified under this GC 5.5.3, the Owner and the Contractor shall first engage in good faith negotiations to resolve the dispute. If within 10 calendar days following the issuance of a Notice of Non-Payment, the Owner and Contractor cannot resolve the dispute, either party may issue a notice of Adjudication in a form prescribed under the *Construction Act*. The Owner and Contractor will then submit the dispute to Adjudication as set out under PART 8 – DISPUTE RESOLUTION.

5.5.4 The amounts disputed and described under the Notice of Non-Payment shall be held by the Owner until all disputed portions of the Proper Invoice for final payment have been resolved in accordance with PART 8 – DISPUTE RESOLUTION. Any portion of the Proper Invoice which is not the subject of a Notice of Non-Payment shall be payable within the time period set out in paragraph 5.5.2.2.

5.5.5 Subject to the provision of paragraph 10.4.1 of GC 10.4 – WORKERS' COMPENSATION, and any lien legislation applicable to the Place of the Work, the Owner shall make payment, to the Contractor in accordance with paragraph 5.5.2.2.

5.5.6 Notwithstanding anything else in this GC 5.5 – FINAL PAYMENT the Owner shall retain a finishing holdback as provided for in the *Construction Act*, which shall be released to the Contractor upon expiry of the lien period provided for under the *Construction Act*, provided no construction liens have been registered.

5.5.7 As additional requirements for release of finishing construction lien holdback, the Contractor shall submit the following documentation:

.1 a written declaration that no claims for lien or written notices of lien have been received by it;

.2 a Statutory Declaration in the form set out in Schedule B that all accounts for labour, subcontracts, Products, construction machinery and equipment, and other indebtedness which may have been incurred by the Contractor and for which the Owner might in any way be held responsible have been paid in full up to the previous progress payment, except for amounts properly retained as a holdback or as an identified amount in dispute; and

.3 a Workplace Safety & Insurance Board Clearance Certificate."

33. GC 5.6 DEFERRED WORK

33.1 Add new paragraph 5.6.2 as follows:

"5.6.2 Upon notice to the Contractor, the Owner may, subject to the Owner's requirement to issue a Notice of Non-Payment under the *Construction Act,* withhold or retain all or any portion of any payment due to the Contractor under this Contract to ensure the performance of the Work or to protect the Owner's rights in respect of the events set out in this paragraph 5.6.2, but only such portion of any payment as is reasonably necessary for such purpose. The Owner may make such withholding or retention upon the occurrence and continuance of any of the following events:

.1 the Contractor is in default of any of its material obligations under this Contract;

.2 all or any part of such payment is attributable to Work which is defective or not performed in accordance with the Contract Documents;

.3 the Contractor has improperly failed to make prompt payments to its Subcontractors and Suppliers respecting Work for which the Owner has made payment to the Contractor; or

.4 the amounts described in section 17(3) of the *Construction Act*."

33.2 Add new paragraph 5.6.3 as follows:

"5.6.3 If because of climatic or other conditions reasonably beyond the control of the Contractor, there are items of work that cannot be performed, payment in full for that portion of the Work which has been performed as certified by the Owner shall not be withheld or delayed by the Owner on account thereof, but the Owner may withhold, until the remaining portion of the Work is finished, only such an amount that the Owner determines is sufficient and reasonable to cover the cost of performing such remaining work."

33.3 Add new paragraph 5.6.4 as follows:

"5.6.4 In the event of deficiencies or delays in the Work that the Contractor fails or refuses to address upon receiving notice of same in accordance with the requirements of the Contract, the Owner may, without limiting the remedies available to it under this Contract and subject to the Owner's requirement to issue a Notice of Non-Payment under the *Construction Act*, retain and set off as against any payments that would otherwise be owing to the Contractor, the reasonable costs of rectifying such deficiencies or delays as determined by the Owner."

33.4 Add new paragraph 5.6.5 as follows:

"5.6.5 In addition to any rights the Owner has pursuant to the Construction Act and subject to the Owner's requirement to issue a Notice of Non-Payment under the Construction Act, if a lien is registered against the Place of the Work or served upon the Owner, or an action commenced against the Owner, by any Subcontractor, the Owner having made all payments currently due in accordance with the payment terms of the Contract Documents, the Owner shall have the right to withhold from any money otherwise due to the Contractor, the full amount claimed in the lien action plus an additional amount sufficient to satisfy all of the Owner expenses relating to such lien action, including legal and consulting costs. These funds, less expenses incurred, shall be released to the Contractor upon the full discharge of all liens and dismissal of all actions against the Owner."

34. GC 5.8 CONSTRUCTION LIENS

34.1 Add new GC 5.8 – CONSTRUCTION LIENS as follows:

"**GC 5.8 – CONSTRUCTION LIENS**

5.8.1 Notwithstanding anything else in this PART 5 – PAYMENT, in the event a claim for lien is registered against title to the Place of the Work by the Contractor, a Subcontractor or a Supplier, or served on the Owner with regard to the Project by a Subcontractor or a Supplier, or the Owner receives a written notice of or claim for lien from a Subcontractor or a Supplier, the Owner shall be entitled to withhold any payment otherwise due to the Contractor until such time as such claims have been dealt with as provided below.

5.8.2 In the event that a claim for lien or a written notice of a lien is received by the Owner in relation to the Project, the Contractor shall, within 10 calendar days, at its sole expense, arrange for the vacating or the discharge of the claim for lien and/or the withdrawal of the written notice of lien or have the lien vacated pursuant to the *Construction Act*. If the Contractor commences an application to the Court to have the lien vacated, the Contractor shall provide the Owner with copies of all court documents submitted by the Contractor and the Order issued by the Court. If the lien is only vacated, the Contractor shall, if requested, undertake the Owner's defence of any subsequent action commenced in the respect of the lien at the Contractor's expense.

5.8.3 If the Contractor fails or refuses to take such steps as required under paragraph 5.8.2, the Owner shall, at its option, be entitled to take all steps necessary to vacate and/or discharge the claim for lien or the withdrawal of the written notice of lien, and all costs incurred by the Owner in doing so (including, without limitation, legal fees on a full indemnity basis and any payment which may ultimately be made out of or pursuant to security posted to vacate the lien) shall be the responsibility of the Contractor, and the Owner may deduct such amounts from the amounts otherwise due or owing to the Contractor.

5.8.4 Without limiting any of the foregoing, the Contractor shall satisfy all judgments and pay all costs resulting from any liens or any actions brought by a Subcontractor or Supplier in connection with any liens, or in connection with any other claim or lawsuit brought against the Owner by any person that provided services or materials to the Project which constituted part of the Work, and the Contractor shall indemnify the Owner for any and all costs (including, without limitation, legal fees on a solicitor and client basis) the Owner may incur in connection with such claims or actions.

5.8.5 Section 20(1) of the Construction Act does not apply to this Contract and no general lien arises under or in respect of the Work, such that all liens shall arise and expire on a lot-by-lot basis."

35. GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

35.1 Amend paragraph 6.1.2 by adding the following to the end of that paragraph:

"This requirement is of the essence and it is the express intention of the parties that any claims by the Contractor for a change in the Contract Price and/or Contract Time shall not be approved unless there has been compliance with PART 6 – CHANGES IN THE WORK. No course of conduct or dealing between the parties, no express or implied acceptance of alterations or additions to the Work and no claims that the Owner has been unjustly enriched by an alteration or addition to the Work, whether in fact there is any such unjust enrichment or not, should be the basis for a claim for additional payment under this Contract or a claim for any extension of the Contract Time."

35.2 Add new paragraph 6.1.3 as follows:

"The Contractor agrees that changes resulting from construction coordination, including but not limited to site surface conditions, site coordination, and Subcontractor and Supplier coordination, are included in the Contract Price and shall not entitle the Contractor to claim an addition to the Contract Price in relation to coordination."

36. GC 6.2 CHANGE ORDER

36.1 Add new paragraph 6.2.3 as follows:

"The Contractor shall not be entitled to any additional compensation arising out of changes to the Work aside from the amounts determined and agreed to under this GC 6.2, or as provided in GC 6.3 – CHANGE DIRECTIVE. The Contractor's fee for overhead and profit related to a Change Order or Change Directive shall be as set out in the Contract Documents."

36.2 Add new paragraph 6.2.4 as follows:

"Change Orders are not valid and binding upon the Owner unless approved and executed in accordance with the Owner's internal approval processes."

37. GC 6.3 CHANGE DIRECTIVE

37.1 Amend paragraph 6.3.6 in the second line by adding the word "actual" before the word "cost".

37.2 Delete paragraph 6.3.6.3 in its entirety and substitute the following:

".3 The Contractor's fee shall be as specified in paragraphs 6.2.3 and 6.2.4 and the Contractor's fee for overhead and profit shall be as set out in the Contract Documents."

37.3 Amend paragraph 6.3.7 by adding the word "actual" before the word "cost" in line 1.

37.4 Amend GC 6.3.7.6 by adding the following to the end of the paragraph:

", provided that such amounts are not caused by negligent acts, omissions, or default of the Contractor or Subcontractor;"

37.5 Delete GC 6.3.7.17 in its entirety including all subparagraphs.

38. GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

38.1 Amend paragraph 6.4.4 by deleting the words "and GC 9.5 – MOULD" and substituting the words "GC 9.5 – MOULD and GC 9.6 – IMPACT ASSESSMENT."

