ONTARIO NORTHLAND

TRANSPORTATION COMMISSION

Request for Proposals No. RFP 2024 001

For

Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades

REPLY BY DATE: 2 p.m. Tuesday, February 20, 2024

Primary Contact:

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Procurement Contracts Specialist
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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 negotiated by the parties for the supply of the Goods and/or Services;

"Material" means a document or information that must be included in the Proposal 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 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 centers 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 – Scope of Work
(b) Schedule 3-A-1 – Technical Specifications
(c) Schedule 3-A-2 – Reference Drawings
(d) Schedule 3-A-3 – Reference Photographs
(e) Schedule 3-A-4 – Bill of Materials

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

Part 5 – CCDC 2 – 2020 – Ontario Northland – Supplementary Conditions **[The Supplementary Conditions and Special Supplementary Conditions will be issued by way of Addendum in accordance with these RFP Documents.]**

(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 the Owner 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 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, 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; 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 limited company, 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 Agreement to Bond

(1) 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.

(2) Proposals not accompanied by the required agreement to bond will be declared non-compliant.

(3) 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 years immediately prior to the Submission Deadline. Unless otherwise set out in the RFP Data Sheet, the Respondent shall provide a minimum of three 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 referees, 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 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 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; or,

(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 7.1(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 – DRAFT AGREEMENT NEGOTIATION, FINALIZATION AND DEBRIEFING AND SUCCESSFUL RESPONDENT

8.1 Negotiation and 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) Proposal Form 5 – Compliance with Contract Documents allows a Respondent to submit suggested changes to the Supplementary Conditions. ONTC may, in ONTC's sole discretion; (i) consider only a minimal number of changes to the Supplementary Conditions or (ii) disqualify any Respondent where the changes or the number of changes of 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 (7) below or are unacceptable to ONTC.

(4) 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.

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

(6) The Successful Respondent will be required to enter into the agreement which shall include the Supplementary Conditions in Part 5. Terms and conditions proposed by the Successful Respondent in Proposal Form 5, excluding any changes to Confidentiality, Personal Information, Intellectual Property ownership and infringement, Indemnification, Limitation of Liability or rights of ONTC on termination, may be included in the Supplementary Conditions or other Contract Documents, upon agreement by the parties. 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(7).

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

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

(8) 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 Supplementary Conditions;

(c) executed Contractors Health and Safety Responsibility Agreement;

(d) Respondent's Health and Safety and Environmental Policy; 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(8) within the time period specified in Section 8.1 or fails to execute the Final Agreement shall be limited to ten (10) percent of the value of the Final Agreement.

(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 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 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 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 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 Procurement 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 Contract with ONTC will 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 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.

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.

PART 2

REQUEST FOR PROPOSALS

SUMMARY OF REQUIREMENTS

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

RFP 2024 001 **Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades**	
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 Respondents' Meeting will not be held for this procurement.
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, 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 posted in these locations.

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

RFP 2024 001
Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades

Proposal Detail *continued* – *Note the requirements below are new to ONTC*

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
Submission Requirements	This checklist		
	Proposal Form 1 - Proposal Submission Form		Material
	Proposal Form 1-A - 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		Material
	Proposal Form 6 Health, Safety and Environment		Material
	Proposal Form 7 - Schedule of Materials		
	Proposal Form 8 - List of Equipment		
	Proposal Form 9 Schedule and Proposed Approach **Include Construction Schedule in Gantt chart format and Written Narrative Proposed Approach**		Material
	Proposal Form 10 - Schedule of Progress Payments		
	Proposal Form 11 List of Personnel **and Resumes**		Material
	Proposal Form 12 - Current Labour Agreements		
	Proposal Form 13 Contractor's Qualification Statement **Include Company Profile and 3 Project Descriptions**		Material
	Proposal Form 14 - Claims		
	Agreement to Bond as prescribed in Part 1, Request for Proposals, Section 4.3.		Material

PART 2 – REQUEST FOR PROPOSALS

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

RFP 2024 001 **Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades**			
Important Dates			
Publication Date	Wednesday, January 17, 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	Tuesday, February 20, 2024, at 2:00 p.m. local time		
Target Implementation Date	Spring/Summer 2024		
Draft Agreement			
Liquidated Damages	The per diem rate calculated in relation to Article 10-4 of the Agreement is $500 for each calendar day of delay beyond the prescribed date or Ready-for-Takeover until Ready-for-Takeover is achieved and certified, pursuant to the terms of the Contract Documents.		
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 Requirement	**Pass**	**Fail**
	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 6, Health, Safety and Environment)		
	Respondent has achieved a minimum score of 12 under Experience and Qualifications		
	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 001 **Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades**		
Procedure of Selection *continued*		
Evaluation General Procedure	ONTC will proceed with an evaluation of the Proposals. The evaluation will be based on the following criteria:	
Evaluation Criteria	**Description**	**Weight**
	Price ONTC will use the following to calculate the score for price: Lowest price of all Proposals / price of Respondent x 35 = 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".* *Of note, this procurement is subject to budgetary approval. As a result, ONTC reserves the right to proceed with any or all of the crossings, and Respondents shall submit their proposal based on the assumption that ONTC may award any or all of the crossings. Respondents shall identify in their Proposal any available discounts that would apply in the event that ONTC proceeds with all crossings.*	35
	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 – 4 points Company Profile – 4 points Project Profile 1 – 4 points Project Profile 2 – 4 points Project Profile 3 – 4 points (ONTC may or may not contact references as part of the evaluation and may use this information as part of this score)	20

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

RFP 2024 001 **Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades**		
Procedure of Selection *continued*		
	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? - 2 points Are the milestone dates in conjunction with the ONTC deadline? - 2 points Is the schedule and proposed approach logical and does it have sufficient detail with durations for each task? Has the critical path been identified? - 6 points	10
	Supply Chain Security Are you able to deliver the grade crossing warning system upgrades per the critical delivery schedule specified in the RFP? Provide details of the associated support ONTC should expect as part of the overall service. Include how your organization can ensure on-time delivery of the services and how your organization will be responsive and on-site as per the schedule outlined in the RFP. – 10 points	10
	Local Benefit Please advise if you will be utilizing local resources for the grade crossing warning system upgrades. What is the value of the budget to be allocated to local subcontractors and how and when will the vendor use the local workforce, local vendors, local manufacturers, etc. – 5 points Describe your experience with the climatic and environmental requirements in Northern Ontario. – 10 points	15
	References ONTC may rely on the information submitted by Respondents or contact references in order to evaluate this area.	5
	Vendor Performance ONTC will assign a score for vendor performance based on the average of all scores for the Respondent then weighted accordingly for a score of out 5. Respondents who have not had any vendor performance evaluations with ONTC will receive 3 out of 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 001
Description of Requirement:	Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades

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: 1-800-363-7512 or 705-472-4500 Ext. 548
Fax: 1-705-475-5003
Email: brinda.ranpura@ontarionorthland.ca
Website: www.ontarionorthland.ca

PART 3

REQUEST FOR PROPOSALS

SPECIFICATIONS

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

Introduction

Ontario Northland Transportation Commission (ONTC) owns and maintains 1,125 km of track and signal infrastructure servicing northeastern Ontario and northwestern Quebec. ONTC's rail system includes over 500 public, private and approved snowmobile crossings, of which 72 public/private grade crossings are equipped with warning systems.

To help improve the safety, ONTC wishes to benchmark its grade crossings infrastructure against the standards as defined in the Grade Crossing Regulations (GCR) and Grade Crossing Standards (GCS). ONTC is conducting the crossing upgrades at more than forty plus (40+) crossing locations between 2024 and 2026 on various subdivisions throughout our rail network. These crossing upgrades or new installs will include gated and non-gated crossings. ONTC intends to enter into a one-year contract with an optional second and third year with the Successful Respondent to complete the crossing upgrades in 2024, 2025, and 2026.

The project will start off upon contract award and aiming to begin construction on May 1st or in the favorable weather condition in the spring season. The goal is to finish the fieldwork before November 1st to prevent frost-related issues, highlighting a seasonal approach for completion. All submissions must be submitted by:

2:00 p.m. local time on Tuesday, February 20, 2024.

Conditions of the Place of Work

Each Respondent must form its own opinions and conclusions regarding the work addressed in the RFP Documents, based on the provided templates and assumptions. This involves considering the process of evaluating signals and communication construction factors, the industry-standard challenges in the proposals, and accounting for anticipated conditions inherent to the work in the bidding process. It is important to note that no additional costs will be considered within the typical ONTC design templates and construction unless the design or the specific work locations require a revision. Such scenarios will need to be reviewed and approved by ONTC before the construction based on the design and site-specific construction.

Claims regarding conditions typical to signals and communication construction, or those that could reasonably have been known before submitting the bid, will not be considered.

Scope of Work

The Work covered under this contract involves the design, supply, installation, testing and commissioning of all materials and equipment required to upgrade the Crossing Automatic Warning Device systems in accordance with the Proposal Documents.

The Work includes but is not limited to:

- Engineering and design of the grade crossing warning system upgrades;
- Procurement of all materials and equipment required;
- Wiring of all equipment, bungalow, gate mechanisms etc.;
- Mobilization;

- Environmental protection;
- Installation of crossing warning time control equipment, signal assembly with LED light units, bell(s), gates (if applicable), mast, and foundation and signal housings;
- Testing and commissioning of all supplied and installed signal equipment;
- Cleaning and painting of corroded steel (as/where required);
- Removal and recovery/disposal of existing cases and signal equipment; and,
- Demobilization.

It is anticipated that the Contractor will perform installation of the inside equipment, wiring, and Factory Acceptance Testing of the bungalows at their facility, followed by field work, installation and commissioning of the completed bungalows.

The Contractor shall contact Ontera as soon as possible after the work locations are established and provide construction details/plans with planned construction start and completion dates.

The contactor is also required to provide Ontera a work schedule indicating when work affecting the Fibre optic cable will take place.

Ontera Contacts:
Peter.Aultman@Ontera.ca
Serge.Contant@Ontera.ca

Additionally, the Contractor shall contact On1call prior to any excavation work on railway property at least 72 hours prior to work taking place.

General Information Related to this RFP

- ONTC will provide track protection under the supervision of a flag person, for all planned work in the Right of Way, at no cost.

- Contractor Orientation is to be completed by each employee online prior to working in the Right of Way.

- The Contractor is responsible for all materials, including shipment through to installation.

- To reduce delays with establishing new power services with Hydro One, some electrical layouts have already been requested. It is expected that upon contract award and execution, the Contractor will prioritize the start of electrical service work to ensure the services are ready in time for system commissioning.

- The Contractor is responsible for inspecting and identifying any insulated items (insulated switch rods, gauges rods, joints) that require replacement within the crossing circuits. Any insulated track hardware requiring replacement or that is required per the design will be supplied and installed by ONTC track forces.

- Contractor may preferably use plug bond track connectors, or Cad-Welds/pin brazing.

- Hand digging under the tracks is acceptable if restored properly and approved by ONTC.

- Refer to the attached Bill of Materials (BOM) template for a basic ONTC crossing upgrade (Schedule 3-A-4 – Bill of Material).

  Of note, the BOM templates were prepared with a high level of accuracy; however, it is for estimating purposes only. It is the Contractors' responsibility to complete the engineering and design, to determine specific materials and quantities required.

PART 3 – RFP SPECIFICATIONS
SCHEDULE 3-A-1
TECHNICAL SPECIFICATIONS

Refer to the technical specifications as outlined below, and which are attached to this Schedule 3-A-1.

SECTION	TITLE
01 11 00	Summary of Work
01 14 00	Work Restrictions
01 35 00	Special Requirements
01 42 19	Reference Standards
01 52 00	Construction Facilities
01 54 60	Rail Traffic Protection and Work Blocks
01 56 10	Environmental Protection
26 05 00	Electrical General Requirement
31 24 11	Excavation, Trenching and Backfilling
34 05 05	Demolition and Removal
34 42 01	Signal and Fibre Optic Cable Protections
34 42 02	Signal Power Requirements
34 42 03	Signal Foundations
34 42 04	Signal Installation Requirements
34 42 05	Signal System Testing Requirements
34 42 06	Signal Documentation
34 42 13	Signal Material Requirements
34 42 23	Wayside Housing and Cases

1. General

1.1 Summary

1.1.1 The general scope of work consists of the design, supply, installation, testing and commissioning of all materials and equipment required to upgrade the Crossing Automatic Warning Device systems following ONTC's standard system template drawings, local conditions at each crossing, and Transport Canada's Grade Crossing Regulations and Grade Crossing Standards. The expected production for this potential multi-year contract will be a minimum of 8 crossing upgrades for the first year and upwards of forty plus (40+) between 2024, and, 2026 pending ONTC's approval.

1.2 Work Included

1.2.1 The Work is multi-disciplinary, requiring coordination by the Contractor with their designer, ONTC, maintenance contractors, local utilities, and adjacent property owners. The Work shall be performed in accordance with the Contract Documents, ONTC's standard template drawings, Grade Crossing Standards, and Grade Crossing Regulations, and includes:

1.2.1.1 Engineering and design of the grade crossing warning system upgrades in accordance with the Contract Documents, ONTC's standard template drawings, designed speed (TBD), and local conditions at each crossing;

1.2.1.2 Procurement of all material and equipment required based on the Contract Documents, ONTC's standard template drawings, designed speed (TBD) and the resulting location-specific designs.

1.2.1.3 Installation of new crossing control system and associated housings.

1.2.1.4 Power service connections for the signal bungalows and cases.

1.2.1.5 New track circuit connections and junction boxes.

1.2.1.6 Installation of crossing signal assembly, with or without gates as per the design.

1.2.1.7 Reconnection of crossing warning system wiring to a new signal assembly.

1.2.1.8 Installation of conduits if applicable.

1.2.1.9 Testing and commissioning of all Signal & Communications (S&C) and Electrical Works.

1.2.1.10 Retirement of relevant crossing warning signal assembly, equipment, cases, and bungalows.

1.2.1.11 Provision of all “as built” test records, drawings, and schematics, in both PDF and native file formats.

1.2.1.12 Provision of an “In Service” certificate for each location certifying that the installation meets the requirements of the standard design template, Grade Crossing Standards, and Grade Crossing Regulations, and listing any outstanding deficiencies.

1.3 Reference Documents

1.3.1 American Railway Engineering and Maintenance of Way Association (AREMA), Manual for Railway Engineering, latest version.

1.3.2 American Railway Engineering and Maintenance of Way Association (AREMA), Communications & Signals Manual, latest version.

1.3.3 Railway Association of Canada, latest edition.

1.3.4 Canadian Standards Association, latest edition.

1.3.5 Transport Canada Grade Crossing Regulations (SOR/2014-275).

1.3.6 Transport Canada Grade Crossing Standards.

1.3.7 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.3.8 Transport Canada Standards Respecting Railway Clearances (E-05).

1.3.9 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.3.10 Ontario Electrical Safety Code, latest edition.

1.3.11 Ontario Traffic Manual Book 7, latest edition.

1.3.12 Railway Association of Canada Circular NO. 13, “Recommended Practices for Manual Protection of Highway / Railway Grade Crossings”.

1.3.13 Local / Provincial / Federal Electrical codes as they apply to a railroad environment.

2. Scope of Work

2.1 Overview

2.1.1 The Contractor shall produce the design, supply all required materials, and install equipment and cabling in accordance with the Template Drawings and Contract Documents that need to be reviewed and approved by a possible third party and ONTC.

2.1.2 The Contractor shall develop test plans (including factory acceptance, post-installation checkout, site acceptance, and on-site commissioning), conduct tests, and submit results for acceptance by a possible third party and ONTC.

2.1.3 The Contractor shall be willing to coordinate and work with a possible 3rd party Consultant representing ONTC throughout the project and to witness the factory/field testing and commissioning.

2.1.4 The Contractor shall provide constant warning time control equipment software and install this software in the crossing bungalows..

2.1.5 The Contractor shall supply and install (including necessary coordination with local utilities) electrical services to signal bungalows and cases.

2.1.6 The Contractor shall supply and install temporary protection systems for existing overhead utilities, as well as the protection of underground utilities, including fibre optic and signal cables on the right of way.

2.1.7 The Contractor shall coordinate all workforces including local utilities, locating companies, material and service suppliers, personnel from ONTC's Maintenance Department, and Rail Traffic Control Centre personnel required to facilitate completion of the Contractor's scope described herein.

2.1.8 The Contractor shall develop Site Specific Work Plans (SSWP) and identify required work blocks and track protection that needs to be reviewed and approved by a possible third party and ONTC.

2.1.9 The Contractor shall obtain permits and licenses required to complete the Work, including any environmental permits and municipal approvals.