38.2 Add new paragraph 6.4.5 as follows:

"The Contractor acknowledges that it has received the Impact Assessment Reports for the Project that are described in the RFP documents and that it has considered the mitigation measures described in the Impact Assessment Reports in the Contract Price. If the Impact Assessment Reports are not completed prior to the closing of the RFP submission deadline, any adjustments required to the Contract Price shall be determined in accordance with GC 9.6.2.3. The Impact Assessment Reports are provided for information only and the Owner shall not be liable for any errors or omissions in the reports. "

38.3 Add new paragraph 6.4.6 as follows:

"The Contractor confirms that, prior to submitting its response to the RFP for the Project, it had the opportunity to carefully investigate the Place of the Work and applied to that investigation the degree of care and skill described in paragraph 3.12.1, given the amount of time provided between the issue of the RFP documents and the actual submission deadline for the RFP, the degree of access provided to the Contractor prior to submission of the response, and the sufficiency and completeness of the information provided by the Owner. The Contractor is not entitled to compensation or to an extension of the Contract Time for conditions which could reasonably have been ascertained by the Contractor by such careful investigation undertaken prior to the submission of its response."

39. GC 6.5 DELAYS

39.1 Delete paragraph 6.5.1 in its entirety and replace it with the following:

"If the Contractor is delayed in the performance of the Work by an act or omission of the Owner or the Consultant or anyone employed or engaged by the Owner or Consultant directly, contrary to the provisions of the Contract Documents, then the Contract Time shall be extended for such reasonable time as the Consultant recommends and the Owner approves. The Contractor shall be reimbursed by the Owner for its reasonable direct costs directly flowing from the delay but excluding any indirect, consequential, or special damages."

39.2 Delete paragraph 6.5.2 in its entirety and substitute:

"If the Contractor is delayed in the performance of the Work by a stop work order issued by a court or other public authority on account of a breach, violation, contravention, or a failure to abide by any laws, ordinances, rules, regulations, or codes or the advice, recommendations and instructions of public health officials directly by the Owner, the Owner's other contractor(s) or the Consultant and relating to the Work or the Place of the Work and providing that such order was not issued as the result of an act or fault of the Contractor or any person employed or engaged by the Contractor directly or indirectly, then the Contract Time shall be extended for such reasonable time as the Consultant may recommend in consultation with the Contractor and the Owner approves. The Contractor shall be reimbursed by the Owner for the reasonable direct costs directly flowing from the delay but excluding any indirect, consequential, or special damages."

39.3 Delete paragraph 6.5.3 in its entirety and substitute:

"6.5.3.1 If the performance of the Work or the performance of any other obligation(s) of party to this Contract is delayed by Force Majeure, then the Contract Time shall be extended for such reasonable time as the Owner and the Contractor shall agree. The extension of time shall not be less than the time lost as a result of the event causing the delay, unless the Contractor and the Owner agree to a shorter extension. Neither party shall be entitled to payment for its costs incurred by such delays. Upon reaching agreement on the extension of the Contract Time attributable to the Force Majeure event, the Owner and the Contractor shall execute a Change Order indicating the length of the extension to the Contract Time and confirming that there are no costs payable by either party to the other for the extension of Contract Time.

6.5.3.2 Notwithstanding the foregoing, the Owner may issue a Change Directive requiring the Contractor to undertake those specific actions identified in the Change Directive as the Contractor can reasonably and safely initiate to remove or relieve either the Force Majeure or its direct or indirect effects on the Project, in which case the Contract Price will be adjusted in accordance with paragraph 6.3.7. If the Contractor fails within the time period specified in the Change Directive to take such action, then the Owner may, at its sole and absolute discretion and after it has given Notice in Writing to the Contractor, take some or all of such actions to partially or wholly remove or relieve such Force Majeure or its direct or indirect effects, and thereafter require the Contractor to resume the performance of the Work."

39.4 Delete paragraph 6.5.4 in its entirety and substitute new paragraph 6.5.4:

"No extension of the Contract Time will be approved unless the Contractor provides Notice in Writing to the Owner within 3 Working Days of the date upon which the Contractor ought reasonably to have been aware of the delay contemplated in paragraphs 6.5.1, 6.5.2 or 6.5.3. For the Notice in Writing to be valid under this paragraph 6.5.4 it must include specific details about:

.1 the cause of the delay;

.2 the likely impact the delay will have on the Contract Time and details of the extension of time being requested; and

.3 mitigation efforts, if any, undertaken by the Contractor or, where no mitigation efforts have been undertaken by the Contractor, the reasons why mitigation is either not possible or has not been undertaken by the Contractor."

39.5 Add new paragraph 6.5.6 as follows:

"If the Contractor delays the performance of the Work and such delay is for a cause within the Contractor's control, the Contractor shall pay to the Owner the per diem rate for liquidated damages specified in Article 10 of the

Agreement for each day of delay if Ready-for-Takeover is not achieved in accordance with the time specified in Article A-1.3. If the per diem rate for liquidated damages is not specified in the Contract Documents, the Contractor shall pay to the Owner the Administration Costs incurred by the Owner as a result of the delay."

39.6 Add new paragraph 6.5.7 as follows:

"If the Contractor is delayed in the performance of the Work due to the replacement of a representative or a worker pursuant to GC 3.5.4 or 3.6.2, the Contractor shall pay to the Owner the per diem rate for liquidated damages specified in Article 10 of the Agreement for each day of delay if Ready-for-Takeover is not achieved in accordance with the time specified in Article A-1.3. If the per diem rate for liquidated damages is not specified in the Contract Documents, the Contractor shall pay to the Owner the Administration Costs incurred by the Owner as a result of the delay.

40. GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

40.1 Amend paragraph 7.1.2 by adding the words "including failing or neglecting to comply with the requirements in GC 3.4 – CONSTRUCTION SCHEDULE..." immediately following the word "properly" in line one.

40.2 Amend paragraph 7.1.3.1 as follows:

Insert after the word "commences" the words "and is diligently proceeding with".

40.3 Revise paragraph 7.1.3.2 by substituting the words "an acceptable schedule" with "a schedule Acceptable to the Owner".

40.4 Amend paragraph 7.1.4.2 by adding to the end of the paragraph the words "and within 5 Working Days publish a notice of termination (form 8) in accordance with the *Construction Act*."

40.5 Amend paragraph 7.1.5.3 by substituting the words "the difference" at the end of paragraph 7.1.5.3 with the words "on the expiry of the warranty period specified in paragraph 12.3.1 for that portion of the Work performed by the Contractor, provided that such payment shall be made only in accordance with the requirements set out in GC 5.5 – FINAL PAYMENT".

40.6 Amend paragraph 7.1.5.4 by substituting the words "the difference" at the end of paragraph 7.1.5.4 with the words "for that portion of the Work performed by the Contractor, provided that such payment shall be made only in accordance with the requirements set out in GC 5.8 – CONSTRUCTION LIENS".

40.7 Add new paragraph 7.1.7 as follows:

"The Owner may, if conditions arise which make it necessary for reasons other than as provided in paragraphs 7.1.1 and 7.1.4, suspend performance of the Work or terminate the Contract by giving Notice in Writing to that effect to the Contractor identifying the reason for the suspension and the expected length of the suspension. Such suspension or termination shall be effective in the manner specified in said notice and shall be without prejudice to any claims which either party may have against the other."

40.8 Add new paragraph 7.1.8 as follows:

"The Contractor upon receiving notice of suspension or termination from the Owner shall suspend all operations as soon as reasonably possible except work which, in the Contractor's opinion is necessary for the safety of personnel and for the care and preservation of the Work, the materials and plant. In the event of such suspension, the Contractor shall be reimbursed by the Owner for the reasonable costs incurred by the Contractor for such protection. Subject to any directions in the notice of suspension or termination, the Contractor shall discontinue ordering materials, facilities and supplies and make every reasonable effort to delay delivery of existing orders and, in the event of termination, to cancel existing orders on the best terms available."

40.9 Add new paragraph 7.1.9 as follows:

"During the period of suspension, the Contractor shall not remove from the Place of the Work any part of the Work, or any Product or materials without the consent of the Owner."

40.10 Add new paragraph 7.1.10 as follows:

"If the Work should be suspended for a period of 30 days or less, the Contractor, upon the expiration of the period of suspension, shall resume the performance of the Work in accordance with the Contract Documents. If the suspension was not due to an act or an omission of the Contractor, there shall be an equitable adjustment to the Contract Time and the Contract Price as agreed upon by the Owner and the Contractor."

40.11 Add new paragraph 7.1.11 as follows:

"If, after 30 days from the date of notice of suspension of the Work the Owner and the Contractor agree to continue with and complete the Work, the Contractor shall resume operations and complete the Work in accordance with the terms and conditions agreed upon by the Owner and the Contractor."

40.12 Add new paragraph 7.1.12 as follows:

"The Owner may terminate this Contract at any time for any or no reason. Such termination shall be effective upon the date specified in the Owner's Notice in Writing advising of the termination of the Contract pursuant to this paragraph 7.1.12. In such event, the Owner shall pay for the actual and verifiable Work performed up to the effective date of termination, including demobilization costs, and for such additional costs, if any, directly flowing from and which are a reasonable consequence of the termination, but excluding any consequential, indirect or special damages, termination fees, penalties or levies, and any claims for loss of profit, lost deposits, or lost opportunity. The Owner shall not be liable to the Contractor for any other claims, costs or damages whatsoever arising from such termination of the Contract. Within 3 Working Days of termination by the Owner, the Contractor shall deliver a Notice in Writing to each of its Subcontractors and Suppliers confirming the effective date of the termination."

41. GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

41.1 Amend paragraph 7.2.1 by adding to the end of the paragraph the words "and within 5 Working Days publish a notice of termination (form 8) in accordance with the *Construction Act*."

41.2 Amend paragraph 7.2.2, by:

(i) adding the following after the words "public authority" in the second line:

"on account of a breach, violation, contravention, or a failure to abide by any laws, ordinances, rules, regulations, or codes of *Authorities Having Jurisdiction*, directly by the *Owner*, the *Owner's* other contractor(s) or the *Consultant* and relating to the *Work* or the *Place of the Work*,"; and,

(ii) adding the following to the end of the paragraph:

"unless an acceptable arrangement for an extension of the Contract Time is agreed to by the Contractor and the Owner."

41.3 Delete paragraph 7.2.3.1 in its entirety and replace it with "Intentionally left blank".

41.4 Delete paragraph 7.2.3.3 in its entirety and substitute new paragraph 7.2.3.3:

".3 the Owner fails to pay the Contractor when due the amount certified by the Consultant or awarded by arbitration or a Court, except where the Owner has a bona fide claim for set off; or"

41.5 Amend paragraph 7.2.3.4 by deleting all the words after "degree" and replacing them with " and the Contractor confirms by a detailed Notice in Writing to the Owner that sufficient cause exists. Such detailed written statement must contain particulars, including references to the Contract Documents, and supporting documentation demonstrating the alleged default by the Owner."

41.6 Amend paragraph 7.2.4 by adding to the end of the paragraph the words "and within 5 Working Days publish a notice of termination (form 8) in accordance with the *Construction Act*."

41.7 Delete 7.2.5 in its entirety and replace it with the following:

"If the Contractor terminates the Contract under the conditions described in this GC 7.2, the Contractor shall be entitled to be paid for all Work performed to the date of termination. The Contractor shall also be entitled to recover the costs associated with termination, including the costs of demobilization, losses sustained on Products and

construction machinery and equipment. The Contractor shall not be entitled to any recovery for any indirect, special or consequential losses."

42. GC 8.2 ADJUDICATION

42.1 Delete GC 8.2 – ADJUDICATION in its entirety, including all subparagraphs thereunder.

43. GC 8.3 NEGOTIATION, MEDIATION, ARBITRATION AND ADJUDICATION

43.1 Delete GC 8.3 – NEGOTIATION, MEDIATION, AND ARBITRATION, including all paragraphs thereunder and substitute the following:

"**GC 8.3 – NEGOTIATION, MEDIATION, ARBITRATION AND ADJUDICATION**

"8.3.1 Save and except where the Contractor has given an undertaking, in accordance with the *Construction Act*, to refer a dispute to Adjudication, prior to delivering a notice of Adjudication in a form prescribed by the *Construction Act*, the parties agree to first address all Disputes in a tiered approach as follows:

.1 A Dispute shall be referred to the Owner's project manager for the Project and a representative of the Contractor of the equivalent seniority or position for resolution within a period not to exceed 30 days.

.2 If unresolved, after following the process described in paragraph 8.3.1.1, the Dispute shall be referred to the Owner's Director or Vice President who is responsible for the Project and an employee of the Contractor of the equivalent seniority or position for resolution within a period not to exceed 30 days.

.3 If unresolved after following the process described in paragraph 8.3.1.2, and only at the election of the Owner, the Dispute shall be referred to the President and CEO of the Owner and the most senior executive employee of the Contractor for resolution within a period not to exceed 30 days. If the Owner does not elect, at its sole option, to proceed under this paragraph 8.3.1.3, the Dispute may proceed to under either step as described in paragraphs 8.3.2 or 8.3.3.

8.3.2 If the Dispute remains unresolved despite the Parties' attempting to resolve it following the process in paragraph 8.3.1, a party may elect to proceed with the Dispute by way of an Adjudication. If a party elects to proceed by way of an Adjudication, the other party shall not be bound to proceed by way of an Adjudication, save and except where the parties are obliged under the *Construction Act*. The following procedures shall apply to any *Adjudications* the parties engage in under the *Construction Act*:

.1 any hearings shall be held in the offices of the *Owner*, or, if such offices are unavailable, another venue as the parties may agree and which is acceptable to the adjudicator;

.2 the *Adjudication* shall be conducted in English;

.3 each party may be represented by counsel throughout an *Adjudication*;

.4 there shall not be any oral communications with respect to issues in dispute that are the subject of an *Adjudication* between a party and the adjudicator unless it is made in the presence of both parties or their legal representatives; and

.5 a copy of all written communications between the adjudicator and a party shall be given to the other party at the same time.

8.3.3 Any documents or information disclosed by the parties during an *Adjudication* are confidential and the parties shall not use such documents or information for any purpose other than the *Adjudication* in which they are disclosed and shall not disclose such documents and information to any third party, unless otherwise required by law, save and except the adjudicator.

8.3.4 In respect of any claim or dispute, if the *Contractor* fails to comply with any of the notice requirements set out in the *Contract Documents* then the Contractor shall be barred from advancing such claim(s) or dispute(s) and shall have no entitlement whatsoever in respect of such claim(s) or dispute(s) (including to an increase in payment under the *Contract*, or an extension of *Contract Time*) and by failing to comply

with the notice requirements waives the right to make any such claim(s) or dispute(s) in an *Adjudication* or in any other form of dispute resolution available under this *Contract* or at law. This GC 8.3.4 shall operate conclusively as an estoppel and bar in the event such claims or disputes are brought in an *Adjudication* or other form of dispute resolution and the *Owner* may rely on this GC 8.3.4 as a complete defence to any such claims or disputes.

8.3.5 The parties hereby acknowledge and agree:

.1 that counterclaims, claims of set-off or the exercise or use of other contractual rights that permit the *Owner* to withhold, deduct or retain from monies otherwise owed to the *Contractor* under the *Contract* may be referred to, and included as part of, *Adjudications* under the *Construction Act*;

.2 that disputes related to the termination or abandonment of the *Contract*, as well as any disputes that arise or are advanced following the termination or abandonment of the *Contract*, shall not be referred to *Adjudication* under the *Construction Act*;

.3 that notice(s) of *Adjudication*, with respect to any dispute or claim relating to the *Project*, shall not be given, and no *Adjudication* shall be commenced following *Ready-for-Takeover*, abandonment, or termination of the *Contract*;

.4 that any *Adjudication* between the *Contractor* and a *Subcontractor* or a *Supplier* that relates to an *Adjudication* between the *Owner* and the *Contractor* shall be joined together to be adjudicated by a single adjudicator, provided that the adjudicator agrees to do so, and the *Contractor* shall include a provision in each of its subcontracts that contain an equivalent obligation to this GC 8.3.5.4; and

.5 that, other than where the *Contractor* is obliged to commence an *Adjudication* pursuant to an undertaking under the *Construction Act*, neither the *Owner* nor the *Contractor* shall commence an *Adjudication* during the *Restricted Period (Adjudication).*

8.3.6 If the Dispute remains unresolved despite the Parties attempting to resolve it following the process in paragraph 8.3.1 or, following a determination of the Dispute pursuant to an Adjudication under paragraph 8.3.2, a party may elect to proceed with the Dispute under a mediation model to be agreed upon by the parties. A party shall elect to proceed to mediation no later than: (i) 10 days following the expiry of the timeline set out in paragraphs 8.3.1.2 or 8.3.1.3, whichever is the later, or (ii) 10 days following the rendering of the adjudicator's determination following an Adjudication. Where a party elects to proceed with mediation within the timelines prescribed in this paragraph 8.3.6, the other party shall be bound to proceed to mediation. No later than 10 days after a party makes an election to proceed to mediation, or such longer period as may be mutually agreed between the parties, the parties shall enter into a mediation agreement which shall set out the mediation process and designate the mediator.

8.3.7 If neither party elects to proceed to mediation within the timelines outlined in paragraph 8.3.5 or 8.3.6, or the Parties are unable to enter into a mediation agreement within the time limits, the matter shall proceed and be finally resolved by binding arbitration by a single arbitrator in accordance with the *Arbitration Act* by an arbitration agreement to be executed by the parties and the arbitrator. The Parties shall mutually agree on the selection of the arbitrator, failing which the arbitrator shall be appointed in accordance with the *Arbitration Act*. The arbitration proceedings shall take place in Toronto, Ontario, Canada. The language of the arbitration shall be English. The Parties agree that any arbitration award, including with respect to costs, shall be binding on the Parties, may be enforced in any court of competent jurisdiction and shall be final and no appeals or judicial reviews shall be permitted as of right or by application to any court of competent jurisdiction, except on errors of law. The Parties shall each bear their own costs and their proportionate share of any joint costs of arbitration, subject to any award of an arbitrator.

8.3.8 The timelines in GC 8.3 may be amended by mutual agreement of the parties."

44. GC 8.4 RETENTION OF RIGHTS

44.1 Add new paragraph 8.4.3 as follows:

"8.4.3 If the Owner gives the notice in writing described in paragraph 8.3.6 to have a dispute resolved by arbitration, the Contractor agrees that this paragraph 8.4.3 shall be construed as a formal consent to the stay of any lien proceedings until an award is rendered in the arbitration or such dispute as otherwise resolved between the parties. In no event shall the Contractor be deprived of its right to enforce its lien against the Project should the Owner fail to satisfy any arbitral award against it in full on the dispute in

respect of which the lien proceedings were commenced. Provided nothing in this paragraph 8.4.3 shall prevent the Contractor from taking the steps required by the *Construction Act* to preserve and/or perfect a lien to which it may be entitled."