2.1.10 The Contractor shall obtain additional permissions to access other properties not owned by ONTC that may be required to access the site or execute the defined work.

2.1.11 The Contractor is not responsible for modifications to the Rail Traffic Control Centre but shall coordinate with others performing that work.

2.1.12 The Contractor shall provide record documents and distribute "Construction records" documentation to required locations.

2.1.13 The Contractor shall be responsible for lay down areas and security of materials (both ONTC supplied and Contractor supplied) until the system is accepted into service and replaced equipment has been removed.

2.1.14 ONTC shall maintain the first right of refusal of all released or recovered material and equipment. The Contractor shall deliver and place in storage salvaged material that ONTC wishes to retain as instructed by ONTC. All remaining material and equipment shall become the property of the Contractor and shall be removed from ONTC's property and adjacent properties.

2.1.15 The Contractor shall supply service manuals and maintenance instructions for products delivered under this contract.

2.2 Signals & Communications

2.2.1 All Bidders are to submit a proposed set of Signal & Communication (S&C) design and installation standards as part of the tender submission. Acceptability of the standards will be determined during the tender evaluation process.

2.2.2 Acceptable S&C installation standards include CP, CN or other Canadian federally regulated railroads. The contractor is responsible for ensuring that the installation standards align and will provide a fully functional system. The contractor must demonstrate that the proposed standards meet the following requirements:

2.2.2.1 Ontario Northland's Signal System Inspections & Test.

2.2.2.2 Standard has been used on a Canadian federally regulated railroad in the past five years.

2.2.2.3 Contractor has installed fully integrated S&C systems using the proposed standards.

2.2.3 The Contractor shall decommission and remove S&C equipment and bungalows and/or cases made redundant from the Contract Drawings design installation.

2.2.4 The Contractor shall correlate each location in accordance with ONTC's standard template drawing requirements and in advance of commencement of Work.

2.3 Signal Details By Design Template

2.3.1 Crossing without gates

2.3.1.1 Design, supply, install and test new signal bungalow equipped with crossing control equipment, in accordance with ONTC's standard template drawings.

2.3.1.2 Install two new crossing warning signal assemblies, LED light units, bell(s), mast, dolly arms(if required) and foundations, in accordance with design drawings.

2.3.1.3 Install 5”temporary bonds on joint bars and double long bonds around insulated joints within the crossing approach designed for removal and/or are redundant.

2.3.1.4 Install a new external 100A power service and panel, in accordance with contract drawings. Note that the hydro electrical layouts have already been requested for many locations, with the new service coming off the existing pole nearest the existing signal case.

2.3.1.5 Provide and install new cabling, wiring, and bonding in accordance with design drawings.

2.3.1.6 Remove and recover any equipment made redundant from this project.

2.3.2 Crossing with Gates.

2.3.2.1 Design, supply, install and test new signal bungalow equipped with crossing control equipment, in accordance with ONTC’s standard template drawings.

2.3.2.2 Install two new crossing warning signal assemblies with gates, LED light units, bell(s), mast, dolly arms (if required) and foundations, in accordance with design drawings.

2.3.2.3 Install 5” temporary bonds on joints bars and double long bonds around insulated joints within the crossing approach designed for removal and/or are redundant.

2.3.2.4 Install a new external 100A power service and panel, in accordance with contract drawings. Note that the hydro electrical layouts have already been requested for many locations, with the new service coming off the existing pole nearest the existing signal case

2.3.2.5 Provide and install new cabling, wiring and bonding in accordance with design drawings.

2.3.2.6 Remove and recover any equipment made redundant from this project.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes restrictions imposed on the Work undertaken on site.

1.2 Reference Documents

1.2.1 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.2.2 Transport Canada Highway Crossings Protective Devices Standards (E-6).

1.2.3 Transport Canada Grade Crossing Standards (GCS).

1.2.4 Transport Canada Standards Respecting Railway Clearances (E-05).

1.2.5 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.2.6 American Railway Engineering and Maintenance of Way Association (AREMA) Communications & Signals Manual, latest version.

1.2.7 American Railway Engineering and Maintenance of Way Association (AREMA) Manual of Railway Engineering, latest version

1.2.8 Ontario Electrical Safety Code, latest edition.

2. Restrictions When Working Near Tracks

2.1 Hours of Work

2.1.1 Work in the corridor may be performed Monday to Friday between 0700 and 1600 hours or any shift/cycle mutually agreed upon and approved by ONTC.

2.1.2 Work shall only commence after authorization from the Flag Person.

2.1.3 ONTC cannot guarantee that the scheduled start or finish times for Work can be provided due to emergent conditions in train operations. Work may be subject to cancellation or rescheduling by ONTC at any time.

2.1.4 Unless negotiated in advance with ONTC, no track closures are authorized outside of the hours stated above.

2.1.5 Except for the work to be executed under scheduled track closures, all other work executed by the Contractor shall be carried out without interfering with the continued safe movement of rail traffic. The Contractor shall be liable for the cost of train delays and for the cost of repairs to the track required as a result of damage caused by the Contractor's operation.

2.1.6 The Contractor shall note that track closures may be scheduled on nights, holidays and weekends.

2.2 Site Specific Work Plans

2.2.1 All Work site tasks or activities, whether intrusive or non-intrusive, shall be properly planned to ensure safe, efficient and timely completion of the Work. Such planning shall be documented in a Site Specific Work Plan (SSWP). A template SSWP is provided in Appendix A - Site Specific Work Plan.

2.2.2 An accepted SSWP is required before performing any task of Work on Site.

2.2.3 The SSWP shall address the resources, methodology, permits, potential risks (and associated control measures), and timing of a task to ensure that once the task commences, it can proceed without delay to completion, within the allotted time, in a safe manner. This document shall explicitly state the responsibilities of various parties during installation, including the Contractor, any Subcontractors or suppliers, and ONTC.

2.2.4 The Contractor shall submit a SSWP a minimum of 20 business days prior to the proposed Work date. On site Work shall not proceed without ONTC's acceptance of the SSWP.

2.2.5 Prior to submission of the SSWP, the Contractor shall evaluate the task of Work to ensure there is no possibility of disruption to operations.

2.2.6 Where installation Work proposes multiple stages or phases, the requirements of this section apply to all stages or phases.

2.2.7 As part of the SSWP, the Contractor shall submit a detailed work schedule for each and every construction activity occurring.

2.2.8 The SSWP shall identify any specific requirements for track closures.

2.2.9 For track closures, the Contractor's SSWP shall include details of:

2.2.9.1 The type of crews present and carrying out work;

2.2.9.2 The number of workers in each crew and number of crews;

2.2.9.3 The length of each shift, number of shifts per crew and crew leaders;

2.2.9.4 Work cycle;

2.2.9.5 The name of the leader of each crew and his experience in related work;

2.2.9.6 A list of all equipment and machinery on site during each track closure;

2.2.9.7 A detailed description of methods and equipment to be used in handling materials;

2.2.9.8 Standby equipment, if any;

2.2.9.9 Method of installation; and

2.2.9.10 All other information which may assist ONTC in assessing the Contractor's comprehension of the scope of the work and expertise in planning and executing the work.

2.3 Track Protection

2.3.1 ONTC will supply track protection under the supervision of a Flag Person at no cost to the Contractor to accommodate the hours of work identified in this Section. No extra compensation will be provided to the Contractor when a Flag Person is not available.

2.3.2 ONTC will arrange for track protection, as identified by the Contractor in the SSWP. The Contractor shall adhere to the instructions provided by the Flag Person at all times.

2.3.3 The Contractor's forces shall cooperate fully with the ONTC Flag Person in the operation of construction machinery and manpower on the ONTC right-of-way. No Work or entry on to the railway right-of-way at any time shall be undertaken without an accepted SSWP and the track protection identified therein.

2.3.4 Minor revisions to the SSWP, such as equipment changes or extensions of the Work limits shall be identified in advance to the Flag Person, who shall determine whether changes in track protection are required.

2.3.5 The Work shall be carried out without interference to the passage of trains at their normal operating speeds unless otherwise authorized by means of the accepted SSWP.

2.3.6 The Contractor shall anticipate experiencing brief delays, on occasion. No extra compensation will be provided to the Contractor due to train operations delaying the Work.

2.3.7 The Contractor shall arrange to have a daily written record of actual work stoppage to allow train passage, if any, on which the Contractor and ONTC shall agree and sign at the end of each work period.

2.4 Safe Passage of Trains and Railway Equipment

2.4.1 Immediately prior to the passage of trains, locomotives or other rail-mounted vehicles or equipment, at or by the Work site, all Contractor and Subcontractor personnel shall stop work, move to a safe location and face the track upon which such passage is occurring. All personnel, tools, machinery and equipment shall be outside of the railway clearance envelope. Any Contractor owned, leased, etc. vehicles or equipment must be stopped and placed in neutral gear, until passage is complete. No work or other activity shall recommence until the train, locomotive or other rail-mounted vehicle or equipment has passed by that particular site and resumption of work has been authorized by the Flag Person.

2.4.2 The ONTC representative (Flag Person) providing track protection will advise the Contractor's designate, who will in turn ensure that all personnel on/near the Work site have been duly advised of the imminent movement of trains, locomotives, etc. The Contractor's designate will confirm to the Flag Person that all personnel are clear of the movement.

2.4.3 Failure to comply with instructions regarding track protection will result in the employee's immediate removal from the Work site. The Contractor shall ensure all of its personnel and Subcontractors are aware of this, prior to the commencement of the Work on site.

2.5 Crossing Tracks

2.5.1 The Contractor shall not cross tracks without permission from the Flag Person.

2.5.2 The Contractor shall not cross the railway tracks with scrapers, bull dozers, trucks or other mechanical equipment where no level crossing is provided.

2.6 Pre-Closure Working Meetings

2.6.1 Three days prior to the commencement of each major track closure, the Contractor shall call upon all key personnel executing the work to attend a working meeting with ONTC representatives to review:

2.6.1.1 All the activities to be executed during that specific track closure;

2.6.1.2 The methodology and equipment to be used;

2.6.1.3 Conduct an audit to verify that all materials at the storage site are on hand and discuss loading and unloading procedures;

2.6.1.4 Discuss with all participants the expected progress; and

2.6.1.5 Review all safety compliance procedures.

2.7 Track Closures

2.7.1 At least 24 hours prior to the scheduled major track closures, the Contractor shall have all resources and equipment in place to carry out the work for the closure. If in the opinion of ONTC, any of the above is unsatisfactory, ONTC will cancel and reschedule the temporary track closure and the Contractor will pay all costs associated with the cancellation and rescheduling.

2.7.2 The Contractor shall note that, from time to time, ONTC or other work in the area may impact on the scheduled closures, and may cause cancellation of the closure or reduction of the hours allowed. The Contractor shall have no claims for additional payment for delays.

2.7.3 All work must be completed and the track ready for safe passage of train traffic at the end of each work period.

2.8 Job Briefing

2.8.1 The Flag Person and Contractor's Supervisor shall deliver a job briefing, including safety and protection arrangements to all personnel that will be involved in the Work each day immediately prior to commencement of Work. Briefings must also be held any time locations or plans of Work change. The Contractor shall ensure the details of the briefing are clearly understood by and passed onto their entire staff and any sub-Contractors working at the site through the use of a SSWP. The Contractor shall maintain and make available to ONTC, upon request, copies of all SSWPs, signed by those in attendance at the briefing.

2.9 Radios

2.9.1 The Contractor shall supply radios to ONTC and Flag Person to facilitate communications with the Contractor whilst working near the tracks.

2.9.2 The use of all radios shall be in accordance with ONTC procedures and in accordance with Industry Canada regulations, in addition to any internal Contractor radio procedures.

2.10 Contractor Orientation

2.10.1 All Contractor employees shall be required to complete a Contractor Orientation session prior to commencing any work on ONTC rail corridors.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes special requirements for the Work.

1.1.2 The Contract Drawings for signaling Work are colour-coded showing installations in red and removals in blue.

1.1.3 Requirements for Signals & Communications quality assurance and testing are described in Section 34 42 05 Signal System Testing Requirements.

1.2 Submittals - General

1.2.1 The Contractor shall provide two (2) hardcopies of Submittals, plus one (1) electronic digital copy, unless specifically stated otherwise.

1.2.2 The Contractor shall provide a reference list of Standards and Specifications applicable to the construction of this project. To establish a compliance baseline the Standards and Specifications list must include all standard drawings and document reference titles, numbers, current revisions and dates.

1.2.3 The Contractor shall submit manufacturer's product data for all products procured for this project. The Contractor shall provide manufacturer’s product data showing specific compliance with specified standards, requirements for reliability, availability, maintainability, durability or environmental requirements for the product as specified in the Contract Documents.

1.2.4 Identify Product data sheets clearly and completely with Contract number, date, Contractor’s name, sheet number and description of Product. List information that confirms Product complies with specified values and parameters.

1.2.5 The Contractor shall submit samples as specified in the Contract Documents. Samples must represent physical examples to illustrate materials, products or Work quality and to establish standards by which completed Work is judged. The Contractor shall identify samples clearly and completely with Contract number, date, Contractor’s name, sample number, description of sample and applicable Section of the Contract Documents. The Contractor shall label samples as to origin and intended use in the Work and in accordance with the requirements of the Contract Documents. The Contractor shall provide two (2) identical samples as the standard requirement, unless specified otherwise, but ensure samples are of sufficient size and quantity to illustrate quality and functional characteristics with integrally related parts and attachment devices.

1.2.6 The Contractor shall submit manufacturer’s documentation and manuals where the Contract Documents require installation in accordance with manufacturer’s recommendations or instructions, prior to commencement of Work on such item or portions thereof.

2. Execution

2.1 Quality Control and Assurance

2.1.1 The Contractor shall be responsible to conduct its own quality assurance program to ensure all materials, etc. meet the requirements of the Contract Documents.

2.1.2 Where tests or inspections undertaken as part of the Contractor's quality assurance program reveal Work not in accordance with the Contract Documents, the Contractor shall pay costs for additional tests or inspections required by ONTC to verify acceptability of corrected work.

2.1.3 ONTC or a third party may carry out its own Quality Assurance activities. The Quality Assurance effort undertaken by ONTC will not relieve the Contractor in any way with respect to the accuracy or the quality of the Contractor's work.

2.1.4 The Contractor shall provide ONTC a minimum of 48hours notice for testing to be permitted.

2.1.5 Where tests or inspections are called for prematurely or the testing laboratory is delayed by the Contractor, the Contractor shall pay all additional costs incurred.

2.1.6 The Contractor shall furnish all labour and facilities to:

2.1.6.1 Provide access to work to be inspected and tested.

2.1.6.2 Facilitate inspections and tests.

2.1.6.3 Make good work disturbed by inspection and test.

2.1.6.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

2.1.6.5 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and accepted by ONTC.

2.1.7 ONTC shall not be responsible for any delays to the Contractor's operations where the Contractor fails to give sufficient advance notice to ONTC to carry out the required inspection, sampling and testing.

2.2 Site Access

2.2.1 The Contractor shall include all preparatory work and costs associated with the Contractor, obtaining additional accesses to the Work site through other properties not owned by ONTC, which may be needed to execute the Work.

2.2.2 The Contractor shall not enter any non-owned ONTC property for Construction until permission is provided by ONTC. Once said permission is received, the Contractor shall only be permitted to access the Work site to undertake Construction activities.

2.2.3 The Contractor shall acquire and pay for all necessary permits, including all required Ministry of Environment (MOE) and Ministry of Natural Resource (MNR)

permits and other agencies having jurisdiction, for the use of local roads, access roads from borrow sites, operation of borrow sites, transportation of material from borrow pits for use on site and/or transportation of material from site for the purposes of reuse or disposal.

2.2.4 Whenever the Contractor enters into an agreement with any authority having jurisdiction, or landowner, said agreement shall be in writing, signed by the authority having jurisdiction, or landowner, and a representative of the Contractor. A copy of the agreement must be provided to ONTC prior to use of such access.

2.2.5 The Contractor shall conduct a pre-condition survey of the roads and properties, jointly with the authorities having jurisdiction, landowners and ONTC.

2.2.5.1 The Contractor shall include methods to be employed for the mitigation of any claims arising from the Contractor's operations in the survey.