45. GC 9.1 PROTECTION OF WORK AND PROPERTY

Amend paragraph 9.1.1.1 by adding the following words at the end of that paragraph:

"...which the Contractor could not reasonably have discovered applying the degree of care and skill described in paragraph 3.4.1 to its review of the Contract Documents."

45.1 Delete paragraph 9.1.2 in its entirety and substitute the following new paragraph 9.1.2:

"Before commencing any work, the Contractor shall determine the locations of all underground utilities and structures indicated in the Contract Documents or that are discoverable by applying to an inspection of the Place of Work the degree of care and skill described in paragraph 3.12.1."

45.2 Add new paragraph 9.1.5 as follows:

"The Contractor shall neither undertake to repair and/or replace any damage whatsoever to the work of other contractors, or to adjoining property, nor acknowledge the same was caused or occasioned by the Contractor, without first consulting the Owner and receiving written instructions as to the course of action to be followed from either the Owner or the Consultant. However, where there is danger to life or public safety, the Contractor shall take such emergency action as it deems necessary to remove the danger."

46. GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

46.1 Add new paragraph 9.2.10 as follows:

"The Contractor shall indemnify and hold harmless the Owner, the Consultant, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits or proceedings arising out of or resulting from exposure to, or the presence of, toxic or hazardous substances or materials which were either brought on to the Place of the Work by the Contractor, or anyone for whom the Contractor is in law responsible, and mishandled or handled negligently or improperly or which are otherwise mishandled or handled negligently or improperly by the Contractor, or anyone for whom the Contractor is in law responsible, thereby creating exposure to toxic or hazardous substances or materials. This obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity set out in GC 13.1 – INDEMNIFICATION or elsewhere in the Contract or which otherwise exist respecting a person or party described in this paragraph."

47. GC 9.4 CONSTRUCTION SAFETY

47.1 Delete paragraph 9.4.1 in its entirety and replace it with the following:

"9.4.1 The Contractor shall be solely responsible for construction safety at the Place of the Work and for compliance with the rules, regulations and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work. Without limiting the generality of the foregoing, the Contractor shall comply with the occupational health and safety laws and regulations and any orders, recommendations and restrictions made by the federal, provincial or municipal governments and the advice, recommendations and instructions of public health officials, as they apply to the Place of the Work. If the Place of the Work is located on the Owner's premises, the Contractor shall comply with all the Owner's policies and directions to ensure the health and safety of the Owner's employees and contractors as well as the Contractor's employees, Subcontractors and Suppliers. The Contractor shall submit its Health and Safety Plan to the Owner and the Consultant for Acceptance prior to commencing the Work, which Plan shall include all the elements required by the Specifications for a Health and Safety Plan. The Contractor shall indemnify and hold harmless the Owner for any fines, penalties or other costs imposed or assessed on or incurred by the Owner arising from the Contractor's failure to comply with the applicable health and safety laws, any orders, recommendations and restrictions of the federal, provincial or municipal governments or the advice, recommendations and instructions of public health officials. "

47.2 Amend GC 9.4.2 by adding the following words after "and the Contractor":

", Subcontractors and Suppliers".

47.3 Amend GC 9.4.3 by adding the following words after "and the *Contractor*":

", *Subcontractors* and *Suppliers*".

47.4 Delete paragraph 9.4.4 in its entirety and replace it with the following:

"9.4.4 Prior to the commencement of the Work, the Contractor shall submit to the Owner:

.1 a current WSIB clearance certificate;

.2 copies of the Contractor's insurance policies having application to the Project or certificates of insurance, at the option of the Owner;

.3 documentation of the Contractor's in-house safety-related programs; and

.4 a copy of the Notice of Project filed with the Ministry of Labour naming itself as "Constructor" under the *Occupational Health and Safety Act*."

47.5 Delete paragraph 9.4.5 in its entirety and replace it with the following:

"The Contractor shall indemnify and save harmless the Owner, its agents, officers, directors, employees, consultants, successors and assigns from and against the consequences of any and all safety infractions committed by the Contractor under the *Occupational Health and Safety Act* and any breaches of the *Emergency Management and Civil Protection Act* and related orders, recommendations or regulations, including the payment of legal fees and disbursements on a full indemnity basis."

47.6 Add new paragraph 9.4.6 as follows:

"9.4.6 The Contractor shall ensure that it and its employees, Subcontractors and Suppliers are aware of and, while being on the Owner's property, comply with the Owner's policies, including its Drug and Alcohol Policy, and with the Ontario Northland Operating Manual, including the Current Summary Bulletin, current Ontario Northland Time Table, C.R.O.R. 2022, Infrastructure Special Instructions, Dangerous Goods and Ontario Northland General Operating Instructions, as applicable."

47.7 Add new paragraph 9.4.7 as follows:

"9.4.7 In the event of an emergency threatening health, life or property, the Contractor shall take such action as may be necessary to save lives and protect persons from injury and to protect and preserve the property. The Contractor shall notify the Owner of such emergency as promptly as is practical under the circumstances."

48. GC 9.6 IMPACT ASSESSMENT

48.1 Add new GC 9.6 – IMPACT ASSESSMENT as follows:

"**GC 9.6 IMPACT ASSESSMENT**

9.6.1 The Contractor shall be responsible for:

.1 ensuring that any potential impacts and areas of concern identified in the Contract Documents or Impact Assessment Reports, if provided, are mitigated during the Work; and,

.2 identifying any previously unknown impacts relating to fish, navigable waters, species at risk, vegetation, wildlife, socio-economic and heritage that arise prior to commencing the Work and during the Work.

9.6.2 If the Contractor or Owner observes or reasonably suspects the presence of any impacts described in paragraph 9.6.1.2 that are not mentioned or accounted for in the Contract Documents or Impact Assessment Reports, if any, and related mitigation plans,

.1 the observing party shall immediately report the circumstances to the other party;

.3 the Contractor shall immediately take reasonable steps, including stopping the Work if necessary, to ensure that any potential impacts are mitigated; and,

.4 if the Owner and Contractor do not agree on the existence, significance or mitigation measures for the impact, the Owner shall retain and pay for an independent qualified expert to investigate and determine the issue and the parties will enter into a Change Order if the mitigation measures will cause an increase or decrease in the Contractor's cost or time to perform the Work.

9.6.3 If the Contractor fails to comply with the requirements in paragraph 9.6.2, the Contractor shall:

.1 be responsible for all costs incurred by the Owner or the Contractor to mitigate the damage caused due to the failure;

.5 not be entitled to request a Change Order relating to the failure to comply; and

.6 indemnify the Owner and hold it harmless from any claims, damages, costs, fines or other expenses, including reasonable legal fees and expenses, relating to or arising from the Contractor's failure to comply with paragraph 9.6.2."

49. GC 9.7 ENVIRONMENTAL PROTECTION FOR CONSTRUCTION IN AND AROUND WATERBODIES

49.1 Add new GC 9.7 – ENVIRONMENTAL PROTECTION FOR CONSTRUCTION IN AND AROUND WATERBODIES as follows:

"**GC 9.7 ENVIRONMENTAL PROTECTION FOR CONSTRUCTION IN AND AROUND WATERBODIES**

9.7.1 The Contractor shall comply with the environmental protection requirements and mitigation measures that apply to construction involving work in and around waterbodies and on waterbody banks as set out in OPSS.PROV 182.

9.7.2 Pursuant to section 38(4) of the *Fisheries Act,* the Contractor has an obligation to notify the Department of Fisheries & Oceans("DFO") when the Work results in the unauthorized death of fish or a harmful alteration, disruption or destruction ("HADD") of fish habitat or where there is imminent danger that the death of fish or HADD of fish habitat could occur. The notification shall be done using the form attached as Schedule D. The Contractor shall also notify the Consultant and the Owner of any such incidents. Failure to notify DFO of such incidents is a federal offence.

9.7.3 In accordance with the Fisheries Act, notification must be made without delay to DFO after the Contractor ensures the immediate health and safety risks are managed at the Place of the Work. Updates to DFO may be provided at a later time, if required.

9.7.4 All spills and sediment releases into a waterbody during the Work must be immediately reported by the Contractor to the Consultant and the Owner who must report the release to the Spills Action Centre ("SAC") operated by the Ministry of Environment, Conservation and Parks ("MECP") at 800-288-6060. If the Consultant or the Owner is not available, the Contractor shall report the incident to SAC. The Contractor shall take all reasonable measures to mitigate or remedy any adverse effects that result from the occurrence or might reasonably be expected to result from it."

50. GC 9.8 ENVIRONMENTAL SPILLS AND RELEASES

50.1 Add new GC 9.8 – ENVIRONMENTAL SPILLS AND RELEASES as follows:

"**GC 9.8 ENVIRONMENTAL SPILLS AND RELEASES**

9.8.1 All spills and releases of hazardous substances in the course of the Work must be immediately reported by the Contractor to the Consultant and the Owner who will report the spill or release to the MOECP SAC. If the Consultant or the Owner is not available, the Contractor shall report the incident to the MOECP SAC and the ONTC RTC at 800-558-4129 or Ext. 141.

9.8.2 The Contractor shall take immediate steps to mitigate the damage to the environment and contain the spill or release. If the Contractor does not take timely action or, if the Contractor is not available, the Consultant or the Owner may direct others to remedy the situation.

9.8.3 If the spill or release was the fault of the Contractor, the remedial work shall be completed at the cost of the Contractor and with no additional cost to the Owner and the Owner shall be entitled to seek reimbursements for all costs associated with the remedial work including the cost of work done by third parties.