2.2.6 The Contractor shall open, clear and grade all roads that they deem necessary for their operations.

2.2.7 The Contractor shall secure the site with fencing and gates to prevent public access to the site.

2.2.8 The Contractor shall minimize any inconvenience caused by Construction activities to adjacent properties.

2.3 Equipment

2.3.1 The Contractor shall provide all tools and equipment required, including but not limited to:

2.3.1.1 Hi-Rail vehicles.

2.3.1.2 Cranes.

2.3.1.3 Excavators.

2.3.1.4 Vacuum and hydro-vac trucks/machines.

2.3.1.5 Boring machines.

2.3.1.6 Tamping machinery capable of lifting, lining and tamping. Equivalent to Mark IV or better.

2.3.1.7 Mechanized on-track ballast regulator.

2.3.1.8 Dynamic track stabilizer.

2.3.1.9 Rail bonding machines.

2.3.2 The Contractor shall be responsible for the proper care and storage of Work equipment when the equipment is not in use. All reasonable precautions must be taken to protect and secure the equipment against unauthorized use, damage or tampering. Equipment stored on the right-of-way must be clear of operating tracks and the following precautions must be taken:

2.3.2.1 All machines shall be locked. If this is not possible, a battery cable must be disconnected and the battery box locked.

2.3.2.2 All machines must have brakes and other locking mechanisms applied, and must be blocked to prevent movement. Attachments such as working heads, bucket blades or booms must be securely supported or lowered to rest.

2.3.3 Off-track machines must be placed on level ground where possible and parallel to the track. They must be placed as far from the track as practicable, and in no case less than 3.05 m from the centre line of the nearest track. Machines with booms must be placed so that the boom, at its maximum radius, will not be less than 3.05 m from the centre line of the nearest track.

2.3.4 Work equipment may only be operated by qualified, and licensed where required by law, employees; that is, those employees who have been instructed in the operation and maintenance of the equipment and found capable.

2.3.5 Only those employees whose duties require them to do so will be permitted to ride on equipment. Riders must not occupy an unsafe position, nor extend any part of their body beyond the sides of equipment in such a way as to expose themselves to injury. Operators are responsible for seeing that only authorized persons are carried on equipment and must know that they are properly positioned before a movement is made. Getting on or off equipment in motion is considered unsafe and is prohibited.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes Standards which are referred to in the Contract Documents or which may apply to the Work performed by the Contractor. This list is not intended to be exhaustive and other Canadian or international Standards may be required to be applied to the Work.

1.2 Scope

1.2.1 The version of each standard current as at the date of Contract award shall apply. Where any deviation to this requirement exists, a specific version is quoted herein.

1.2.2 The AREMA Communications and Signals Manual of Recommended Practice applies to all signalling and communications Work and products.

1.2.3 The AREMA Manual for Railway Engineering applies to all railway Work and products.

1.2.4 All railway Work shall be in compliance with the Railway Safety Act and Transport Canada E-54, Rules Respecting Track Safety (Railway Association of Canada).

1.2.5 Electrical Work and electrical products shall conform to the Canadian Electrical Code, as defined in the scope of that code, wherein exceptions for railway equipment are also defined.

1.2.6 Where any conflict between standards exists, advise ONTC, in writing, citing the conflict, the Standards involved and the impact of the conflict on the Work. ONTC will advise the Contractor of the precedent standard within fourteen (14) calendar days.

1.2.7 Installation work shall be undertaken in accordance with the standards approved under Section 01 11 00, 2.2.

1.3 Standards

1.3.1 American Railway Engineering and Maintenance of Way Association (AREMA) Communications & Signals Manual, latest version.

1.3.2 American Railway Engineering and Maintenance of Way Association (AREMA), Manual for Railway Engineering, latest version.

1.3.3 Government of Canada - Fisheries Act, R.S. 1985 c. F-14.

1.3.4 Government of Canada - Migratory Birds Conservation Act, 1994 (1994, c. 22).

1.3.5 Government of Canada – Railway Safety Act, R.S.C., 1985, c. 32.

1.3.6 Health Canada Safety Code 6.

1.3.7 Province of Ontario – Environmental Protection Act and the Ontario Water Resources Act.

1.3.8 Province of Ontario – Fish and Wildlife Conservation Act, 1997, S.O. 1997, c. 41.

1.3.9 Ontario Electrical Safety Code, latest edition.

1.3.10 Ontario Provincial Standard Specification OPSS 102, latest revision, “Weighing of Materials”.

1.3.11 Ontario Provincial Standard Specification OPSS 180, Management of Excess Materials.

1.3.12 Ontario Provincial Standard Specification OPSS 201 Clearing, Close Cut Clearing, Grubbing and Removal of Surface Boulders.

1.3.13 Ontario Provincial Standard Specification OPSS 206, Grading, except as indicated below.

1.3.14 Ontario Provincial Standard Specification OPSS 209, latest revision, “Construction Specification for Embankments over Swamps and Compressible Soils”.

1.3.15 Ontario Provincial Standard Specification OPSS 212, Borrow.

1.3.16 Ontario Provincial Standard Specification OPSS 314, latest revision, “Construction Specification for Untreated Granular, Subbase, Base, Surface, Shoulder and Stockpiling”.

1.3.17 Ontario Provincial Standard Specification OPSS 401, latest revision, “Construction Specification for Trenching, Backfilling and Compacting”.

1.3.18 Ontario Provincial Standard Specification OPSS 506, latest revision, “Dust Suppressants”.

1.3.19 Provincial Standard Specification OPSS 510, latest revision, “Construction Specification for Removal”.

1.3.20 Ontario Provincial Standard Specification OPSS 512, latest revision, “Construction Specification for Installation of Gabions”.

1.3.21 Ontario Provincial Standard Specification OPSS 517, latest revision, “Dewatering of Pipeline, Utility, and Associated Structure Excavation”.

1.3.22 Ontario Provincial Standard Specification OPSS 518, latest revision, “Control of Water from Dewatering Operations”.

1.3.23 Ontario Provincial Standard Specification OPSS 570 Topsoil.

1.3.24 Ontario Provincial Standard Specification OPSS 804, Seed and Cover Ontario.

1.3.25 Ontario Provincial Standard Specification OPSS 805, Temporary Erosion and Sediment Control Measures.

1.3.26 Ontario Provincial Standard Specification OPSS 902, Excavating and Backfilling – Structures.

1.3.27 Ontario Provincial Standard Specification OPSS 1001, latest revision, “Aggregates - General”.

1.3.28 Ontario Provincial Standard Specification OPSS.MUNI 1004, latest revision, “Material Specification for Aggregates - Miscellaneous”.

1.3.29 Ontario Provincial Standard Specification OPSS 1010, latest revision, “Material Specification for Aggregates - Bases, Subbase, Select Subgrade, and Backfill Material”.

1.3.30 Ontario Provincial Standard Specification OPSS 1430, latest revision, “Material Specification for Gabion Baskets and Mats”.

1.3.31 Ontario Provincial Standard Specification OPSS 1860, latest revision, “Material Specification for Geotextiles”.

1.3.32 Ontario Provincial Standard Specification OPSS 2501, latest revision, “Material Specification for Calcium Chloride Flake and Solution”.

1.3.33 Transport Canada Grade Crossing Regulations (SOR/2014-275).

1.3.34 Transport Canada Grade Standards.

1.3.35 Transport Canada E-54, Rules Respecting Track Safety (Railway Association of Canada), Effective: May 25, 2012.

1.3.36 Transport Canada Standards Respecting Railway Clearances (E-05).

1.3.37 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.3.38 Transport Canada Railway Signal & Traffic Control Standards (E-17).

END OF SECTION

1. General

1.1 Description

1.1.1 This section covers mobilization, temporary procedures & controls, temporary works, protections, project identification, site maintenance, public convenience, safety, parking, etc. necessary to carry out the Work.

1.2 Mobilization

1.2.1 Mobilization and demobilization shall include, but not limited to, all preparatory work within and outside the Site, including Site preparation; supply, installation and maintenance of temporary facilities and controls, including Site and roadway maintenance; all costs related to establishing construction offices for the Contractor and Subcontractors; temporary power, communications, and other temporary utilities which may be required; Site security as necessary; installation and maintenance of construction barriers, maintenance of environmental controls; transportation to the Site of construction equipment as required for the performance of the Work; and demobilization and removal and disposal from the Site of all items not turned over to ONTC. Include all provisions outlined in this section.

1.2.2 Upon request of ONTC, support the unit rate submitted for Mobilization and Demobilization with data that will substantiate its correctness.

2. Temporary Controls

2.1 Traffic Control

2.1.1 The Contractor shall provide whatever signs, barriers, hoarding or other delineation required to isolate construction vehicles and equipment from adjacent access ways and neighbouring properties. The Contractor shall meet with ONTC prior to the commencement of the Work to receive approval for all proposed traffic control methods.

2.2 Barriers

2.2.1 Supply and erect barriers to close off Work Site and protect public access ways during performance of the Work, to the satisfaction of ONTC and the governing authority having jurisdiction.

2.2.2 Provide signage, flag-persons to control movement of pedestrians, vehicles, shipments, etc. as directed by ONTC.

2.2.3 Provide barriers around trees and plants for protection from damage by equipment or construction procedures.

2.2.4 Prior to start of the Work, submit to ONTC for approval, a comprehensive, thoughtful, written plan outlining measures to be undertaken for temporary controls.

2.3 Scaffolding

2.3.1 Provide and maintain any required scaffolding, ramps, ladders, swing staging, platforms, temporary stairs, etc. in accordance with the Occupation Health and Safety Act and all authorities having jurisdiction.

2.3.2 All temporary access measures must be designed and approved by an experienced professional engineer, licensed in the province of Ontario.

2.4 Hoisting & Cranes

2.4.1 Provide, operate, maintain hoists and cranes required for moving of workers, materials and equipment in accordance with the Ontario Occupational Health and Safety Act, Regulation for Construction Projects.

2.4.2 Cranes shall be operated by qualified operator whose proof of certification and/or qualifications must be available onsite at all times.

3. Temporary Works

3.1 Installation and Removal

3.1.1 The Contractor shall provide temporary utilities, facilities and controls in order to execute the Work expeditiously. Remove from Site when directed to do so by ONTC.

3.2 Temporary Power

3.2.1 Supply, install and maintain temporary electrical power if required in order to complete the Work.

3.2.2 Do not use voltage in excess of 600 V.

3.2.3 Arrange for connection with appropriate utility company and arrange for payment of all costs for installation, consumption, maintenance and removal.

3.3 Water Supply

3.3.1 Provide and pay for a continuous supply of potable water as required for Contractor’s use.

3.4 Sanitary Facilities

3.4.1 Provide and maintain sanitary facilities for work-force in accordance with governing regulations and authorities having jurisdiction, including the Ontario Ministry of Labour’s Occupational Health & Safety Act.

3.5 Telephone Service

3.5.1 Provide and pay for temporary telephone service as required for Contractor’s use.

4. Protection

4.1 Protection of Public Area

4.1.1 The Contractor shall protect surrounding private and public property from damage during performance of the Work.

4.2 Fire Protection

4.2.1 Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated in accordance with authorities having jurisdiction, governing codes, regulations, by-laws and to the satisfaction of ONTC, as well as the municipal and insurance authorities.

4.2.2 Bulk storage of flammable liquids and other hazardous materials is not allowed on Site. Flammable liquids must be handled in approved containers.

4.2.3 Handling, use and disposal of gasoline, benzene or other flammable materials shall be required, with safe practice as required by authorities having jurisdiction.

4.2.4 Provide fire extinguishers of the non-freezing chemical type in each temporary building, enclosure, and/or trailer.

4.2.5 The contractor shall follow the Ministry of Natural Resources' (MNR) Industrial Operations Protocol (IOP) in regards to the work that can be done due to forest fire threat severity during the months of April to October. In the event that due to fire hazard conditions the contractor is restricted from performing work, ONTC shall not be liable for the costs that contractor might incur.

5. Temporary Structures

5.1 Temporary Buildings

5.1.1 A temporary office is not required for ONTC. If required, temporary offices for Contractor's own use will be sited at a location determined by ONTC, in cooperation with the Company.

5.1.2 Provide first aid equipment in accordance with requirements of the Workers' Safety and Insurance Board, and the Ontario Ministry of Labour.

5.1.3 Provide such buildings as are required under Trades Union Rules for the protection of labour and custody of clothing and tools.

5.1.4 For all trailers and temporary buildings, provide wood or metal stairs and landing, painted and repainted as required with non-skid abrasive paint. Stairs and landings must be equipped with railings meeting latest Ontario Building Code requirements.

5.1.5 Do not locate any buildings, structures or equipment in a manner that interferes with normal flow of vehicular or pedestrian traffic, unless otherwise approved by ONTC.

5.1.6 Remove temporary buildings immediately upon notification by ONTC.

6. Project Identification

6.1 Display & Documentation

6.1.1 Do not display signs without ONTC's written consent.

6.1.2 All documentation submitted to the company shall be referenced to as: "2019 Grade Crossings Upgrade"

7. Site Maintenance

7.1 Maintenance & Temporary Procedures

7.1.1 Maintain the Site and adjacent premises in a clean and orderly condition, free from debris and other objectionable matter. Immediately remove rubbish and surplus products, equipment and structures from the Site. If the Site is not cleaned (within 48 hours after the Contractor has been instructed to do so), ONTC may clean the Site and retain the cost from monies due, or to become due, to the Contractor.

7.1.2 When the Work of this Contract is substantially performed, remove surplus products, tools, construction machinery and equipment not required for the performance of the remaining Work.

8. Public Convenience, Safety, and Parking

8.1 Haul Routes

8.1.1 Keep haul routes and access roads free at all times from products or construction materials. Clean adjacent highways and streets of deposits due to performance of the Work to the satisfaction of ONTC and the highway and street authorities, within 24 hours of ONTC's instruction.

8.1.2 Construct and maintain whatever access roads are required to complete the Work outlined in the Contract Documents.

8.1.3 ONTC may inspect haul routes, the Site and adjacent highways, roadways and premises daily and may halt operations, withhold payment, or carry out such additional operations as necessary, deducting the cost from monies due, or to become due, to the Contractor.

8.2 Access and Egress

8.2.1 Access and egress to the Site will only be allowed via the approved construction access and egress routes, as indicated on the contract drawings or otherwise agreed to with ONTC.

8.3 Safety

8.3.1 Safety on the Owner's property is strictly governed by the ONTC Contractor's Safety Orientation.

8.3.2 Observe and enforce construction safety measures required by National Building Code of Canada, Occupational Health and Safety Act and Regulations for Construction Projects, Workers Safety and Insurance Board, as well as any municipal statutes and regulations.

8.3.3 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

8.3.4 In event of conflict between any provisions of the above authorities, the most stringent provision shall govern.

8.4 Parking

8.4.1 Parking will be permitted on Site provided it does not disrupt performance of the work or expected traffic patterns. The Contractor shall prevent construction workers from parking within any unapproved areas.

8.5 Site Visitors

8.5.1 During the progress of the Work afford access to visitors duly authorized by ONTC and facilitate inspections or tests they may desire to complete.

8.5.2 Ensure Site visitors follow all safety provisions as specified in the ONTC Contractor's Safety Orientation.

9. Measurement & Payment

9.1 Measurement

9.1.1 The Work of this section will not be measured.

9.2 Payment

9.2.1 Payment for the Work of this Section shall be included in the lump sum for Mobilization and Demobilization included in Schedule A – Schedule of Quantities and Prices. Payment will be full compensation for all materials, labour, and use of equipment, tools and incidentals necessary to complete the Work of this section. Include all costs of attendance at any Site safety and security briefings.

9.2.2 The Contractor will be paid for a maximum of fifty percent (50%) of the lump sum contract price for "Mobilization and Demobilization" after the initial mobilization at the start of the work season. The contractor will be compensated for additional mobilization from North Bay to the work site, and from site to site afterwards based on established KM rates. This shall be a one time fee after each completion of a site and moving to the next work location. The remaining fifty percent (50%) will be paid following completion of the demobilization in accordance with this section at the end of the work season.

END OF SECTION

1. General

1.1.1 Note that part of the work shall be carried out under and adjacent to the ONTC's operating tracks.

1.1.2 Up to 3 scheduled trains may be operated during any 24-hour period as well as Extra Work Trains that are not on any fixed schedule and ordered only as required. Most of these trains would be considered daytime traffic.

1.1.3 Ensure that construction operations are carried out without interfering with the continued safe movement of rail traffic.

.1 Bear all cost of train delays and cost of repairs to any rail, ties and ballast required as a result of damage caused by the operation.

1.1.4 Give ONTC 72 hours notice of the hours within which work is to be carried out in order that protection may be provided. Time wasted unnecessarily by the ONTC personnel due to the Contractor, will be charged against the Contractor.

1.1.5 ONTC will provide flag persons for the protection of the ONTC's plant and equipment.

.1 The Contractor shall not commence work at the start of each work day unless authorized by the ONTC flag person and shall not continue or resume site work outside of the daily work hours unless approved by ONTC.

1.1.6 The Contractor shall ensure that a responsible person is present at all times to whom the ONTC personnel will issue orders regarding work near the tracks. Comply immediately with such orders and instructions.

1.1.7 Contractor is to hold Safety Meetings with all personnel engaged in working on the site and discuss all safety matters pertaining to the work including all matters involving working around and near the railway tracks and structures.

1.1.8 The Contractor shall supply portable, hand held, two-way radios to be used by the flag person to communicate instructions to the Contractor’s responsible person. The number of radios shall be sufficient to supply one each to the flag person, the ONTC Site Supervisor and at least one responsible person for the Contractor at each work location.

1.1.9 The flag person and the Contractor shall have a daily briefing at the beginning of the shift to inform the Contractor what trains are expected and that rail traffic protection is in place. The flag person will also explain the procedure to be used to clear trains.

1.1.10 On the approach of a train, the flag person will communicate to the Contractor’s responsible person, either by radio or personal contact that a train is approaching.

1.1.11 After receiving the train information from the flag person, the Contractor's responsible person will ensure that all workers, equipment and materials are "Clear Of The Track" then communicate this to the flag person.

1.1.12 "Clear Of The Track" shall be defined as:

.1 All workers, equipment and material must be at least 13 feet from the nearest rail of the track on which the train is to pass.

.2 No one shall be allowed on the deck of the bridge while a train is passing.

.3 All off-track equipment within 33 feet of the nearest rail must stop working on the approach of a train and remain stopped until the entire train has passed. Machine operators will leave their equipment unless directed otherwise by the foreman.

.4 All on-track equipment shall be moved into the siding or other track not being used by the approaching train and remain there until directed by the flag person. Operators will leave their equipment unless directed otherwise by the foreman.

.5 Booms of cranes or other similar equipment must not be moved over passing trains.

1.1.13 The Contractor shall safely expedite the "Clearing of the Track" so as not to cause any delays to passing trains.

1.1.14 Once the flag person has received confirmation that the track is Clear, the approaching train will be authorized to pass through the working limits.

1.1.15 After the train has passed, no one is to foul the track until the flag person advises that it is safe to do so.

1.1.16 Ensure that all personnel are instructed in the Safety Requirements contained herein prior to entering the work site.

1.1.17 Provide all means necessary to prevent the entrance of unauthorized personnel on to the work site.

1.1.18 The Contractor is responsible for ensuring that all new workers or visitors to the site are made aware of the safety and flagging procedures.

1.1.19 Anyone failing to comply with these procedures will be removed from the work site.

2. Track Protection

2.1.1 At all locations where there is a possibility of trees, rock or other debris falling on the tracks, provide track protection such as timber mats or an approved equivalent in order to prevent possible damage to rail, ties and ballast.

2.1.2 Prevent excavated material from fouling ballast and sub-ballast.

3. Restrictions on Construction Operations

3.1.1 In order to ensure the continued safe movement of rail traffic, certain restrictions shall be imposed on the construction operations. Without in any way limiting the generality of the foregoing statement, the following are some of the limitations or restrictions that shall be imposed.

.1 When operations are being carried out which may endanger the existing track or impede the safe passage of trains, perform such work only during such times as there is a block on the mainline rail traffic.

.2 All equipment within 33 feet from the nearest rail must stop working on the approach of a train and remain stopped until the train has passed.

.3 Do not work closer than 33 feet from the nearest rail without the prior consent of ONTC and only during such times as there is rail traffic protection provided by ONTC.

.4 Confine all work activities to daylight hours and do not exceed 10 hours per day unless authorized by ONTC.

.5 Drilling or welding to support construction equipment will not be permitted.

3.1.2 ONTC may, from time to time, delay or suspend operation under the Contract, either upon the whole of the works, or at any particular point or points. Should any such delay or suspension, in the opinion of ONTC, unreasonably limit the time for the completion of the works, ONTC may allow such additional limit, in extension of such time for completion; but no such delay, or suspension shall vitiate the Contract, or any part hereof, or any security or obligation for the performance hereof, nor shall the Contractor be entitled to make any claim for damages by reason thereof. Upon the termination of such delay, or suspension, or the removal of the cause thereof, or upon the Contractor receiving notice from ONTC requiring him to resume the work, he shall at once resume operations and diligently carry on the same.

4. Crossing Tracks

4.1.1 Do not cross tracks of ONTC with scrapers, bulldozers, trucks, barrows or other mechanical equipment at grade nor place crossing planks except by authority of ONTC, at locations designated by him. 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.

4.1.2 Construct grade level track crossing at a location and to a standard acceptable to ONTC. Crossings constructed to a standard less than the following shall be used by equipment only when flagging protection has been provided by ONTC personnel.

4.1.3 The crossing shall:

.1 Have a level gradient on either side for a distance of 30 feet or not less than the maximum length of vehicle using it.

.2 Have approach grades not greater than 5%.

.3 Have a crossing surface of suitable material extending at least 3 feet beyond the traveled width on both sides measured at right angles to the roadway.

.4 Be of an overall safe width suitable for the use intended.

4.1.4 Equipment capable of crossing in the time available, considering sight distances, may use the crossing without special protection, but must stop 10 feet short of the nearest rail and ensure that it is safe to cross before doing so. Crawler-mounted equipment and all equipment (including low bed type equipment) which is not capable of safely completing a move across the crossing within the time determined by the sight lines and train speed shall use the crossing only when flagging protection has been provided by ONTC personnel.

4.1.5 To minimize fouling the ballast, install filter fabric over the entire ballast section under the crossing planks and approaches.

4.1.6 Construct, upgrade and maintain crossings to meet the aforementioned requirements.

4.1.7 All costs for material and labor to construct the crossing shall be the responsibility of the Contractor.

5. Short Work Blocks

5.1.1 ONTC may, between scheduled trains, and when required, be able to provide positive protection against train movements for a short time period.

5.1.2 During this block time, no rail traffic shall pass through the construction area except in case of emergency.

5.1.3 Generally this train protection is for the construction operations which, in the opinion of ONTC, have minimal potential to impede rail traffic or damage the main track. The Contractor shall give ONTC 48 hours advance notice when work requiring such a block is to be carried out.

5.1.4 ONTC is prepared to schedule this short work block only to permit the Contractor to do minor work on the structure.

5.1.5 The traffic indicates that these short work blocks occur every day. For work which requires a long duration see “Long Work Blocks” below.

6. Long Work Blocks

6.1.1 These work blocks can occur Saturday to Sunday (Summer Schedule) or Saturday to Monday (Fall/Winter/Spring Schedule), at any time of the day or night. The proposed duration of the work blocks specified herein may be subject to negotiation with ONTC.

6.1.2 During these block times, no rail traffic will pass through the construction area except in case of emergency.

6.1.3 The specific time of day is subject to confirmation by ONTC.

6.1.4 During the long and short blocks, railway traffic will be stopped and the Contractor will be permitted to occupy the track portion of the bridge.

6.1.5 Outside of these “blocks”, the Contractor will not be permitted under any circumstances to occupy the operating track portion of the bridge or in any way affect scheduled train operations.

.1 The Contractor and his equipment must stay out of the train operating area.

.2 When handling structural members, the Contractor shall ensure that they never encroach into the operating area of the track.

7. Measurement And Payment

7.1 Measurement

7.1.1 No measurement for payment will be made for Rail Traffic Protection and Work Blocks.

7.2 Payment

7.2.1 No payment will be made for Rail Traffic Protection and Work Blocks.

END OF SECTION

1. General

1.1 Description

1.1.1 This Section includes procedures and requirements for environmental controls during construction.

1.1.2 The work specified in this section consists of all matters related to protection of the environment, including, but not limited to, protection of streams and watercourses, protection of air and water quality, protection of wildlife and wildlife habitats, protection of vegetation, protection of social, cultural and historic resources and restoration.

1.1.3 The work includes provision of suitable waste disposal means, including but not limited to: disposal of construction wastes, sanitary wastes, process wastes and any other waste materials generated during the conduct of the work or incidental thereto.

1.1.4 The work requires adherence to all applicable Municipal, Provincial and Federal Legislation, Regulations, Orders, Standards and Guidelines.

1.1.5 The work includes obtaining and complying with provisions of all Permits, Permissions, Allowances and Licences required by governing bodies for the conduct of the Work and matters incidental thereto.

1.1.6 The Contractor shall maintain all protection control features in satisfactory working condition throughout the length of this Contract.

1.2 Related Work

1.2.1 Section 01520, Construction Facilities and Temporary Controls

1.2.2 Section 02225, Sitework Demolition and Removal

1.3 Definitions

1.3.1 ENVIRONMENT means all natural physical, chemical and biological components and all social, cultural and historic components of the world.

1.3.2 ECOSYSTEM means the interaction of all environmental components.

1.3.3 WATERBODY shall mean any body of water, whether moving or still, including, but not limited to, rivers, streams, creeks, channels, lakes, ponds, marshes, sloughs, swamps, bogs and ditches with water in them, and shall include the area bounded by these bodies up to and including the high water mark.

1.4 Submittals

1.4.1 The Contractor shall submit the following at least ten (10) business days prior to starting the Work to ONTC for their review and acceptance:

1.4.1.1 Design of all environmental protection measures, which are included in the work or incidental thereto.

1.4.1.2 Plan and methodology for all environmental protection measures which are included in the work or incidental thereto.

1.4.1.3 Emergency response plans for protection of the environment.

1.4.1.4 The names of all responsible parties to the work and how these persons may be contacted at any time.

1.4.1.5 Spills Prevention and Response Plan. The plan shall describe in detail the measures to be used to prevent spills, equipment to be available to address spills and procedures for spill response.

1.4.2 The Contractor shall submit the following from time to time as requested by ONTC and/or any governing body:

1.4.2.1 Samples of air, soils, water, rock and any construction materials, including, but not limited to, fuels, oils, grease and process chemicals. Samples are to be submitted immediately upon request.

1.4.2.2 Evidence of valid licences, permits, permissions and approvals.

1.5 Stoppage of Work

1.5.1 ONTC shall have the authority to stop Work and order immediate actions to remedy a situation that, in their opinion, endangers the integrity of the environment.

1.5.2 The Company shall not be liable for costs or delays caused by such actions.

1.6 Contractor Responsibility

1.6.1 The Contractor is responsible for complying with ONTC environmental standards, other applicable regulatory agency requirements and all permit compliance issues during construction, as well as the following:

.1 Site control for drainage and sediments

.2 Water quality throughout the operation

.3 Materials management

.4 Minimal footprint of impacted area

2. Products

Not Applicable

3. Execution

3.1 Clearing

3.1.1 Clearing shall be performed in compliance with section 02225 – Sitework Demolition and Removal and will not be commence more than three (3) weeks prior to the initiation of grading work. The area of exposed soil shall at all times be minimized.

3.1.2 Burning of vegetation shall NOT be allowed.

3.2 Work Adjacent to Waterways

3.2.1 The Contractor shall not operate construction equipment in waterways. All equipment used adjacent to the waterway shall be clean, sound and inspected for mechanical soundness.

3.2.2 The Contractor shall not dump excavated fill, waste material or debris in waterways.

3.2.3 The Contractor shall not ford or cross waterway with construction equipment except at designated locations.

3.2.4 The Contractor shall not distribute construction materials across waterways.

3.2.5 The Contractor shall ensure that all near-water construction activities and mitigation measures are inspected in accordance with requirements stipulated by the Ministry of Natural Resources.

3.2.6 Temporary storage/stockpile areas, maintenance or refueling of equipment shall not be permitted near a watercourse. Other temporary construction areas shall be a safe distance from the water (minimum of 30 m) and on flat ground that does not drain directly to the water. These areas shall be contained. Storage, maintenance or refueling of equipment or stockpiling of erodible material is not permitted near the water.

3.3 Air Quality Protection

3.3.1 The Contractor shall control dust emissions from the Work or activities incidental to the Work in compliance with the Contractor’s accepted Environmental Protection Plan.

3.3.2 The Contractor shall ensure all equipment is fitted with standard emission control devices appropriate to the equipment and in compliance with Federal, Provincial and Municipal regulations and standards.

3.4 Wildlife and Wildlife Habitat Protection

3.4.1 The Contractor shall avoid disturbance of wildlife and/or disruption of wildlife habitat.

3.4.2 The Contractor shall provide "wildlife proof" garbage disposal containers

for all food scraps, lunchroom scraps and other wastes which might attract wildlife.

3.4.3 The Contractor shall not feed wildlife, including, but not limited to, bears, birds and small mammals.

3.4.4 Raptor nests, wildlife denning sites and other areas of wildlife habitation shall not be disturbed while occupied.

3.4.5 The Contractor shall not destroy the active nests (nests with eggs or young birds), or wound or kill birds, of species protected under the Migratory Birds Convention Act and/or Regulations under that Act. All works shall be completed in compliance with the Migratory Birds Convention Act. Note that no permit can be issued for the incidental take of migratory birds or their nests as a result of economic activities.

3.5 Vegetation Protection

3.5.1 The Contractor shall avoid unnecessary damage to vegetation.

3.5.2 The Contractor shall restrict their activities to the area of Work.

3.5.3 The Contractor shall not push snow and other materials into adjacent vegetated areas.

3.5.4 Trees which surround the area of Work and which in the normal conduct of the Work become damaged, shall be made good by the Contractor in compliance with section 31 24 11 – Excavation, Trenching and Backfilling.

3.6 Petroleum and Fluids

3.6.1 The Contractor shall store petroleum products in compliance with Federal and Provincial regulations and the Contractors accepted Environmental Protection Plan

3.6.2 The Contractor shall check all equipment and vehicles on a regular basis for any fluid leaks. All equipment and vehicle maintenance shall only be performed in designated areas.

3.6.3 The Contractor shall keep spills cleanup materials on site at all times.

3.7 Social, Cultural and Historical Protection

3.7.1 The Contractor shall conduct their activities so that social, cultural and historical resources are protected.

3.7.2 The Contractor shall protect archaeological sites or other sites of historic or cultural significance. Disturbance of such sites in any manner shall not be permitted except with the express written consent of ONTC and the responsible governing body.

3.7.3 Should human remains or burials be encountered during construction activities the Contractor shall stop work and notify ONTC immediately. ONTC will immediately notify the Ministry of Tourism and Culture, the

Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ministry of Consumer and Commercial Relations, the Regional Police Service and any potentially interested First Nations communities.

3.8 Waste Disposal

3.8.1 The Contractor shall observe all regulations concerning public health and is responsible for providing sanitation facilities as required. Sanitary waste shall be taken to an approved disposal site.

3.8.2 The Contractor shall make provision for suitable waste disposal means, including, but not limited to, disposal of construction wastes, sanitary wastes, process wastes and any other waste materials generated during the conduct of the work or incidental thereto. In doing so the Contractor shall comply with Federal, Provincial and Municipal regulations.

3.8.3 The Contractor shall adhere to the following regulations and codes pertaining to the disposal of treated wood:

3.8.3.1 Ontario Regulation 347, as amended.

3.8.3.2 The Canadian Council of Ministers of the Environment (CCME) Provisional Code of Practice for the Management of Post-Use Treated Wood.

3.8.4 The Contractor shall dispose of creosote treated lumber and poles at a waste management facility that is licensed to accept this waste.

3.9 Cleaning During Construction

3.9.1 The Contractor shall provide the site with containers for debris and waste materials.

3.9.2 The Contractor shall remove waste materials and debris from the site on a daily basis.

3.9.3 The Contractor shall dispose of volatile waste in covered metal containers and remove from the site on a daily basis.

3.9.4 The Contractor shall clean the roads soiled by Contractor vehicles on a daily basis.

3.10 Restoration and Reclamation

3.10.1 The Contractor shall ensure that all debris, waste, garbage and other materials not naturally found at the site are removed at the completion of the Work and that the site is left in a neat and tidy condition satisfactory to ONTC.

3.10.2 The Contractor shall remove all temporary structures at the completion of the Work.

3.10.3 The Contractor shall , in compliance with the Contactors accepted Environmental Protection Plan, clean up soils and/or other materials contaminated by petroleum products, chemicals or other undesirable

materials. Materials so fouled shall be excavated and hauled to an approved disposal site, unless otherwise agreed in writing by ONTC.

3.10.4 The Contractor shall remove sediments collected in sediment control traps at the completion of the Work. Sediment control traps shall be similarly removed unless otherwise directed by ONTC.

3.10.5 The Contractor shall stabilize all disturbed areas (e.g., soils exposed due to site access and staging and fine substrates that are exposed due to construction activity) as soon as possible after project completion and restored to a pre-disturbed state or better.

3.10.6 The Contractor shall cut off poles to be removed at ground level and maintain intact to prevent the release of pollutants to air, soil or water.