9.8.4 If the spill or release was not the fault of the Contractor, the Owner shall pay for the remedial work.

51. GC 10.1 TAXES AND DUTIES

51.1 Amend paragraph 10.1.2 by adding the following sentence at the end of that paragraph:

"For greater certainty, the Contractor shall not be entitled to any mark up for overhead or profit on any increase in such taxes and duties and the Owner shall not be entitled to any credit relating to mark up for overhead or profit on any decrease in such taxes."

51.2 Add new paragraph 10.1.3 as follows:

"Where an exemption or a recovery of sales taxes, customs duties, excise taxes or Value Added Taxes, rebates, or monies from incentive programs is applicable to the Contract, the Contractor shall, at the request of the Owner, assist, join in, or make application for any exemption, recovery or refund of all such taxes, duties, rebates and incentives and all amounts recovered or exemptions obtained shall be for the sole benefit of the Owner. The Contractor agrees to endorse over the Owner any cheques received from the federal or provincial governments, or any other taxing or other authority, as may be required to give effect to this paragraph 10.1.3."

51.3 Add new paragraph 10.1.4 as follows:

"The Contractor shall maintain accurate records tabulating equipment, material and component costs reflecting the taxes, customs duties, excise taxes and Value Added Taxes paid."

51.4 Add new paragraph 10.1.5 as follows:

"Any refund of taxes, including without limitation, any government sales tax, customs duty, excise tax or Value Added Tax, whether or not paid, which is found to be inapplicable or for which exemption may be obtained, is the sole and exclusive property of the Owner."

51.5 Add new paragraph 10.1.6 as follows:

"The Contractor agrees to cooperate with the Owner and to obtain from all Subcontractors and Suppliers cooperation with the Owner in the application for any rebates, incentives or refund or exemption of any taxes, which cooperation shall include, but not be limited to, making or concurring in the making of an application for any such rebates, incentives, refund or exemption and providing to the Owner copies, or where required, originals of records, invoices, purchase orders and other documentation necessary to support such applications. All such rebates, incentives or refunds shall either be paid to the Owner, or shall be a credit to the Owner against the Contract Price, in the Owner's discretion."

51.6 Add new paragraph 10.1.7 as follows:

"Customs duties penalties, or any other penalty, fine or assessment levied against the Contractor shall not be treated as a tax or customs duty for purposes of this GC 10.1."

52. GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

52.1 Delete paragraph 10.2.2 in its entirety and substitute the following:

"The Owner has Crown immunity from the *Building Code Act* and the *Planning Act* and will not be obtaining building permits or development approvals. The Owner shall obtain and pay for any permanent easements required for the completion of the Work. The Contractor shall be responsible for all other permissions for access to land or buildings."

52.2 Add to the end of paragraph 10.2.4. the following:

"Whenever standards of law, ordinances, rules, regulations, codes and orders relating to the Work differ, the most stringent standards shall govern."

52.3 Amend paragraph 10.2.5 by adding the words, "Subject to paragraph 3.4.1" to the beginning of the paragraph

- and

add the following to the end of the second sentence:

"...and no further Work on the affected components of the Contract shall proceed until these changes to the Contract Documents have been obtained by the Contractor from the Consultant."

52.4 Amend paragraph 10.2.6 by adding the following sentence at the end of that paragraph:

"In the event the Owner suffers loss or damage as a result of the Contractor's failure to comply with paragraph 10.2.5, and notwithstanding any limitations described in paragraph 13.1.1, the Contractor agrees to indemnify and to hold harmless the Owner and the Consultant from and against any claims, demands, losses, costs, damages, actions, suits or proceedings resulting from such failure by the Contractor."

52.5 Amend paragraph 10.2.7 by adding the words "which changes were not or could not have reasonably been known to the Owner or the Contractor, as applicable, at the time of deadline for submission of responses to the RFP and which changes did not arise as a result of a public emergency or other Force Majeure event" to the second line, after the words "authorities having jurisdiction".

52.6 Add new paragraph 10.2.8 as follows:

"The Contractor shall furnish necessary certificates as evidence that the Work installed conforms with laws and regulations of authorities having jurisdiction, including certificates of compliance for Owner's occupancy or partial occupancy. These certificates are to be final certificates giving complete clearance of the Work."

53. GC 10.3 PATENT FEES

41.1 Delete paragraph 10.3.2 in its entirety.

54. GC 10.4 WORKERS' COMPENSATION

54.1 Add new paragraph 10.4.2 as follows:

"10.4.2 The Contractor shall be solely responsible for its employees and officers and for its Subcontractors and their officers and employees, including ensuring that all required employer filings, contributions, deductions, and payments are made or remitted, as the case may be, with respect to applicable employer health taxes and under the *Employment Insurance Act*, the Canada Pension Plan, the Ontario *Workplace Safety and Insurance Act, 1997*, and all equivalent legislation in any other applicable jurisdiction. Without limiting the generality of the foregoing, the Contractor shall indemnify, defend and hold harmless the Owner, its directors, officers, and employees from all claims, demands, actions, suits or proceedings arising from any health, medical, disability or similar claims which Contractor's employees or officers or any of its Subcontractors or their officers or employees may make against the Owner, its directors, officers, or employees during or after the Contract Time, whether or not such claims are attributable to the Contractor's or Subcontractor's performance of the Work or related to the Contractor's obligations under this Contract."

55. GC 11.1 INSURANCE

55.1 Amend the title of GC 11 to add the words "CONTRACT SECURITY" at end of title.

55.2 Delete items .1 to .8 in paragraph 11.1.1 and replace with the following:

"1. General Liability insurance shall be with limits of not less than $10,000,000 per occurrence, an aggregate limit of not less than $10,000,000 within any policy year with respect to completed operations, and a deductible not

exceeding $50,000. To achieve the desired limit, umbrella or excess liability insurance may be used. Subject to satisfactory proof of financial capability by the Contractor, the Owner may agree to increase the deductible amounts. The insurance coverage shall not be less than the insurance provided by IBC Form 2100 (including an extension for a standard provincial and territorial form of non-owned automobile liability policy) and IBC Form 2320 including but not limited to:

.1 Bodily injury, death, and property damage including loss of use thereof.

.2 Premises and operations liability.

.3 Products and completed operations liability.

.4 Blanket contractual liability.

.5 Cross liability and severability of interest clauses.

.6 Contingent employer's liability.

.7 Personal injury liability.

.8 Owner's and Contractor's protective coverage.

.9 Broad form property damage.

.10 Elevator and hoist liability.

.11 Liability for attached machinery, including loading and unloading.

.12 Extension of coverage shoring; blasting; excavation; underpinning; demolition; on work; below ground surface work, including tunneling and grading, if applicable to the Project.

The General Liability Insurance shall not include any exclusion relating to working in the vicinity of railway operations.

2. Automobile liability insurance in respect of vehicles that are required by law to be insured under a contract by a Motor Vehicle Liability Policy, shall have limits of not less than $5,000,000 inclusive per occurrence for bodily injury, death, and damage to property, covering all vehicles owned or leased by the *Contractor*.
3. Manned Aircraft and watercraft liability insurance with respect to owned or non-owned aircraft and watercraft (if used directly or indirectly in the performance of the *Work*),including use of additional premises, shall have limits of not less than $10,000,000 inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof and limits of not less than $10,000,000 for aircraft passenger hazard. Such insurance shall be in a form acceptable to the *Owner*.
4. Unmanned aerial vehicle liability insurance with respect to owned or non-owned aircraft (if used directly or indirectly in the performance of the Work), shall have limits of not less than $5,000,000 per occurrence or accident for bodily injury, death and damage to property or such amounts as required by any applicable law or regulation.
5. Contractors' equipment insurance coverage written on an "all risks" basis covering *Construction Equipment* used by the *Contractor* for the performance of the *Work*, shall be in a form Acceptable to the *Owner* and shall not allow subrogation claims by the insurer against the *Owner*. Subject to satisfactory proof of financial capability by the *Contractor* for self-insurance, the *Owner* may agree to waive the equipment insurance requirement.
6. Professional liability Insurance. This policy shall cover risks of errors, omissions or negligent acts in the performance of professional services for the *Project*. The Named Insureds are to be approved and accepted for coverage by the Insurer. This policy shall provide for a limit of liability of not less than $1,000,000 per claim and $2,000,000 in the aggregate (inclusive of defence costs and expenses).
7. Technology Liability Insurance for financial loss arising out of an error, omission, or negligent act in the rendering of services in an amount not less than **$5,000,000** per claim and **$5,000,000** aggregate. Such policy shall be on a claims made basis and shall provide coverage for damages and defense costs. The Technology Professional Liability policy will also include an insuring agreement for cyber or network security and privacy liability insurance, covering financial loss arising out of actual or potential unauthorized access, unauthorized use, and a failure to protect confidential information which results in loss or misappropriation of such information

in both electronic and non-electronic format. Such insurance will have a limit of an amount not less than $5,000,000 per claim and $5,000,000 aggregate. The *Contractor* shall maintain said liability coverage in place for a three-year period after termination of the *Contract* by way of annual policy renewal, or purchase of extended reporting period.