4. Measurement and Payment

4.1 Measurement

4.1.1 No measurement for payment will be made for environmental protection.

4.2 Payment

4.2.1 Clearing shall be performed in compliance with section 34 05 05 – Demolition and Removal and will not be commence more than three (3) weeks prior to the initiation

END OF SECTION

1. General

1.1 Scope of Work

1.1.1 Labour, products, equipment and services necessary for electrical general requirements work in accordance with the Contract Documents.

1.1.2 This section covers general requirements for supply and installation of electrical equipment as detailed on Contract Drawings.

1.1.3 The equipment furnished and the equipment installation, wiring methods and materials used shall conform to the latest edition of the Ontario Electrical Safety Code, Electrical Safety Authority (ESA) Bulletins and Supplements issued by the Electrical Safety Authority, and the applicable ONTC Standards. In case of any conflicts, the more stringent requirement shall apply.

a) In general, the following summarizes the electrical scope of work; refer to Contract Documents for project specific requirements.

b) Provide electrical distribution equipment as per Contract Documents.

c) Provide grounding and bonding system per OESC grounding and bonding requirements.

d) Confirm existing site conditions as they apply to electrical systems and adjust work to suit site requirements. Advise ONTC of any discrepancies to Contract Documents prior to making any adjustments.

e) Coordinate work with other Divisions prior and during construction to avoid interference of equipment and services.

f) Cut, patch and make good all holes made due to electrical system installation to match existing condition.

g) Correct and complete all construction deficiencies before scheduling commissioning.

h) Complete inspection, start-up, testing and commissioning of installed equipment to manufacturer's recommendations and Contract Documents.

i) Provide services of manufacturer’s technical representative for commissioning at no additional cost to ONTC.

1.2 Design Requirements

1.2.1. Design Electrical equipment and systems to all applicable standards of CSA, ULc, IEEE, ESA.

1.2.2. Design electrical equipment and systems to standards and codes to be latest editions adopted by and enforced by local authorities have jurisdiction.

1.2.3. Equipment installed in a controlled environment shall be able to withstand the controlled environmental conditions without damage or degradation of operating characteristics.

1.2.4. The grounding system shall accommodate at each site grounding inspection wells for ground rods. There must be at least two grounding test wells per site.

1.2.5. System protective devices (relays, fuses, breaker trip units, etc.) shall be selected and coordinated to ensure that the interrupter nearest the point of short circuit or high overload will open first and minimize disturbances on the rest of the system.

1.2.6. Brownfields sites and systems design shall be accommodated as follows:

1) Option 1 – Complete System Replacement:

   i) Where the electrical system is to be completely replaced the design shall allow for complete removal of all existing equipment. The design shall also allow for the complete removal without incurring damage or loss of function to any remaining equipment.

   ii) The new equipment shall be installed, tested and commissioned in the same manner as a greenfields installation.

2) Option 2 – Partial System Replacement:

   i) Where only a partial section of an existing electrical system is to be replaced the design shall allow any new section to harmoniously interface with the existing section. The design shall also allow for the partial removal without incurring damage or loss of function to remaining equipment.

   ii) The new equipment in the system shall be fully installed, tested and commissioned. While, only interfaces between the new equipment and existing equipment in the system shall be tested and commissioned.

3) Option 3 – System Extension:

   i) Where an existing electrical system is to be extended the design shall allow any new section to harmoniously interface with the existing section.

   ii) The new equipment in the system shall be fully installed, tested and commissioned. While, only interfaces between the new equipment and existing equipment in the system shall be tested and commissioned.

1.3 Reference Standards

1.3.1 Ontario Electrical Safety Code (OESC).

1.3.2 Ontario Building Code (OBC).

1.3.3 American Railway Engineering and Maintenance of Way Association (AREMA).

1.3.4 CSA Z462, Workplace Electrical Safety.

1.3.5 CAN3 C235, Preferred Voltage Levels for AC Systems, 0 to 50,000V.

1.3.6 CAN3-Z299.4, Quality Assurance Program - Category 4.

1.3.7 CSA, Certification Standards and Electrical Bulletins.

1.3.8 CEMA, Canadian Electrical Manufacturers Association.

1.3.9 ESA, Electrical Safety Authority and Bulletins.

1.3.10 EEMAC, Electrical and Electronic Manufacturer's Association Canada.

1.3.11 IEEE, Institute of Electrical and Electronics Engineers.

1.3.12 NEMA, National Electronic Manufacturers Association.

1.3.13 OPSD, Ontario Provincial Design Standards.

1.3.14 ULC, Underwriters' Laboratories of Canada.

1.3.15 SSPC, Surface Preparation Standards.

1.4 Spare Parts

1.4.1 See Contract Documents and related sections.

1.5 Training

1.5.1 See Contract Documents and related sections.

1.6 Warranty

1.6.1 All electrical products to be guaranteed by manufacturer, for a minimum ten years, if not defined by other specifications to be a longer period.

1.7 Delivery, Storage and Handling

1.7.1 Not applicable.

1.8 Submittals

1.8.1 Product Data and Shop Drawings Package:

1.8.1. Submit manufacturer's Product Data indicating:

a) Performance criteria, compliance with appropriate reference standard, characteristics, limitations and troubleshooting protocol.

b) Product transportation, storage, handling and installation requirements.

c) Technical data, Product data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items and parts lists.

1.8.2. Submit Shop Drawings indicating:

a) Materials or equipment being supplied. Include thickness and finishes.

b) Details of construction, accurate dimensions. Include mounting and installation details.

c) Capacity, operating characteristics and performance.

d) Non-catalogue items, prepared specifically for this project.

e) Supplementary data, with database explaining theory of operation.

f) Total weight.

g) Shipping sections.

h) Bill of material.

i) Connections, calculations, test results and loads.

j) Termination and interconnection lists.

k) Equipment nameplate schedule.

l) Nameplate drawings.

m) Interconnection lists, schematic diagrams with cross-referenced components lists and sequence of operations.

n) Equipment and components performance curves.

o) Names and addresses of local suppliers and service representatives.

p) Identification table complete with details of conduit size, wire or cable size, junction boxes, pull boxes and feeder panels/breaker identification. Complete as part of Shop Drawing submission.

1.8.3. Protection Coordination.

Submit the following:

a) Complete schedule of all main protective relays, fuses and other protective devices listing device locations, function number, manufacturer, model number, size, range and setting.

b) Protection Coordination and Load Flow study.

c) Study to include time current curves of protective devices in the system with corresponding short level levels, damage curves and single line diagram. All main protective devices, transformers, all large motors and main feeder cables shown be included on time current curves.

d) Study to illustrate prospective fault currents and shall verify equipment short circuit withstand ratings specified for electrical equipment provided under the Contract.

e) Study shall include all the assumptions and all the data.

1.8.4. Quality Assurance Package.

a) Submit construction inspection and acceptance sign off checklists during construction as the work is completed. The checklists shall be complete with signatures and dates from the contractor and the owners on site representative. These checklists are to be completed and reviewed by the commissioning team at the time of commissioning.

b) Submit test report for each test performed. Tests shall be signed by testing engineer and where witnessed by ONTC or Representatives. Report shall include: records of tests performed, methods of calculation, date and time of test, ambient conditions, names of testing company, test engineer and witnesses if required.

1.8.5. Commissioning Package.

Submit the following:

a) Commissioning plan and procedures (submit prior to scheduling commissioning).

b) Deficiency Report.

c) Commissioning Closeout Report.

d) Certificate of Readiness. Certifying electrical installation ready and fit for service.

Submit the following for incorporation into Operation and Maintenance Manuals:

a) Complete set of reviewed Shop Drawings of equipment.

b) Complete bills of materials and spare parts showing manufacturer's names, addresses, local replacement sources and telephone numbers.

c) Stock list of recommended spare parts and quantity of each item.

d) Manufacturer's warranties.

e) Manufacturer's certified reports.

f) Installation instructions.

g) Appropriate servicing, trouble shooting and preventative maintenance schedule and instructions for equipment and systems. Equipment and components performance curves.

h) Field testing and commissioning reports.

i) Factory test reports.

j) Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of portion or feature of installation.

k) Final ESA and/or local Hydro Certificates.

1.8.6. Regulatory Requirements Package.

a) Submit Shop Drawings to AHJ and obtain approval that equipment or complete system meets their requirements before submission of drawings to ONTC.

b) Complete ESA inspection and approval of new installation.

1.8.7. As-Built and Record Drawings.

Submit As-Built or Record Drawings indicating:

a) Accurately maintained, dimensioned record of cable, conduit, bus duct and equipment for site specific locations. Show deviations and changes in Work from Contract Drawings.

b) Actual locations of conduits and ducts, piping, maintenance holes and related items located below or outside of structure.

c) On each drawing in lower right-hand corner in letters minimum 13 mm high as follows: AS-BUILT (or Record Drawing): THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED followed by signature of Contractor and date.

1.9. Coordination with Utilities

1.9.1. Coordinate with the Electrical Utility for required electrical services.

1.9.2. Provide required equipment for services per coordination with Electrical utility including Ductbanks, Manholes, Fences, Grounding, Lightning arrestors, High Voltage distribution equipment and cabling as required.

1.9.3. Coordinate with utility authorities and municipal authorities regarding protection, relocation, removal and reinstatement of utilities.

1.9.4. Verify location of existing services with applicable utilities as necessary to complete the Work.

1.9.5. Notify ONTC if third party inspection is required, at least 20 Business Days prior to start of Work.

1.9.6. Coordinate all utility authorities Work that will be undertaken in conjunction with the Work. Provide at least 15 Business Days' notice to utility authorities and ONTC prior to undertaking proposed Work.

1.9.7. Notify ONTC 15 Business Days prior to start of Work by utility authority or municipality.

1.9.8. Support, protect and restore all affected utilities.

1.9.9. Obtain written approvals from utility authorities for Work performed.

1.9.10. Remove and dispose of all abandoned underground ductbanks, handwells and pole bases of the Electrical Utility, other utilities and per ONTC's requirements.

1.9.11. All distribution equipment is to be provided with lightning arrestors.

1.10. Site Conditions

1.10.1. Protect, support and maintain existing active services as required for execution of Work without disturbing these services.

1.10.2. Notify and obtain ONTC's written permission, before disconnecting existing circuits or accessing existing electrical equipment.

1.10.3. In the event circuit designations on existing panelboards do not agree with field installation. Trace and verify such circuits, as required.

1.10.4. Do not disrupt existing lighting, power, and signalling and communications systems.

1.10.5. If temporary connections are required to maintain services during construction period, provide such necessary temporary services: design, material, equipment and labour to electrical safety codes and standards including emergency back-up power if required by ONTC review.

1.10.6. Notify ONTC before working on any existing panel or electrical equipment.

1.10.7. Disconnect from power supply existing electrical equipment or device to be worked on or removed. After completion, reconnect existing services, equipment and devices to remain in operation.

1.10.8. Leave existing electrical services abandoned or removed in safe condition, disconnected from power source.

1.10.9. Remove redundant wire and cable, insert a fish wire and cap associated conduits at both ends and label them EC (empty conduit).

1.10.10. Electrical safety: Protect personnel during construction from physical danger from exposed energized equipment such as panelboard mains and outlet wiring. Shield and mark live parts, i.e. LIVE - 600 VOLTS AC.

1.10.11. Arrange for installation of temporary doors, barriers and similar items, for rooms containing electrical equipment. Keep doors locked except when under direct supervision.

1.10.12. Use minimum 1.5 hour fire rated temporary doors and barriers for rooms containing electrical equipment.

1.11. Quality Assurance

1.11.1. All Quality Assurance submittals listed in this specification shall be provided.

1.11.2. All electrical work shall be carried by licensed electricians with experience and training in the equipment and systems (certified or manufacture approve) being installed in Ontario.

1.11.3. All electrical work shall be inspected and approved by ONTC for acceptance. Interim and final inspections shall be performed with ONTC or It's representative present.

1.11.4. Coordination.

a) Coordinate Work specified in this Section with work provided under other electrical work and work of other trades.

b) Determine required separation between cable and other work.

c) Determine cable routing to avoid interference with other work.

d) Provide core drilling where required prior to commencing Work.

e) Coordinate alternate cable routing with ONTC prior to proceeding with the Work.

1.12. Regulatory requirements

1.12.1. Comply with authorities having jurisdiction (AHJ). Include for changes or alterations required by AHJ. Where a conflict is observed in the Contract Documents and AHJ requirements, the more stringent requirement shall apply.

1.12.2. Obtain and pay for permits required by the AHJ and arrange and pay for inspection and testing.

1.12.3. Submit required documentation and drawings to AHJ to obtain approval for the Work. Submit any additional information, details and related items that AHJ requests.

1.12.4. Supply and install warning signs, labels, nameplates and glass covered diagrams as required by AHJ.

1.12.5. Where materials require special inspection and approval of CSA or AHJ, obtain such approval for that installation. If CSA certified equipment unavailable, obtain special approval for equipment from CSA and/or ESA.

1.12.6. Carry out all changes and alterations required by the authorized inspector of any AHJ without delay to the progress of the work and without extra cost.

2. Products

2.1. GENERAL

2.1.1. Equipment and materials shall be in accordance with requirements of related sections and the Contract Documents.

2.1.2. Provide equipment suitable for its intended use for the environmental conditions experienced in the location without damage or degradation of operating characteristics.

2.1.3. Provide equipment for electrically noisy environments (EMI) that shall be able to withstand the EMI conditions without damage or degradation of operating characteristics.

2.1.4. Equipment shall be CSA certified. Where CSA certified equipment is unavailable, obtain special approval for equipment from CSA or it's designated representative.

2.1.5. Equipment shall be factory made where possible and not cost prohibitive. Site fabrication shall be minimized.

2.2. Design

2.2.1. Submit design document in accordance with the following, but not limited to:

2.2.2. Preliminary design to illustrate site layouts and single line concepts;

2.2.3. Coordinate with utilities for power requirements;

2.2.4. Submit load diversity factors per nature of load for ONTC to Accept before load calculations;

2.2.5. Power calculations to cover but not limited to: load calculations, equipment sizing, voltage drop, and short circuit.

2.2.6. Detailed Specifications describing scope requirements: equipment, supply, installation, testing, commissioning, maintenance, warranty, spare parts and other issues identified by ONTC;

2.2.7. Design drawings at required milestones and final design drawings stamped issued for construction ahead of commencing Work;

2.2.8. Maintain throughout construction updated record drawings and make available for ONTC review at any time;

2.2.9. Provide design, Specifications, drawings, calculations and required documentation to ESA, Fire Marshall and authorities having jurisdiction to obtain approvals;

2.2.10. Provide final record drawings to ONTC for Acceptance;

2.2.11. Obtain permits, occupancy permits, inspections and final certificates of completion with required utilities, ESA, Fire Marshall and authorities having jurisdiction. Submit certificates to ONTC.

2.2.12. Cables, wires and conductors shall be designed to withstand the environmental conditions to which they are exposed without damage or degradation of operating characteristics. Refer to Section 26 05 00 for general environmental conditions.

2.2.13. The voltage drop in an installation shall not exceed

a) 3% in a feeder or branch circuit; and

b) 5% from the supply side of the hydro service to the point of utilization.

2.2.14. The calculation of the size of conductors to downstream equipment shall be based on the full current rating of the downstream equipment. Calculation based on demand loads or a derated load is not allowed.

2.2.15. The minimum insulation temperature rating shall be 90°C. All calculations and design shall be done using 75 °C.

2.2.16. The minimum Fire Test (FT) rating for all cables and wires shall be FT-4.

2.2.17. There are to be no cable splices allowed below grade.

2.3. Materials

2.3.1. General

a) Materials used for the Work shall meet all ESA, CSA, applicable authorities having jurisdiction, codes and standards.

b) Electrical Work shall comply with all ESA, CSA, and applicable authorities having jurisdiction, codes and standards. This extends to the connection of power supply branch circuit at signalling equipment.

2.3.2. Plywood: In accordance with the requirements of this Section.

2.3.3. Primer: Primer for galvanized surfaces and paint, in accordance with requirements of this Section.

2.3.4. Fish wire: Yellow waterproof polypropylene rope minimum six (6) mm diameter.

2.3.5. Sleeves: In accordance with the requirements of this Section.

2.3.6. Steel sheet: ASTM A653, Z275 coating designation; galvanized steel sheet.

2.3.7. Support channels: Type 1: Slotted channels minimum 2.6 mm thick hot dipped galvanized steel sheet.

2.3.8. Hardware: of cadmium plated steel:

a) Precast concrete panel: Red Head Sleeve Anchor, 10 mm maximum diameter and 50 mm deep.

b) Concrete structure: Stud Bolt, Red Head Stud Anchors and Sleeve Anchor.

c) Concrete block wall: Spring-in toggle bolt.

d) Concrete Anchoring: Red Head Self Drill Shield. Machine bolts and threaded rod: cadmium plated to ASTM B766. Size machine bolts and threaded rod according to applicable loads including safety factors and standards.

e) Hollow wall anchoring: Spring-in toggle bolt.

f) Steel beams and columns: Bolts, washers and nuts, cadmium plated to ASTM B766.

g) Fastening equipment to mounting channel: Spring Nuts.