8. "All Risks" Builders Risk and Boiler & Machinery Insurance shall have limits of not less than the sum of 1.1 times *Contract Price,* plus any property, including design services, the *Owner* provides for incorporation into the *Work*. This policy shall cover all risks of direct physical loss or damage to the *Project*, including but not limited to the perils of earthquake and flood, subject to policy sub limits, warranties and exclusions and shall not be less than the insurance provided by IBC Forms 4042 and 4047 or their equivalent replacement. This insurance shall cover all property forming part of the *Project*, and goods and materials to be incorporated in the *Project* while at the *Place of the Work*, in transit, or while in off-site storage. It shall not provide coverage for the *Contractor's* or *Subcontractors'* equipment other than scaffolding, formwork, fences, shoring, hoarding, falsework, tarpaulins and temporary buildings in connection with the *Work*. The insurance shall not have a deductible greater than $50,000.
9. Pollution Liability Insurance for an amount not less than $5,000,000 per occurrence and in the aggregate and a deductible of not more than $50,000. This policy shall be written on either an Occurrence or Claims Made Form and will provide coverage on a sudden and accidental, and gradual pollution events basis for on-site cleanup and remediation as well as on-site and off-site third party claims for bodily injury and property damage, cleanup and remediation."

55.3 Amend GC 11.1.1.6 (1) by deleting the words "as the Consultant may recommend in consultation with the Contractor" and replacing them with "as the Owner determines, acting reasonably."

56. GC 11.2 CONTRACT SECURITY

56.1 Add new GC 11.2 – CONTRACT SECURITY as follows:

"**GC 11.2 CONTRACT SECURITY**

11.2.1 The Contractor shall provide a performance bond and a labour and materials payment bond, each issued by a bonding company acceptable to Owner and licensed to issue such instruments in the Place of the Work, in the amounts and forms as follows:

.1 Amount of performance bond shall be equal to not less than 50% of the Contract Price in the form prescribed by the *Construction Act.*

.2 Amount of labour and material payment bond shall be equal to not less than 50% of the Contract Price in the form prescribed by the *Construction Act*.

11.2.2 The bonds provided in accordance with paragraph 11.2.1 shall guarantee the faithful performance of the Contract in accordance with the Contract Documents, including the requirements for warranties provided for the GC 12.3 – WARRANTY, and the payment of all obligations incurred in the event of the Contractor's default, including but not limited to the following:

.1 the payment of legal, accounting, architectural, engineering and other Consultant's expenses incurred by the Owner in determining the extent of Work executed and any additional Work required as a result of the interruption of the Work, and its completion; and

.2 the payment of additional expenses to the Owner in the form of security guard services, light, heat, power, loss of use of premises, and other related costs, payable over the period between the default of the Contract and completion of the Work.

11.2.3 Without limiting the foregoing in any way, the bonds shall indemnify and hold harmless the Owner for and against costs and expenses (including legal and consultant services and court costs) arising out of or as a consequence of any default of the Contractor under this Contract.

11.2.4 The Contractor shall be responsible for notifying the surety company of any changes made to the Contract Documents or the Contract Price during the course of the Work.

11.2.5 The premiums for bonds required by the Contract Documents shall be included in the Contract Price.

11.2.6 Should the Owner require additional bonds by the Contractor or any of his Subcontractors, after the receipt of bids for the Work, the Contract Price shall be increased by the actual costs attributable to providing such bonds. The Contractor shall promptly provide the Owner, through the Consultant, with any such bonds that may be required."

57. GC 12.1 READY-FOR-TAKEOVER

57.1 Delete GC 12.1.1 in its entirety and replace it with the following:

"12.1.1 *Ready-for-Takeover* shall be achieved when all of the following has occurred, as verified and approved by the *Owner*:

.1 *Substantial Performance of the Work* has been achieved, as certified by the *Consultant*;

.2 the appropriate permits (if any) for the *Place of the Work* have been obtained from the authorities having jurisdiction;

.3 the *Work* to be performed under the *Contract* has satisfied the requirements for deemed completion in accordance with Section 2(3) of the *Construction Act*,

.4 final cleaning and waste removal, as required by the *Contract Documents*;

.5 the *Contractor* has delivered to the *Consultant* and the *Owner* all inspection certificates from authorities having jurisdiction with respect to any component of the *Work* which has been completed;

.6 subject only to GC 12.1.2, the entire *Work* has been completed to the requirements of the *Contract Documents*, including completion of all items on the punch list prepared at the time of *Substantial Performance of the Work* and the *Work* is being used for its intended purpose, and is so certified by the *Consultant*;

.7 subject only to GC 12.1.2, the *Contractor* has submitted to the *Owner* and the *Consultant* in a collated and organized matter, all *Close-Out Documentation* and any other materials or documentation required by the *Contract Documents*;

.8 subject only to GC 12.1.2, all *Products*, systems and components of the *Project* have been commissioned and certified for operation and accepted by the *Owner* and *Consultant*, and

.9 subject only to GC 12.1.2, the *Contractor* has submitted to the *Owner* and the *Consultant* full and complete *As-built Drawings* and *Specifications* revised by the *Contractor* to reflect the as-built state of the *Work*, clearly showing changes to the *Drawings* and *Specifications* from the original *Contract Documents*, all of which have been approved by the *Owner* acting reasonably."

57.2 Delete GC 12.1.2 in its entirety and replace it with the following:

"12.1.2 The *Owner* may, in its sole, absolute, and unfettered discretion, waive compliance with a requirement, or a part thereof, for achieving *Ready-for-Takeover* set out in GC 12.1.1.6 to 12.1.1.9 (inclusive). Where the *Owner* exercises the discretion afforded under this GC 12.1.2, the *Contractor* shall be required to comply with GC 5.5.1.3 as part of its application for final payment and the *Owner* and the *Contractor*, in consultation with the *Consultant*, shall establish a reasonable date for completing the *Work*."

57.3 Delete GC 12.1.3 in its entirety and replace it with the following:

"12.1.3 When the *Contractor* considers the *Work* has attained *Ready-for-Takeover*, it shall submit a written application to the *Owner* and the *Consultant* for review."

57.4 In GC 12.1.4, delete the words "list and" from the second line.

57.5 Delete GC 12.1.5 in its entirety and replace it with the following:

"12.1.5 Following the confirmation of the date of *Ready-for-Takeover* by the *Consultant* and as confirmed by the *Owner*, the *Contractor* may submit a final application for payment in accordance with GC 5.5 – FINAL PAYMENT."

57.6 Delete GC 12.1.6 in its entirety.

58. GC 12.2 EARLY OCCUPANCY BY THE OWNER

58.1 Delete GC 12.2 – EARLY OCCUPANCY BY THE OWNER in its entirety.

59. GC 12.3 WARRANTY

59.1 Amend paragraph 12.3.2 by adding the words, “Subject to paragraph 1.1.3....” at the beginning of that paragraph.

59.2 Delete paragraphs 12.3.4 and 12.3.5 substitute the following paragraphs:

“12.3.4 The Contractor shall correct, at no additional cost to the Owner, defects or deficiencies in the Work that appear, prior to and during the Warranty Period. Any Work repaired or replaced during the Warranty Period shall be re-warranted for an additional 12 months from the date of completion of the repair or replacement. Notwithstanding the expiration of the Warranty Period, the Contractor shall not be relieved of its obligations to correct any defects or deficiencies in the Work of which Notice in Writing has been given to the Contractor prior to the expiration of the Warranty Period.

12.3.5 The Owner shall provide Notice in Writing to the Contractor of defects and deficiencies in the Work discovered during the Warranty Period. The Contractor shall submit a remediation plan for the permanent rectification of the defects and deficiencies within 2 Working Days after delivery of the Notice in Writing, including the schedule for the remediation work to be completed. Upon Acceptance by the Owner of the remediation plan, the Contractor shall remediate the defects and deficiencies in accordance with the schedule set out in the Accepted plan. Acceptance by the Owner of a remediation plan does not prohibit the Owner from pursuing other remedies it may have against the Contractor arising from the defects and deficiencies in the Work.

59.3 Amend paragraph 12.3.6 by adding at the end of the paragraph the following:

“The Extended Warranty Period for each Extended Warranty described in the Specifications shall commence on the expiry of the Warranty Period described in paragraph 12.3.1. The Extended Warranties shall be submitted to ONTC as part of the Close-Out Documentation.”

59.4 Add the following new paragraphs 12.3.7 to 12.3.12:

“12.3.7 The decision of the Owner shall be final as to the existence of such defects and deficiencies in the Work, the necessity of remedying same, and the remedial measures required.

12.3.8 If the Contractor fails to do the work to correct the defects or deficiencies, the Owner shall be entitled to carry out such work by its own forces or by other contractors. If such work is work which the Contractor should have carried out at the Contractor’s own expense, the Owner shall be entitled to recover from the Contractor the cost thereof or may deduct the same from any monies due or that become due to the Contractor, including the warranty holdback, if any.

12.3.9 Any insurance, contract security, surety or deposit required by the Contract Documents shall remain in full effect at the expense of the Contractor during the Warranty Period.

12.3.10 The Contractor shall be responsible for the costs for inspection and testing for the correction of defects or deficiencies. The Owner shall have the right to deduct the cost of the inspection and testing from any monies owed to the Contractor.

12.3.11 The Owner may hold back, if set out in the Contract Documents, on each application for payment, advance payment or progress draw, 2.5% of the total amount payable under each such application for payment, advance payment or progress draw as security for the Contractor’s performance of its warranty obligations. In the event the Contractor fails to correct a defect or deficiency during the warranty period within the required time and/or fails to pay for the redesign, reconstruction and other costs related to damages arising from a defect or deficiency, the Owner shall have the right to use the warranty holdback, or such part of it still being held by the Owner to pay for the costs of remedying the defect or deficiency and any redesign, reconstruction or other costs relating to the defect or deficiency. If the costs are greater than the amount of the warranty holdback, the Contractor shall pay the additional costs upon receipt of an invoice from the Owner. The Contractor shall have the right to invoice the Owner for the balance of

the warranty holdback at the end of the Warranty Period or Extended Warranty Period as described in paragraph 12.3.4.