2.3.9. Supports and Brackets:

a) Supports and brackets for installation of equipment, cables, and conduit to be in accordance with manufacturer's written requirements. Hot dip galvanize steel parts after fabrication to ASTM A123, or approved equivalent.

b) Cushion clamps for fastening cables, of required length to application including growth factor, or approved equivalent.

2.3.10. Fasteners: Expansion bolt or concrete anchor, drilled-in type, 10 mm diameter Studbolt, or approved equivalent.

2.3.11. Clamps: Stainless steel as recommended by support channel manufacturer, or approved equivalent.

2.4. Fabrication

2.4.1. All equipment must be CSA certified. If CSA certified equipment is unavailable, obtain special approval for equipment from approved Ontario Electrical Safety Authority.

2.4.2. Provide equipment suitable for its intended use within environmental range as of temperature and humidity values experienced in Ontario.

2.4.3. Fabricate steel supports, plates and hardware as required. Hot dip galvanize prefabricated supports such as channels, brackets, hangers, slotted angles. Do not field weld, butt bolt or clamp. Touch-up cut sections with cold galvanizing zinc coating.

2.5. Finishes

2.5.1. Prepare and clean surfaces of electrical Products requiring painting to SSPC SP3 for rust and SSPC SP1 for oil, grease, dirt and other contaminates.

2.5.2. Apply one (1) coat of primer.

2.5.3. Apply two (2) coats of finish paint. Colour of manufacturer's standard ASA gray except as specified otherwise. Paint outdoor electrical equipment "equipment green" finish to NEMA standard. Primer and finish coats should be from the same manufacturer.

2.5.4. Apply paint in accordance with manufacturer's instructions regarding application methods, coating thicknesses, equipment, temperature and humidity conditions.

2.5.5. Clean and touch up surfaces scratched or marred during shipment and installation, to match original paint finish. Provide Owner with touch up paint containers minimum of four (4) gallons per colour.

2.5.6. Clean, prime and paint exposed hangers, racks and fasteners to prevent rust in accordance with maunfacturers recommendations.

2.6. Circuit Breakers

2.6.1. The following general requirements apply to all circuit breakers covered by this Specification.

a) Circuit breakers shall be single throw.

b) Circuit Breakers shall be “Trip-Free”.

c) It shall be possible to open and close all breakers manually.

d) A trip on any one pole shall trip all poles.

e) Multi-pole applications shall be common-trip breakers with single handle.

f) The maximum interrupting time is 5 cycles.

g) Circuit breakers shall be 100% continuous duty unless otherwise indicated on the Contract Documents.

h) Circuit breakers shall be provided with a direct mechanical means for indicating its closed, open and/or tripped positions at the place of operation. Lamp indication in place of a mechanical indicator will not be accepted.

i) Service Entrance Circuit Breakers for main panelboards shall include a solid state, electronic trip unit which is capable of being coordinated with the other protective devices in the system to allow operation of protective devices closest to the fault location. The trip unit shall include communications capability as indicated on the Contract Documents.

j) Circuit Breakers shall have a minimum symmetrical rms interrupting capacity rating, as shown in the Short Circuit Protection and Coordination Studies or Contract Documents.

k) Circuit breakers shall include all necessary interlocks to prevent inadvertent operations and to ensure safety of operating personnel and the equipment.

2.6.2. Circuit breaker Manufacturer shall furnish necessary bus connections, wire jumpers, bolts, nuts, washers, etc., suitably packaged and marked to facilitate assembly. Identify each shipping container with name of contents, contract number, and equipment number permanently marked and readily visible.

2.6.3. Circuit breaker mounting methods included but are not limited to: enclosed in stand alone enclosures, wall mounted, or mounted inside panelboards/switchboards/switchgears/load-centers. Refer to Contract Documents for requirements.

2.7. Rigid Galvanized Steel (RGS) Conduit

2.7.1. Material: Hot-dip galvanized steel tubing. Metallic rigid conduit other than hot-dip galvanized rigid steel is unacceptable.

2.7.2. Applications: Indoor and dry locations. Permitted in hazardous locations in accordance with OESC, Section-18, hazardous locations and as indicated on Contract Drawings.

2.7.3. Fittings: Use threaded hubs (bullet hubs) for connections to threadless junction boxes, enclosures and equipment. Threaded hubs shall be of rugged steel/malleable iron construction, electro-zinc plated, complete with nylon insulated throat. Couplings shall be threaded of rugged steel/malleable iron construction and electro-zinc plated and shall allow conduit coupling without rotating either pipe. Straps shall be steel/malleable iron construction with hot-dipped galvanized finish. Expansion/contraction fitting shall be telescopic sleeve type with bonding jumper and made of steel/malleable iron construction with hot-dipped galvanized finish. Conduit bodies shall be steel/malleable iron with zinc electroplate finish.

2.7.4. Conduit shall be threaded at both ends.

2.8. Power Wire and Cable

2.8.1. All conductors shall be stranded copper.

2.8.2. Conductors smaller than No. 12 AWG shall not be permitted for lighting or motor branch circuit wiring, except that No. 14 AWG multi-strand type conductors may be used for control circuits only. All conductors larger than No. 14 AWG shall be multi-stranded.

2.8.3. The insulation shall be one level higher than required by Code. I.e. if 300 V insulation is required by Code then 600 V insulation shall be provided. The minimum insulation ratings shall be 600 V.

2.8.4. Insulation shall be chemically cross-linked thermosetting polyethylene material rated RW90, and RWU90 for underground installation or as indicated on Contract Drawings.

2.8.5. All wires shall be free of splices between terminations. If physical constraints of installation prevent this, details of splicing are subject to ONTC’s approval.

2.9. Teck Cable

2.9.1. Conductor: Single or Multi-conductor, stranded soft copper in accordance with ASTM B3, Class B stranding in accordance with ASTM B8.

2.9.2. Insulation: XLPE, Type RW90 or RWU90.

2.9.3. Grounding conductor: Uninsulated Class B stranded grounding conductor included in cable assembly.

2.9.4. Multiple conductor cables assembled with suitable fillers and binder tape.

2.9.5. Inner jacket: Flame-retardant and moisture resistant Polyvinyl Chloride (PVC).

2.9.6. Armour: Aluminum Interlocked Armour (AIA) or Galvanized Steel Interlocking Armour (GSIA).

2.9.7. Outer jacket: Low-temperature, moisture and sunlight resistant Polyvinyl Chloride (PVC).

2.9.8. Connectors: Watertight, approved for Teck cable.

3. Execution

3.1. General

3.1.1. Perform electrical work to Ontario Building Code, Ontario Electrical Safety Code and to Canadian Standards Association.

3.1.2. Provide regulatory requirements as provided in paragraph 1.12 of this specification.

3.1.3. Do not manufacture or install electrical equipment or systems until Shop Drawing review and acceptance by ONTC and the AHJ.

3.2. Electrical safety

3.2.1. Protect personnel during construction from physical danger from exposed energized equipment such as panelboard mains and outlet wiring. Shield and mark live parts “LIVE – XXX VOLTS” (label voltage as required, 600V, 208 V, 120 V, etc.).

3.2.2. Protect personnel during construction from physical danger from arc-flash hazards by assessment of hazards and provision of arc-flash labels.

3.2.3. Arrange for installation of temporary doors, barriers and signage for rooms containing electrical equipment. Keep doors locked except when under direct supervision.

3.3. Installation

3.3.1. Protect, support and maintain existing active services as required for execution of Work without disturbing these services.

3.3.2. Notify and obtain written permission from ONTC before working on or accessing any existing panel or electrical equipment.

3.3.3. Install electrical equipment in locations shown on Contract Drawings. Where conflicts or site conditions require deviation from work as specified or indicated in the Contract Documents, notify ONTC and provide required documentation for acceptance before proceeding. Commencement of Work means acceptance of existing conditions.

3.3.4. Quantities or lengths indicated in Contract Documents are approximate and do not gauge or limit Work. No adjustment to Contract Price allowed to complete Work.

3.3.5. Verify equipment access and coordinate with equipment supplier to ensure equipment can physically transport to installation location.

3.3.6. ONTC reserves the right to relocate electrical items during construction, but prior to installation, without cost, if the relocation per item does not exceed 3 m from the original location. No credits shall be anticipated where relocation per item of up to and including 3 m reduces materials, products and labor.

3.3.7. ONTC reserves the right for reconstruction of electrical items without cost, due to lack of timely submissions or approvals before commencing work. Remove, relocate or replace work to the acceptance of ONTC.

3.3.8. No change to Contract price is allowed for relocation of equipment incorrectly installed because of failure to check and coordinate details, Contract Drawings and interferences, prior to installation.

3.3.9. If temporary connections are required to maintain services during construction period, supply and install necessary material, equipment and labor to electrical safety codes and standards.

3.3.10. Protect electrical equipment from elements and damage by other construction activities in area. Install protective materials around and over services as required. Be present during excavation and backfilling to supervise installation.

3.3.11. Protect finished and unfinished work of other trades until completed work has been accepted.

3.3.12. Perform testing of packages of work and promptly make any changes necessary.

3.3.13. After completion of a package of work, notify ONTC to perform a final inspection for acceptance purposes. Any deficiencies identified by ONTC shall be rectified and the inspection repeated for those deficiencies.

3.3.14. Obtain ONTC written approval prior to any final connections to existing operational electrical panels and equipment. ONTC will present and agree to the any connection on existing electrical panels and equipment.

3.3.15. Place packages of work into service at such time and in such order as ONTC may direct.

3.3.16. Unless otherwise specified, Contract Documents intended to cover ancillary items necessary for work. Supply and install all ancillary omitted items essential for complete and operational installation.

3.3.17. Unless otherwise specified, Contract Documents intended to result in completely operational electrical systems and equipment. Supply, install, connect, configure and test to achieve a complete and operational installation.

3.3.18. Circuit designations on existing panelboards may not agree with field installation. In such cases trace and verify such circuits and update the circuit designations.

3.4. Existing Equipment

3.4.1. Electrical equipment requiring temporary or permanent relocation or power due to construction is the Contractor's responsibility. Contractor shall coordinate any relocation with ONTC.

3.4.2. All new and existing electrical equipment shall be connected to or disconnected from existing distribution system (after approval by ONTC.

3.4.3. Include and provide additional items and accessories or connections obviously required to provide complete working system for relocated equipment but omitted from Specifications or not shown on Contract Drawings.

3.4.4. Contractor shall assume that all existing conduits in Work area contain live circuits.

3.4.5. Trace conduits and circuits feeding existing equipment in Work area obstructing and interfering with Contract Work. Maintain circuits live, and if required in use.

3.5. Conduit and Cable Installation

3.5.1. Assume existing conduits in Work area contain live circuits. Coordinate any Work on existing equipment with ONTC.

3.5.2. Relocate temporary or permanent electrical equipment and conduits as required.

3.5.3. Install 50 mm high raised concrete curb at floor openings for bus ducts through floor slabs.

3.6. Load Balancing

3.6.1. Measure phase current to panelboards with normal loads operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record current readings. Submit recorded data to ONTC for review.

3.6.2. Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment. Measure phase voltages to reflect utility voltage fluctuations and set accordingly.

3.7. Care, Operation and Start Up

3.7.1. Instruct ONTC's staff in operation, care and maintenance of installation at times arranged by ONTC and detailed in other Sections at no extra cost to ONTC.

3.7.2. Provide services of Contractor's staff to supervise startup of installation, check, adjust, balance and calibrate components at no extra cost to ONTC.

3.7.3. Provide these services for such period and for as many visits as necessary to put installation in working order and to ensure ONTC's staff conversant with all aspects of its care and operation at no extra cost to ONTC.

3.8. Finish

3.8.1. Painting Procedure:

a) Prepare and clean surfaces of electrical equipment requiring painting to SSPC SP3 for rust and SSPC SP1 for oil, grease, dirt and other contaminates.

b) Apply one coat of primer.

c) Apply 2 coats of finish paint. Colour of manufacturer's standard ASA grey except as specified otherwise. Paint all electrical equipment to EEMAC standard.

d) Apply paint in accordance with manufacturer's instructions regarding application methods, coating thicknesses, equipment, temperature and humidity conditions.

3.8.2. Contractor shall clean and touch up surfaces scratched or marred during shipment and installation, to match original paint finish.

3.8.3. Contractor shall clean, prime and paint exposed hangers, racks and fasteners to prevent rust.

3.8.4. Contractor shall provide touch-up paint.

3.9. Field Quality Control and Commissioning

3.9.1. General

a) Field quality control and commissioning shall be performed in accordance with related sections.

b) Commissioning shall verify electrical and mechanical operation is in accordance with Standards and recommendations of manufacturers.

c) A 3rd party commissioning agent shall be engaged to perform commissioning work and provide all required commissioning submittals.

d) Provide factory authorized and trained personnel to perform commissioning and start-up testing, including checkout, adjustments, balancing and calibration of components and systems, as required.

e) Provide these services as required to ensure installation is in proper working order and to ensure the ONTC's staff conversant with all aspects of its care and operation at no extra cost to ONTC.

f) Inspections by jurisdictional authorities shall include all appropriate local and provincial authorities, including but not limited to:

i. Building Inspection's Department.

ii. Local hydro companies (local utility authority).

iii. Fire services inspection's department.

iv. Ministry of Labour.

v. Electrical Safety Authority.

3.9.2. Tests

a) Field testing shall be performing on all systems included in the Contract.

b) Test wiring systems with switchboards, panelboards, fuseholders, switches and overcurrent devices in place and connected.

c) Polarity test: Test sockets for correct polarity.

d) Voltage drop test: Perform voltage test at last outlet in each circuit, one on each circuit, with circuit fully loaded. If excessive drop in potential, locate cause and correct condition. Replace defective parts, materials, conductors, insulation or splices.

e) Supply voltage: Measure and report to ONTC line voltage of each phase at load terminals of main breakers. Make test with majority of electrical equipment in use.

f) General operation: Energize and put into operation each electrical circuit and item. Make necessary repairs, alterations, replacements, tests and adjustments required for complete and acceptable operating electrical system.

g) Make tests in presence of ONTC. Perform General-Operation testing at time of acceptance of Work.

3.9.3. Cleaning

a) Perform final cleaning in accordance with Contract documents.

b) Where equipment shows corrosion, or damage to finish of panels, panelboards fixtures or devices, touch-up surfaces to the acceptance of ONTC.

c) Polish plated work and glass. Replace burned out lamps.

d) Repair, adjust and lubricate mechanisms and leave in operating condition.

3.9.4. Training

a) Provide training, video instructions if appropriate and documentation in accordance with the Contract documents and as indicated within related sections.

3.9.5. Maintenance

a) Maintain all equipment and systems installed until Substantial Performance, in accordance with the Contract documents.

3.10. Wiring Methods

3.10.1. Use wiring methods required by the AHJ, the OESC, and as indicated on the Contract Drawings, manufacturer's instructions, and as specified herein.

3.10.2. Protect wire and cable from kinks.

3.10.3. Provide grommets and strain relief where required.

3.11. Installation of Wires and Cables

3.11.1. Pull in all wires in any one conduit at same time directly from reels or coil carefully to avoid damage to conductors or insulation. In accordance with cable manufacturer's recommendations.

3.11.2. Conductors and cables shall be outdoor rated where installed outdoor and /or installed in locations where they will be exposed to weather elements, including solar radiation.

3.11.3. Conductors and cables shall be underground rated where installed below grade underground.

3.11.4. No joints in any conductors between any boxes or outlets. Neutral conductors unbroken throughout their length. Feeders continuous without splices throughout their entire length unless ONTC's approval given to allow splices.

3.11.5. Use proper crimping tool on pressure applied specific connectors at conductor joints.

3.11.6. Use terminal lugs on conductors No.10 AWG or larger where they are terminated for connection to switchboard or other equipment. Apply lugs with proper tools.

3.11.7. Carefully unroll cable from reels and coil and run cable as complete from one outlet or junction box to next.

3.11.8. Seal space between cables and sleeves or wall or floor opening, with UL listed firestop putty, sealant, compound or pillow, after wires and cables have been installed.

3.11.9. If necessary to splice cable, make splice in junction box of adequate size. Keep number of splices in any run of cable to absolute minimum consistent with available coil length and with installation conditions. If in opinion of ONTC excessive number of splices have been made in cable, remove cable and replace with proper number of splices.