12.3.5 The Contractor shall assign to the Owner all warranties, guarantees or other obligations for Work, services or Products performed or supplied by any Subcontractor, Supplier or other person in connection with the Work and such assignment shall be with the consent of the assigning party where required by law or by the terms of that party's contract. Such assignment shall be in addition to, and shall in no way limit, the warranty rights of the Owner under the Contract Documents. Until the expiry of the relevant Warranty Periods enforceable against the Contractor, the Owner shall have in its custody all warranties, guarantees and other obligations to third parties respecting the Work.

12.3.6 The Contractor's obligations under this GC 12.3 shall continue notwithstanding any withholding of payment made by the Owner under GC 5.8 **–** WITHOLDING OF PAYMENT or by performance by the Owner directly or through other forces of the Contractor's obligations under this Contract, where the Contractor is in default in the performance of such obligations."

60. GC 13.1 INDEMNIFICATION

60.1 Delete GC 13.1 – INDEMNIFICATION in its entirety and substitute the following:

"13.1.1 The Contractor shall indemnify and hold harmless the Owner and its directors, officers, employees, contractors and agents (collectively the "Owner's Indemnitees") from and against all loss, liability, damage, fines, cost, legal cost and disbursement whatsoever arising out of or related to the Work or the Contract Documents ("Loss"), by whomever made, sustained, incurred, brought or prosecuted, arising out of, or in connection with, anything done or omitted to be done by the Contractor in the course of the performance of the Contractor's obligations under the Contract Documents or otherwise in connection with the Work. The Contractor shall, at the Owner's election, either assume the defence of every proceeding brought in respect of such Loss, or cooperate with the Owner in the defence, including providing Owner with prompt Notice of any possible Loss and providing the Owner with all information and material relevant to the possible Loss.

13.1.2 GC 13.1 – INDEMNIFICATION shall govern over the provisions of paragraph 1.3.1 of GC 1.3 – RIGHTS AND REMEDIES.

13.1.3 The Contractor shall make full and complete compensation for any bodily injury or death to any person and for any damage caused to the Owner's or a third party's physical property by the Contractor's act or omission.

13.14 The Contractor shall be liable for any claims arising from any personal injuries to or death of any of the Contractor's employees, subcontractors or suppliers or from any loss of or damage to any property belonging to the Contractor or its employees, subcontractors or suppliers during the performance of the Work unless caused by the negligent act or omission of Owner.

13.15 Notwithstanding any other provision of the Contract Documents:

(a) The Owner shall not be responsible for indirect, consequential, special, incidental or contingent damages of any nature whatsoever, including loss or revenue or profit or damages resulting from interruption of service or transmission. This limitation shall apply regardless of the form of action, damage, claim, liability, cost, expense or loss, whether in contract (including fundamental breach), statute, tort (including negligence), or otherwise, and regardless of whether the Owner has been advised of the possibility of such damages; and,

(b) Any express or implied reference to the Owner providing an indemnity or any other form of indebtedness or contingent liability that would directly or indirectly increase the indebtedness or contingent liabilities of the Owner or the Province of Ontario, whether at the time of execution of this Agreement or at any time during the performance of the Work and the Warranty Period, shall be void and of no legal effect in accordance with s.28 of the Financial Administration Act, R.S.O. 1990, c. F.12.

13.16 The Contractor shall indemnify the Owner and the Owner Indemnitees and save them harmless from and against all Loss incurred by the Owner arising from:

(a) any decision or interpretation by any court or governmental authority that: (i) any of the Contractor's employees are an employee of the Owner; or (ii) the Owner is liable to pay statutory contributions or deductions in respect of any of the Contractor's employees under any laws, including employment insurance, provincial health insurance, income tax or other employment matters;

(b) any health, medical disability or similar claims which the Contractor or Contractor's employees may have during or after the term of this Agreement;

(c) a claim by any third party against the Owner alleging that the Submittals and their use by the Owner, infringes any Intellectual Property rights;

(d) safety infractions committed by the Contractor under the Occupational Health and Safety Act or any other laws, guidelines or public health orders regulating health and safety at the Work Site;

(e) any claims against the Owner for the failure of the Contractor to protect the confidentiality of Confidential Information;

(f) exposure to, or the presence of, toxic or hazardous substances or materials which were either brought on to the Work Site by the Contractor or the Contractor mishandled or handled negligently or improperly the substances or materials;

(g) a claim from adjacent landowners or other third parties regarding damage to their property due to the Work; and

(h) the release into the environment of materials resulting from the Work that contain Environmental Contaminants during the transportation of such materials from the Work Site to the approved waste disposal site.

61. GC 13.2 WAIVER OF CLAIMS

61.1 Delete GC 13.2 – WAIVER OF CLAIMS in its entirety and substitute the following:

"13.2.1 Waiver of Claims by Owner

As of the date of the final certificate for payment, 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:

.1 those made in writing prior to the date of the final certificate for payment and still unsettled;

.2 those arising from the provisions of GC 13.1 – INDEMNIFICATION or GC 12.3 – WARRANTY;

.3 those arising from the provisions of paragraph 9.6.1 of GC 9.6 – IMPACT ASSESSMENTS and arising from the Contractor failing to comply with the mitigation plans in the Impact Assessment Reports or failing to assess impacts and implement mitigation plans for impacts that arise during the Work;

.4 those arising from the provisions of paragraph 9.2.5 of GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES and arising from the Contractor bringing or introducing any toxic or hazardous substances and materials to the Place of the Work after the Contractor commences the Work;

.5 those arising from the provisions of paragraph 9.5.1 of GC 9.5 – MOULD and arising from the Contractor bringing or introducing mould to the Place of the Work; or

.6 those made in writing within a period of 6 years from the date of Substantial Performance of the Work, as set out in the certificate of Substantial Performance of the Work, arising from the Contractor's performance of the Contract with respect to material defects or deficiencies in the Work.

13.2.2 Waiver of Claims by Contractor

As of the date of the final certificate for payment, 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:

.1 those made in writing prior to the Contractor's application for final payment and still unsettled; and

.2 those arising from the provisions of GC 9.2 – TOXIC AND HAZARDOUS SUBSTANCES, GC 9.5 – MOULD, or GC 10.3 – PATENT FEES.

13.2.3 GC 13.2 – WAIVER OF CLAIMS shall govern over the provisions of paragraph 1.3.1 of GC 1.3 – RIGHTS AND REMEDIES."

62. **PART 14 OTHER PROVISIONS**

62.1 Add new PART 14 as follows:

"**PART 14 OTHER PROVISIONS**

GC 14.1 OWNERSHIP OF MATERIALS

14.1.1 Unless otherwise specified, all materials existing at the Place of the Work at the time of execution of the Contract shall remain the property of the Owner. All work and Products delivered to the Place of the Work by the Contractor shall be the property of the Owner. The Contractor shall remove all surplus or rejected materials as its property when notified in writing to do so by the Consultant.

GC 14.2 CONTRACTOR DISCHARGE OF LIABILITIES

14.2.1 In addition to the obligations assumed by the Contractor pursuant to GC 3.6 – SUBCONTRACTORS AND SUPPLIERS, the Contractor agrees to discharge all liabilities incurred by it for labour, materials, services, Subcontractors and Products, used or reasonably required for use in the performance of the Work, except for amounts withheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

GC 14.3 DAILY REPORTS/DAILY LOGS

14.3.1 The Contractor shall cause its supervisor, or such competent person as it may delegate, to prepare a daily log or diary reporting on weather conditions, work force of the Contractor, Subcontractors, Suppliers and any other forces on site and also record the general nature of Project activities. Such log or diary shall also include any extraordinary or emergency events which may occur and also the identities of any persons who visit the Place of the Work who are not part of the day-to-day work force.

14.3.2 The Contractor shall also maintain records, either at its head office or at the Place of the Work, recording manpower and material resourcing on the Project, including records which document the activities of the Contractor in connection with GC 3.4 – CONSTRUCTION SCHEDULE, and comparing that resourcing to the resourcing anticipated when the most recent version of the schedule was prepared pursuant to GC 3.4 – CONSTRUCTION SCHEDULE.

GC 14.4 CONFIDENTIAL INFORMATION

14.4.1 The Contractor must not advertise or issue any information, publication, document or article (including photographs or film) for publication or media releases or other publicity relating to the Work or the Owner's Confidential Information without the prior written approval of the Owner.

14.4.2 The Contractor must not, and must ensure that the Contractor's personnel do not, without the prior written approval of ONTC:

.1 use Confidential Information other than as necessary for the purposes of fulfilling the Contractor's obligations under this Contract; or

.2 disclose the Confidential Information, other than to the Contractor's personnel who need the information to enable the Contractor to perform its obligations under this Contract, to the Contractor's legal advisors, accountants or auditors, or where disclosure is required by law (including disclosure to any stock exchange).

14.4.3 The Contractor must, within 10 Working Days (or any other period agreed in writing by ONTC) after a direction by the Owner to do so, return or destroy all Confidential Information in the Contractor's possession, custody or control.

14.4.4 If the Owner or the Contractor is required by law to disclose Confidential Information, it shall promptly notify the other party so that that party may intervene to prevent the disclosure.

14.4.5 The Contractor specifically acknowledges that Owner is subject to the Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c. F. 4, and that the Owner may be compelled by law to disclose certain Confidential Information.