3.11.10. Support cables on clips at maximum spacing of 1 m. Make bends in cable with proper tools (available from manufacturer), to following minimum radii measured inside bend.

Table 3-1: Cable Bending Radius

SHEATH DIAMETER (OD)	MINIMUM BENDING RADIUS
Above 19 mm and including 38 mm	12 x Sheath diameter
Above 38 mm	15 x Sheath diameter

3.11.11. Straighten cable runs to form neat and uniform appearance. Route cables, where possible, parallel to or at right angles to walls, ceilings and floors. Where this is not possible seek permission from ONTC.

3.11.12. Carry out stripping, straightening, bending, supporting and termination in conformity with this Section and installation instructions of cable manufacturer. Consult ONTC regarding any discrepancy.

3.11.13. Carry conductors of branch circuits or feeders in same multi-conductor cable, unless otherwise noted or reviewed by ONTC.

3.11.14. Connectors: Wing nut type as manufactured by Thomas & Betts or equivalent approved by ONTC.

3.11.15. Terminal lugs: Solderless pressure-applied type lugs. Lugs to have conductivity not less than wire or cable to which they are attached.

3.11.16. Duct seal: Duct Seal Weatherproof Compound by Appleton Electric Products or equivalent approved by ONTC.

3.11.17. Soldering lugs: As recommended by cable manufacturer.

3.12. Installation of Teck Cable

3.12.1. Ground cable sheaths at supply end only with opposite cable end to be isolate from ground.

3.12.2. Provide isolating plate at load end where cables may be in contact with any metal enclosures. Isolate cable sheath or sheaths from metal enclosures.

3.12.3. Space cables to maintain air space minimum 100% of largest cable diameter.

3.12.4. Lay cable in cable troughs in accordance with the OESC.

3.12.5. Terminate cables in accordance with the OESC.

3.12.6. Identify at both ends utilizing permanent markers.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes requirements for Excavation, Trenching and the supply, delivery, placement and compaction of Backfilling.

1.2 References

1.2.1 Conform to OPSS 902 Excavating and Backfilling Structures, except where indicated below.

1.2.2 Conform to OPSS 404 Construction Specification for Support System.

1.2.3 Conform to OPSS 539 Construction Specification for Temporary Protection System.

1.2.4 Conform to OPSS 517 Construction Specifications for Dewatering of Pipeline, Utility, and Associated Structure Excavation.

Conform to OPSS 518 Construction Specifications for Control of Water from Dewatering Operations.

1.3 Quality Control Methods

1.3.1 All materials that are to be incorporated in the Work are to be accepted by ONTC. Material found not satisfactory shall be disposed of as instructed by the ONTC. Quality control methods for determining conformance to specified requirements shall be as follows:

1.3.1.1 Particle-Size Analysis of Soils - ASTM D422.

1.3.1.2 Compaction Characteristics of Soil - ASTM D698.

Maximum Index Density and Unit Weight of Soils - ASTM D4253

2. Products

2.1 Materials

2.1.1 Classification of excavated materials shall conform to OPSS 206.03.

2.1.2 The following classes of materials shall be recognized:

2.1.2.1 Common Material (CM) is defined as any material remaining on site after stripping has been performed. CM Excavation refers to the removal of such material as specified by the Drawings. Suitable CM shall be utilized for construction where specified. The excavation of all materials including hardpan, quicksand and frozen earth; also rock, concrete or masonry less than 1.0 m^3 in volume shall be classified as CM excavation.

2.1.2.2 Earth means all soils except those defined as rock, and excludes stone masonry, concrete, and manufactured

materials.

2.1.2.3 In addition to the definition given in section 2.1.1 of this Specification, unsuitable material is defined as material ONTC determines to be:

2.1.2.3.1 Of such unstable nature as to be incapable of being compacted to a specified density using ordinary methods; or

2.1.2.3.2 Too wet to be properly compacted and circumstances prevent suitable in-place drying prior to incorporation into the Work; or

2.1.2.3.3 Frozen or containing ice particles.

2.1.2.3.4 Containing organic, peat or other deleterious material.

2.1.2.3.5 Otherwise unsuitable for the planned use.

2.1.3 Native Backfill: selected material from excavation approved by ONTC for use intended, unfrozen and free from rocks larger than 150 mm, cinders, ashes, sods, refuse or other deleterious materials.

3. Execution

3.1 Site Conditions

3.1.1 Examine the site to determine local conditions under which the Work will be undertaken.

3.2 Site Preparation

3.2.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 Protection of Existing Features

3.3.1 Existing buried utilities and structures:

3.3.2 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

3.3.3 Prior to commencing excavation work, notify authorities having jurisdiction, establish location and state of use of buried utilities and structures. ONTC or authorities having jurisdiction shall clearly mark such locations to prevent disturbance during Work.

3.3.4 Confirm locations of buried utilities by careful test excavations.

3.3.5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. Obtain direction of ONTC before moving or otherwise disturbing utilities or structures.

3.3.6 Record location of maintained, re-routed and abandoned underground lines.

3.3.7 Protect existing trees, landscaping, bench marks, buildings, pavement, signage, signals, etc. which are to remain. If damaged, restore to original or better condition unless directed otherwise.

3.3.8 The Contractor shall protect all work as specified in Section No. 02353, Special Procedures for Traffic Control.

3.4 Stripping of Topsoil

3.4.1 Commence topsoil stripping of areas as directed by ONTC after area has been cleared of brush, weeds and grasses and removed from site. Refer to Section No. 02311, Site Grading and Earth Excavation.

3.4.2 Strip topsoil. Do not mix topsoil with subsoil.

3.5 Stockpiling

3.5.1 Stockpile fill materials in areas permitted by ONTC. Stockpile granular materials in manner to prevent segregation.

3.5.2 Protect fill materials from contamination.

3.6 Dewatering

3.6.1 Keep excavations free of water while Work is in progress.

3.6.2 Protect open excavations against flooding and damage due to surface run-off.

3.6.3 Dispose of water in a manner not detrimental to public and private property, or any portion of Work completed or under construction.

3.6.4 Continuously dewater the excavations to control surface runoff or perched water table seepage for concreting and other work to be carried out in the dry condition.

3.6.5 Submit for review details of the proposed dewatering methods, such as well points to ONTC.

3.7 Excavation

3.7.1 Excavate to lines, grades, locations, elevations and dimensions as indicated or directed by ONTC.

3.7.2 Remove excavated material and other obstructions encountered during excavation.

3.7.3 Excavation must not interfere with normal 45° splay of bearing from bottom of any footing or from the bottom of any tie of an in service railroad track.

3.7.4 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

3.7.5 For trench excavation, unless otherwise authorized by ONTC in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

3.7.6 Dispose of surplus and unsuitable excavated material off-site.

3.7.7 Do not obstruct flow of surface drainage or natural watercourses.

3.7.8 The bottom of excavation shall be undisturbed soil, level, free from loose, soft or organic matter.

3.7.9 Remove unsuitable material from trench bottom to extent and depth as directed by ONTC.

3.7.10 The Contractor is responsible for the proper disposal of surplus or unsuitable material off the site. They shall arrange and pay for additional testing as required by the receiver site as a condition for acceptance of the material. Submit to ONTC the forms provided under OPSS 180 which are signed by the receiver site.

3.7.11 Correct unauthorized over-excavation as follows:

3.7.11.1 Fill under bearing surfaces and footings with concrete specified for footings.

3.7.11.2 Fill under other areas with Granular ‘B’ material.

3.7.12 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.7.13 The requirements for supplying, placing, maintaining and removing support systems required to permit the excavation and backfilling of trenches or excavation for installation of sewer pipes and watermain and associated appurtenances shall be in accordance with OPSS 538. Where temporary protection systems are required within trenches, the construction of temporary protection systems shall be in according to OPSS 539.

3.7.14 In addition to typical construction health and safety concerns relating to dewatering and excavations, the project specific health and safety plan must address worker and community exposure to leachate and methane gas. This document is to be prepared and provided to ONTC before the Work is to commence. All of which is to be prepared in conformance with the Ontario Occupational Health and Safety Acts and any related regulations.

3.8 Bedding and Surround of Underground Services

3.8.1 Place and compact granular material for bedding and surround of underground services as indicated and as specified.

3.8.2 Place bedding and surround material in unfrozen condition.

3.8.3 Bedding and cover material shall be compacted to 95% of maximum dry density.

3.9 Backfilling

3.9.1 Do not proceed with backfilling operations until ONTC has inspected and approved installations.

3.9.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

3.9.3 Do not use backfill material which is frozen or contains ice, snow or debris.

3.9.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

3.9.5 Backfill around installations.

3.9.5.1 Place bedding and surround material as specified elsewhere.

3.9.5.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

3.9.5.3 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 0.3 m.

3.9.5.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

3.9.5.4.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from ONTC or:

3.9.5.4.2 If approved by ONTC, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by ONTC.

3.9.6 Granular ‘B’ Type II sewer and watermain backfill material shall be compacted to 100% of maximum dry density.

3.9.7 Native backfill material shall be compacted to 95% of maximum dry density.

3.9.8 Disturbed track ballast to be reinstated and profiled to match original conditions. Ballast materials used for backfilling to be free of contaminants.

3.9.9 Provide geotechnical certification from a qualified geotechnical consultant within 30 days of completion of the backfilling work, certifying that the trench backfill meets the backfill materials requirements and compaction requirements as specified in this specification.

3.10 Inspection and Testing

3.10.1 Testing of materials and compaction maybe carried by a testing laboratory designated by ONTC if required. Frequency of tests will be determined by ONTC.

3.10.2 Testing shall be carried out in accordance with these Specifications.

3.11 Restoration

3.11.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects to the satisfaction of ONTC.

3.11.2 Replace topsoil to the satisfaction of ONTC.

3.11.3 Replace and profile track ballast to the satisfaction of ONTC.

3.11.4 Reinstate pavement, sidewalks, sod and landscaping to elevation which existed before excavation.

3.11.5 Clean and reinstate areas affected by work to the satisfaction of ONTC.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes the requirements for demolition and removal, wholly or in part, of those materials and structures so designated.

1.2 References

1.2.1 Ontario Provincial Standard Specification OPSS 510, latest revision, “Construction Specification for Removal”.

1.3 Storage and Protection

1.3.1 The Contractor shall protect existing items designated to remain and items designated for salvage. In the event of damage to such items, immediately replace or make repairs to approval and at no cost to ONTC.

2. Execution

2.1 Preparation

2.1.1 The contractor shall inspect site with ONTC to confirm the extent of and location of items designated for removal and items to remain on-site/installed.

2.1.2 The Contractor shall locate and protect utilities and preserve active utilities traversing site in operating condition.

2.1.3 The Contractor shall notify and obtain approvals and permits from all agencies having jurisdiction prior to commencing Work.

2.2 Removal

2.2.1 The Contractor shall remove all temporary items or items used for diversions except as directed by ONTC

2.2.2 The Contractor shall remove all old hydro services and signal equipment made redundant, if any, that are no longer required.

2.2.3 The Contractor shall not disturb items designated to remain in place.

2.3 Disposal of Material

2.3.1 ONTC and the Contractor shall jointly inspect all removals to identify materials that shall be returned to ONTC and materials that are to be disposed of. ONTC has the first right of refusal on all released material and shall designate a location where materials are to be returned. All other removed materials shall become the property of the Contractor.

2.3.2 The Contractor shall dispose of all remaining material at government approved facilities, and in the case of hazardous materials provide proof that the material was disposed of at a Government of Ontario approved location. Salvaged material shall be removed as quickly as possible and not be allowed to accumulate.

2.4 Restoration

2.4.1 The Contractor shall restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes the support and protection of all signal and fibre optic cables, and fibre optic cables owned by third parties.

2. Products

2.1 Materials

2.1.1 Where cables must be temporarily supported during excavation or other work, the support system used shall be accepted by ONTC and any affected utility.

3. Execution

3.1 Signals and Communications Cable Protection and Relocation

3.1.1 Modern signals and communications and fibre optic cables are conveyors of high technology information. Disruption of this service is costly to repair and most importantly, causes severe loss of revenue and inconvenience to ONTC and its customers. In addition, some cables carry high voltages that could cause serious injury or fatality. Therefore, it is important that the Contractor use extreme caution when working in the vicinity of any signals and communications cable or fibre optic cable.

3.1.2 This subsection contains the requirements for protection of Railway signals & communications and electrical cables. For all other utility and fibre optic cables, the requirements outlined in Section 3.2 apply.

3.1.3 The Contractor shall supply and maintain the required protection and support all signals and communications and fibre optic cables within the working limits.

3.1.4 The Contractor shall ensure that the cables are not damaged.

3.1.5 For all underground cables, the Contractor shall adhere to the following specific procedures:

3.1.5.1 Prior to mobilization of the Contractor's equipment to the site, the Contractor shall complete utility and cable locates. Location of cables shall be identified by means of markers and/or fluorescent paint. The Contractor shall ensure that current locate information is being used for the site and work being undertaken.

3.1.5.2 The Contractor shall not operate any heavy equipment nor excavate mechanically within 2 m of the cable until arrangements for protecting the cable have been made with ONTC, and a qualified signals & communication employee has been scheduled to supervise the excavation. All required precautions related to third-party utilities such as telecommunication companies must be coordinated directly with the third-party utility contact.

3.1.5.3 The Contractor shall, prior to excavation, expose all cables by an accepted hydra-vac service over the entire area of the Work, and at intervals accepted by ONTC and/or the telecommunication company representative, if applicable.

3.1.5.4 The Contractor shall perform all excavations required within 1 m
(3 ft.) of the cable carefully, with an accepted hydro-vac service only, and in the presence of ONTC and/or the telecommunication company representative, if applicable.

3.1.5.5 The Contractor may also be required to expose cables not in the immediate area of excavation, in order to provide positive identification of the cables. ONTC and the telecommunication company representative, if applicable, will determine this requirement during the joint inspection.

3.1.5.6 The Contractor shall, when it is necessary to cross over the cable with heavy equipment or during blasting operations, protect the cable with 1 m (3 ft.) of cover or greater depth, as dictated by ground conditions and determined by ONTC. Material used for cover shall be accepted fill and separated from the ballast shoulder by means of a heavy filter fabric. The railway track bed shall be restored to its original elevation on completion of the Work.

3.1.5.7 The Contractor shall leave no exposed cable at the end of each work day. Excavations shall be closed or backfilled daily or protected from weather and traffic.

3.1.6 The Contractor shall report any suspected damage to a signals or communications cable promptly to ONTC and Flag Person. The Contractor shall make no attempt to repair damaged cables.

3.1.7 The Contractor’s employees shall be briefed regarding precautions and safety procedures when working in the vicinity of fibre optic and signal & communication cables.

3.1.8 The Contractor shall, prior to commencing any excavation work or any work near and around the fibre optic or signal & communication cables, provide the railway Flag Person a copy of a current locate sheet, no more than 30 days old.

3.1.9 The Contractor shall prior to commencing any excavation work or any work near and around the fibre optic or signal & communication cables, receive authorization from ONTC.

3.1.10 The Contractor shall hand expose, support ONTC and third party fibre optic and signal & communication cables over the excavation and shall adequately secure the cable in a manner meeting the acceptance of ONTC and utility.

3.1.11 The Contractor shall be held liable for any costs for repairs and loss of revenue resulting from any disruption to the cable system caused by the Contractor's operations.

3.2 Telecommunications Company Network Protection and Relocation

3.2.1 The requirements of this section are in relation to the supervision and protection of the existing telecommunication company networks, such as Ontera (a division of NorthernTel LP). Note that multiple fibre optic cables and telecommunication companies may be present in the work area. For all other signal & communications, electrical and fibre optic cables, the requirements outlined in Section 3.1 apply.

3.2.2 The Contractor shall be responsible for scheduling and coordinating all locates supervision and relocation of the telecommunications plant to enable all other Contract Work to progress uninterrupted.

3.2.3 The contractor will be responsible for obtaining cable locates a minimum of 14 days prior to starting any ground work. Locate requests shall be made by contacting Ontario One Call.

3.2.4 The contractor shall notify Ontera upon award of the contract to provide Ontera with detailed construction plans, timeframes of the Work and potential impacts to Ontera's operations if any. Ontera's Contact:

Peter Aultman, Manager Outside Plant Engineering
peter.aultman@ontera.ca
705-490-3274

3.2.5 The requirements of the Work in this section are as follows:

3.2.5.1 No mechanical excavation or underground work shall be performed without confirming locates. Discrepancies could arise with multiple utilities using same colour marking paint and marking methods.

3.2.5.2 No mechanical excavation or underground work shall be performed within 2 m of confirmed locates without a telecommunications company inspector.