14.4.6 The rights and obligations under this Part continue after the termination of this Contract.

GC 14.5 GENERAL

14.5.1 Nothing contained in this Agreement shall be deemed or construed by the parties nor by any third party as creating the relationship of principal and agent, landlord and tenant, or of partnership or of joint venture between the parties.

14.5.2 In addition to those provisions which are expressly stated to survive the termination or expiration of this Agreement, the provisions of this Agreement that are by their nature intended to survive termination or expiration of this Agreement shall continue in full force and effect subsequent to and notwithstanding termination or expiration until or unless they are satisfied.

14.5.3 This Agreement may be executed with electronic signatures or may be executed and delivered by electronic transmission and the Parties may rely upon all such signatures as though they were original signatures. This Agreement may be executed in counterpart and all such counterparts shall, for all purposes, constitute one agreement binding on the parties."

Schedule A to the Supplementary Conditions
Requirements for a "*Proper Invoice*"

To satisfy the requirements for a Proper Invoice, the Contractor's application for payment must satisfy the following criteria:

.1 is in the form of a written bill, invoice, application for payment, or request for payment;

.2 is in writing;

.3 contains the Contractor's name, telephone number and mailing address and contact information of the Contractor's project manager;

.4 contains the title of the Project and the Owner's contract number or purchase order number under which the work was performed and the related request for qualification, tender, or request for proposal number, as applicable;

.5 contains the date the written bill, invoice, application for payment, or request for payment is being issued by the Contractor;

.6 identifies the period of time in which the Work, labour, services, Products and/or materials were supplied to the Owner;

.7 reference to the provisions of the Contract under which payment is being sought (e.g. progress payment / milestone, holdback, final payment, etc.);

.8 a description, including quantities where appropriate, of the labour, services, Products, or materials, or a portion thereof, that were supplied and form the basis of the Contractor's request for payment;

.9 the amount the Contractor is requesting to be paid by the Owner, set out in a statement, based on the schedule of values approved under paragraph 5.2.5, separating out any statutory or other holdbacks, set-offs and HST;

.10 with each application for payment after the first, a written statement that all accounts for labour, services, subcontracts, materials, equipment, Products, and other indebtedness which may have been incurred by the Contractor and for which the Owner might in any way be held responsible have been paid in full up to the previous application for payment, except for amounts properly retained as a holdback or as an identified amount in dispute;

.11 with the applications for payment of holdback and for final payment, a Statutory Declaration in the form provided by the Owner attached as Schedule B stating that all accounts for labour, services, subcontracts, materials, equipment, Products, and other indebtedness which may have been incurred by the Contractor and for which the Owner might in any way be held responsible have been paid in full up to the previous application for payment, except for amounts properly retained as a holdback or as an identified amount in dispute;

.12 a current Workplace Safety Insurance Board clearance certificate;

.13 the progress report required under GC 3.4 CONSTRUCTION SCHEDULE, in the form provided by the Owner attached as Schedule C;

.14 an updated Construction Schedule in native and .pdf formats;

.15 if requested by the Owner, a current and valid certificate(s) of insurance for the insurance required under GC 11.1 – INSURANCE;

.16 the following statement: "Provided this Proper Invoice complies with the requirements of the Contract and provided no Notice of Non-Payment is issued by the Owner, payment is due within 28 days from the date this Proper Invoice is received by the Owner.";

.17 the name, title, telephone number and mailing address of the person at the place of business of the Contractor to whom payment is to be directed;

.18 in the case of the Contractor's application for final payment;

(a) sufficient evidence that the Contractor has delivered all warranties to the Owner;

(b) sufficient evidence that the Place of the Work has been left in a clean and tidy condition, including evidence that any remaining materials, tools, equipment, temporary work, and waste products and debris have been removed from the Place of the Work;
(c) landfill waybills for the disposal of the waste products, debris and excess soil removed from the Place of Work in accordance with the waste disposal plan; and

(d) an executed, original, full and final release of all claims that may arise as a result of the Work, which full and final release executed by the Contractor shall be in a form approved by the Owner;

.19 information identifying the authority, whether in the Contract Documents or otherwise, under which the services or materials were supplied;

.20 any other information that is prescribed in Article A-3, if any, or identified by the Owner as required;

.21 the amount invoiced to date;

.22 the percentage of the Contract Price invoiced; and

.23 the individual value of Change Orders approved during the invoice period and the cumulative value of Change Orders for the Project.

Schedule "B" to the Supplementary Conditions

Ontario Northland

Statutory Declaration of Progress Payment Distribution by Contractor

To be made by the Contractor **prior to payment** as a condition for release of holdback.	The last application for progress payment for which the Declarant has received payment is No. _____ dated _____.

Identification of Contract :

Name of Contract (Location and description of the Work as it appears in the Contract Documents)

Date of Contract : Day : _____ Month : _____ Year : _____

Name of Owner : Ontario Northland Transportation Commission

Name of Contractor:

Name of Declarant : **Position or Title :** (of office held with Contractor)

Declaration

I solemnly declare that, as of the date of this declaration, I am an authorized signing officer, partner or sole proprietor of the Contractor named in the Contract identified above, and as such have the authority to bind the Contractor, and have personal knowledge of the fact that all accounts for labour, subcontracts, products, services, and construction machinery and equipment which have been incurred directly by the Contractor in the performance of the work as required by the Contract, and for which the Owner might in any way be held responsible, have been paid in full as required by the Contract up to and including the latest progress payment received, as identified above, except for:

Holdback monies properly retained,

Payments deferred by agreement, or

Amounts withheld by reason of legitimate dispute which have been identified to the party or parties, from who payment has been withheld.

I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Declared before me in _____

City/Town Province

on _____.

Date

_____ _____

Signature of Declarant A Commissioner for Oaths or Notary Public

Schedule "C" to the Supplementary Conditions

Project Status Report	
Project Title:	
Reporting Period:	Date:
Project Details:	
Planned Budget: Indicate the original contract value	Current Approved Budget: Indicate the original contract value plus approved change orders
Planned Completion: Indicate the contract schedule completion date	Current Project Completion: Fill in revised date if schedule extension approved through change order
Planned Project Percent Complete: How far should they have progressed by this date?	Actual Project Percent Complete: What is their actual percent complete?
Executive Summary	
Provide a summary of what happened during the period, any concerns, risks or wins and plans for the upcoming period.	
Work Completed in the Period	
List List List	

List

List

Work Planned for Next Period

List

List

List

List

Issues and Concerns

Use this area to identify any concerns related to the project.

Status of Progress

Include a graph to show progress or eliminate this section.

SCHEDULE D:

DUTY TO NOTIFY/EMERGENCY WORKS NOTIFICATION FORM

ONTC DUTY TO NOTIFY / EMERGENCY WORKS NOTIFICATION FORM	
SUBMISSION REQUIREMENTS Contact DFO By Phone 1-855-852-8320 **AND** submit this form to fisheriesprotection@dfo-mpo.gc.ca	
Submit this form to the consultant and the ONTC Project Manager: Esmail Zougari, esmail.zougari@ontarionorthland.ca and to ONTC Legal : legal@ontarionorthland.ca MNRF Office: Contact Area MNRF Office	
PART 1: NOTIFICATION DETAILS	
Type of Notification: □ DUTY TO NOTIFY □ EMERGENCY WORK	
Date of Notification:	Time of Notification:
ONTC Contract #:	DFO PATH File # (if applicable):
PART 2: REPORTING INFORMATION	
Name of Person Reporting:	Name of Field Contact:
Telephone #:	Telephone #:
Email:	Email:
PART 3: INCIDENT INFORMATION	
Bank failure □ Culvert failure Erosion and Sediment Control Measures Failure □ Beaver dam breach Other (specify): □ Hwy shoulder failure	
Date of Incident:	Time of Incident:
Location of Site:	Geographic Coordinates (Lat/Long):
Nearest Community (city/town):	Name of Waterbody(ies): Type (watercourse, lake/pond, ditch):
Indicate if any of the following impacts have occurred or are about to occur: Fish Kill (if yes, approximately how many):_____ □ Sediment deposition in channel Bank failure □ Obstruction of fish passage through: Modification of flows □ Channel □ Culvert	

Other (specify):

Immediate Actions Taken: (Describe the activities/works that are being / have been immediately implemented. e.g. mitigation measures, damming / pumping etc.)
Photos: □ Attached (Where feasible, it is recommended that the photos be submitted with the form or as follow up)

PART 4: EMERGENCY WORKS

Description of Proposed Emergency Works: (Be as specific as possible. Describe what work will be undertaken within the next two weeks. E.g. culvert replacement (include existing and new culvert diameter / length / type), slope restoration (include material / method),:
Mitigation measures: (Describe what measures have been or will be implemented to address the immediate issue. E.g. sediment fence, turbidity curtain, check dam, fish salvage etc.):
Indicate which of the works will be followed (if applicable): Beaver Dam Removal □ Culvert Maintenance Bridge Maintenance □ Like-for-like culvert replacement Ditch maintenance within 30 m of a □ Temporary watercourse crossing waterbody Riparian vegetation maintenance in existing right-of-way
The Emergency Works are (check one): Temporary (additional work will be required) □ Final (no additional work required)

Proposed Start Date: (YYYY/MM/DD)	Proposed End Date: (YYYY/MM/DD)

PART 5: OTHER AGENCIES NOTIFIED

Other Agency(ies) Notified: Yes □ No □	Agency(ies) Notified:

Date Notified:	Incident Report No. (if issued by notified Authority):

END OF SUPPLEMENTARY CONDITIONS