3.2.5.3 Provide at least 48 hours' notice if supervision is required on site.

3.2.5.4 Mechanical excavation/underground work may be performed to a depth of 0.63 m (25 inches) of confirmed locates under the direct supervision of telecommunication company inspector.

3.2.5.5 Telecommunication plant must be proven in 10 cm increments by either hand digging or hydro-vac when encroaching on 0.63 m
(25 inches) limit.

3.2.5.6 Telecommunication inspector may allow further mechanical excavation if they feel the plant will not be compromised by the method of excavation chosen by the Contractor. This decision will be made at the telecommunication inspector's discretion.

3.2.5.7 No heavy machinery/vehicles may pass directly over the plant location unless 900 mm of cover is maintained.

3.2.5.8 The telecommunication plant must be fully exposed by hand-digging or hydro-vac to allow for visual inspection when directional bore rods, reamers and products pass under or over its location. A minimum of 300 mm separation is required between intersecting plant.

3.2.5.9 Only approved utility subcontractors experienced in the handling of fibre optic cable will be authorized to handle the cable, ducts and structures during the relocation process.

3.2.5.10 The approved utility subcontractors will be provided with direction by the telecommunication inspector on the redistribution of available slack if required during the relocation process.

3.2.5.11 Schedule 40 split steel protection will be installed in locations where the new track will cross the plant or where a minimum of 1 m of cover cannot be achieved. Steel pipe installation under the track shall be a minimum of 1.5 m (5 ft.) below the bottom of ties.

3.2.5.12 Duct systems that require relocation will be trenched at an offset of 1.8 m (6 ft.) from the near rail and at a minimum depth of 1.067m
(3 ft. 6 inches) to final grade if running parallel to track, with cable warning tape installed above the plant. Final grade will be taken from either the top of sub-ballast or the top of subgrade elevation, whichever forms the final grade above the duct system.

3.2.5.13 Structures that will require relocation will be installed at a minimum of 4 m offset from the near rail and will be installed as per telecommunication railroad installation specifications.

3.2.5.14 Where the telecommunication plant will pass under the proposed signal duct bank, a separation of 300 mm shall be maintained between the bottom of the signal duct bank and the top of the telecommunication plant with cable marker tape installed above the telecommunication plant.

3.2.6 The Contractor shall be responsible for arranging for the relocation of the telecommunication plant to a depth and offset that will not interfere with future work. This work shall be carried by the telecommunications company or its approved contractor, unless otherwise arranged and approved by ONTC. The Contractor shall record the depth and offset of the relocated telecommunication plant for future reference by the Contractor and others.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes the general signal power requirements for the Work. All Work shall be completed to the standard of installation expected of a competent North American railway Signals & Communications (S&C) contractor.

1.1.2 All electrical work shall be carried by licensed electricians with experience and training in the equipment and systems (certified or manufacture approve) being installed in Ontario.

1.2 Reference Documents

1.2.1 Installation standards as approved under Section 01 11 00, 2.2.

1.2.2 American Railway Engineering and Maintenance of Way Association (AREMA), Communications & Signals Manual, latest version.

1.2.3 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.2.4 Transport Canada Highway Crossings Protective Devices Standards (E-6).

1.2.5 Transport Canada Grade Crossing Standards (GCS).

1.2.6 Transport Canada Standards Respecting Railway Clearances (E-05).

1.2.7 Transport Canada Wire Crossings and Proximity Regulations (E-11).

2. Execution

2.1 Power Supply

2.1.1 The Contractor shall modify the existing power distribution system and upgrade hydro services at various locations as specified in the Contract Documents and Contract Drawings. Upgrades to hydro service will require the Contractor to coordinate with local hydro provider.

2.1.2 The Contractor shall complete their own measurements to determine the cable size required for each location to satisfy the load for the power distribution system. The contractor shall use drawing E-001 Table 2 as reference for choosing cable size.

2.1.3 The Contractor shall add a 30 A generator plug to existing retrofit signal bungalows, where applicable, in accordance with the Contract Documents and Contract Drawings.

2.1.4 The Contractor shall add an exterior grade label beside each of the generator inlets indicating “TO BE USED WITH FLOATING NEUTRAL GENERATOR ONLY”.

2.1.5 The Contractor shall provide all the specification sheets for each type of charger, rectifier and DC/DC converter the Contractor proposes to use if equipment are not provided by ONTC.

2.2 Battery Chargers

2.2.1 All battery chargers shall be constant voltage, electronic or microprocessor type, with temperature compensation and will meet AREMA C&S Manual Part 9.2.1. Dry contacts for Power Off and Fault indications shall be provided.

2.2.2 Chargers shall be of sufficient amperage to supply 1.15 times the rated ampere-hours of the batteries over a 72-hour period plus the load current.

2.2.3 Chargers shall be suitable to accommodate a range of cells and the desired float voltage shall be easily settable.

2.2.4 Acceptable products include the C-Can RLW 12/600E.

2.3 DC/DC Converters

2.3.1 Track batteries shall be used for all track circuits in accordance with the Contract Documents and Contract Drawings.

2.3.2 Converters shall be completely solid state with both input and output provided with surge protection networks to provide protection against lightning damage. Acceptable products include the Safetran Systems DC to DC converter or approved equal.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes the general requirements for signal and rail-highway warning system mast foundations, fill and cribbing surrounding Signals and Communications (S&C) locations including wayside bungalows. All Work shall be completed to the standard of installation expected of a competent North American railway S&C contractor.

1.2 Reference Documents

1.2.1 Installation standards as approved under Section 01 11 00, 2.2.

1.2.2 American Railway Engineering and Maintenance of Way Association (AREMA), Communications & Signals Manual, latest version.

1.2.3 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.2.4 Transport Canada Highway Crossings Protective Devices Standards (E-6).

1.2.5 Transport Canada Grade Crossing Standards (GCS).

1.2.6 Transport Canada Standards Respecting Railway Clearances (E-05).

1.2.7 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.2.8 OPSS 1010 Material Specification for Aggregates-Base, Subbase, Select Subgrade, and Backfill Material (incorporated by reference).

2. Execution

2.1 Foundations

2.1.1 The Contractor shall provide leveling nuts and shall install a galvanized steel plate, 1/4″ thick, between the leveling nuts and the signal base to ensure even distribution of load factors.

2.1.2 The Contractor shall install a rodent-resistant cover between the signal base and foundation to protect the cables.

2.1.3 For crossing gate foundations, the contractor shall install pyramid type galvanized steel foundations which meet AREMA Communications & Signals Manual Specifications Part 14.4.19.

2.1.4 The contractor shall ensure Single Mast Cantilever 12FT-30FT foundations are Precast Concrete and conform to AREMA Communications & Signals Manual Specifications Part 14.4.8D and Part 14.4.8E.

2.1.5 On gate masts with extra light units on a cantilever or “dolly” arm, the Contractor shall install a 152-cm (60-inch) high pyramid type galvanized steel foundation with a 121-cm (48-inch) base plate. Housing foundations shall be galvanized steel and a minimum of 121-cm (48-inches) in height.

2.1.6 The Contractor shall ensure that the signal foundations are hot dipped galvanized square steel.

2.1.7 The Contractor shall ensure that the cable riser assembly is an integral part of the signal foundation.

2.1.8 The Contractor shall ensure bungalow and case foundations are galvanized steel, square type, which meet AREMA Communications & Signals Manual
Volume 4.

2.2 Bungalow Pads and Fill

2.2.1 The Contractor shall situate bungalow pads levelled with the the ballast line. A level surface shall be constructed to subgrade height at or near the fence line at a height of no less than 4″ below the top of the bungalow foundations and signal foundations.

2.2.2 The Contractor shall install approved type cribbing and compactable fill, as required, to construct the pad using 6 inches of ¼ ″ crushed stone, filled to a height of no less than 4″. The fill must be compactable and not subject to erosion. A suitable example material is gravel.

2.2.3 Concrete blocks may be used in place of metal cribbing however the Contractor shall provide information in the form of shop drawings, subject to acceptance by ONTC, for the type of block the Contractor proposes to use prior to installation.

2.2.4 The Contractor shall install fill around the perimeter of the signal housings and signal masts as per the attached table. Measurements are to be taken from the edge of the housings and centerline of the masts for signals.

Table 1: Pad Size

Equipment Type	Pad Measurements		
	Front	Back	Sides
Cases	1.5 m	1.5 m	1.5 m
Bungalows	2 m.	2 m	2 m
Signal Masts	1.5 m	2 m	1.5 m

2.2.5 The Contractor shall install culverts and/or take other measures as required to facilitate proper drainage in order to prevent erosion of the pads.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes the general requirements for the Signals & Communications (S&C) system installation. All Work shall be completed to the standard of installation expected of a competent North American railway S&C contractor.

1.2 Reference Documents

1.2.1 American Railway Engineering and Maintenance of Way Association (AREMA), Communications & Signals Manual, latest version.

1.2.2 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.2.3 Transport Canada Highway Crossings Protective Devices Standards (E-6).

1.2.4 Transport Canada Grade Crossing Standards (GCS).

1.2.5 Transport Canada Standards Respecting Railway Clearances (E-05).

1.2.6 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.2.7 Health Canada Safety Code 6.

1.2.8 Occupational Health and Safety Act and Regulations for Construction Projects.

2. Execution

2.1 Miscellaneous Requirements

2.1.1 S&C installation Work shall be in compliance with Transport Canada Standards Respecting Railway Clearances (E-05).

2.1.2 S&C installation Work shall be in compliance with Transport Canada Wire Crossings and Proximity Regulations (E-11).

2.1.3 S&C equipment, systems, and associated materials, to be furnished shall be manufactured in accordance with AREMA Communications & Signals Manual recommendations and approved shop drawings, inspected and tested prior to shipment.

2.1.4 The Contractor shall protect all equipment and associated materials from damage throughout delivery, storage, and handling. Relays and other sensitive equipment shall be monitored for shock damage during handling and subject to a rigorous inspection regime.

2.1.5 The Contractor shall verify and repair, or replace, any damaged equipment to ONTC’s satisfaction. Upon request, evidence of equipment calibration and performance to specification shall be provided.

2.1.6 The Contractor shall control documentation in a manner such that S&C maintenance personnel may refer to current plans of any signal location at all times and there is no confusion between “Wiring Copies”, “Testing Copies” and “As Installed” plans. “Wiring Copies” and “Testing Copies” shall only be placed on site at the start of work. “Maintenance Copies” of plans shall be marked up as Work progresses.

2.1.7 Upon completion of Work, the Contractor shall submit a minimum of four copies of “Construction Record Documents” plans for all new and modified equipment/systems to ONTC so that office (three copies) and field records (one copy) may be updated. These plans shall be delivered one business day after completion of Work at each signal location.

2.1.8 The Contractor shall provide all on-site resources during installation. This shall include resources from utilities and maintenance contractors, as required. The Contractor shall be responsible for all costs associated with this requirement.

2.1.9 The Contractor shall arrange for appropriate off-site support services and resources to ensure that installation Work is not delayed.

2.1.10 The Contractor shall promptly advise ONTC in writing of non-compliant in-service equipment and cables.

2.2 Installation General Requirements

2.2.1 The interior of new wayside signal cases and bungalows/shelters shall be painted white using non-flammable paint.

2.2.2 The terminal boards shall be painted grey ANSI 61 or approved equal.

2.2.3 Equipment shall be installed as per the Contract Documents and Contract Drawings. Any questions or concerns shall be brought to ONTC’s attention for guidance or resolution.

2.2.4 S&C equipment, systems, and associated materials shall be installed in accordance with manufacturer’s recommendations.

2.2.5 Foundations installed for all crossing signal system mast mounts and cantilever foundations shall be manufactured in accordance with the Contract Documents. Foundations shall be plumb and level and respect specified Transport Canada Grade Crossing Standards for foundations.

2.2.6 Signal masts and cantilevers shall be installed according to manufacturer’s instructions and in accordance with the Contract Documents and Contract Drawings. Upon completion of installation Work, clearance measurements shall be made for all affected tracks.

2.2.7 Signal heads shall be provided with aluminum backgrounds and hoods, painted flat black, and shall be mounted on separate mounting extensions as shown in the Contract Documents and Contract Drawings.

2.2.8 All wires and cables to signal heads and other signal appliances shall be run internal to each structure and mechanically protected against vandalism.

2.2.9 Except where alternate requirements are specifically required elsewhere in the Contract Documents, S&C equipment located on the ground or attached to ties shall be painted silver, with the nomenclature of the equipment stencilled in black. Aluminum or stainless steel S&C components and bungalows shall not be painted. Equipment shall be named in accordance with Contract Documents and Contract Drawings.

2.2.10 New or relocated equipment shall be installed in an accessible manner. Racks shall be accessible from both front and rear sides. Racks shall be isolated from other racks, overhead wire trays and the housing. Racks shall be grounded in accordance with Contract Documents and Contract Drawings. “Swing racks” shall not be used.

2.2.11 Spare cable conductors shall be terminated in conductor sequence with the working conductors of that cable using accepted terminal blocks.

2.2.12 The layout of equipment and terminal boards shall provide sufficient space between, above, and below for making wire connections and re-terminations, and performing any normal maintenance that may be required.

2.2.13 The binding posts shall be in accordance with AREMA Communications & Signals Manual Part 14.1.10 and so arranged that the cable circuits may be opened without removing the wire from the binding post. Solid terminal connectors between adjacent binding posts shall be used for all short terminal jumpers.

2.2.14 Utility and cable locates shall be completed for all work which requires breaking ground. These locates are the Contractor’s responsibility. The Contractor shall ensure that current locate information is being used for the Work site and Work being undertaken.

2.2.15 Underground cables and troughs shall be installed in accordance with cable routings determined in design at the depth specified in Section 1.8 Cable Installation below. Hand digging or hydrovac excavation shall be used as required to prevent damage to existing cables or utilities.

2.2.16 No Work shall be undertaken which may undermine the track infrastructure or disturb track alignment.

2.2.17 All cable entrances to S&C cases and bungalows/shelters shall be sealed with a fire retardant compound, and in accordance with AREMA Communications and Signals Manual, Part 15.2.15.

2.2.18 Cable entrance conduits for houses and cases shall be provided complete with cable entrance bushings and secure to the housings. One spare entrance pipe assembly shall be furnished for each ground mounted wayside housing.

2.2.19 All cables shallbe terminated on designated terminal boards, cut and potted to provide for three re-terminations on any terminal, and properly dressed, trained and finished.

2.2.20 No more than two conductors shall be terminated on a single terminal.

2.2.21 The area around all equipment shall be properly graded and dressed with new granular A material. Upon completion of any work which opens the ground (e.g. underground cable installation, foundation installation or foundation removal), the ground shall be restored to a non-hazardous condition.

2.2.22 Indicators and signals shall be properly focused and aligned horizontally and vertically, to obtain uninterrupted sighting for at least 10 seconds at the applicable track speed for that location. Where multiple types of trains are operated, the highest speed type of train shall be used for this requirement.

2.3 Tagging

2.3.1 General Requirements:

2.3.1.1 Both ends of each cable, each conductor in each cable, and all terminated conductors and equipment in each cable, wayside case, junction box, signal, housing, and any signal system equipment shall be permanently identified with a tag. Each wire shall be tagged so that it can be identified at each terminal.

2.3.1.2 Tagging shall be a combination of the circuit nomenclature method and termination nomenclature method as described in the AREMA C&S Manual Part 16.1.1.

2.3.1.3 All internal wires shall be labeled with a “sleeve” tag, white in color with black lettering.

2.3.1.4 All external wires shall be labeled with a “flat” tag.” The tag shall be vinyl or equivalent nonconductive material acceptable to ONTC.

2.3.1.5 A sample of both the “sleeve” type and “flat tag” to be used must be submitted to ONTC.

2.3.1.6 Tags shall be installed on wires to be read “left to right” or “top to bottom” and include three lines of text. Line 1) to indicate current termination point: Line 2) to indicate circuit designation: Line 3) to indicate final termination point.

2.3.1.7 An example of the text to use on a tag would be:

MTB A11
750TPR
750TR 1F

2.3.1.8 Flat tags shall be permanently affixed to clearly identify the termination point. Sleeve tags shall be “loose” and move freely on the conductor while still clearly defining the termination point. If wiring changes are made to adjacent locations, the revisions shall be labeled in the same manner as the location outlined in this Section.

2.4 Insulated Joints

2.4.1 The Contractor shall be responsible to verify correct installation and placement of the insulated joints as per the Contract Drawings.

2.4.2 The Contractor shall test all new and existing insulated joints, gauge rods and any switch rod insulation to ensure resistance value is within the prescribed range for that type of equipment before placing track circuits into service. These readings are to be provided to ONTC with copies left in the site log book.

2.4.3 Where insulated joints are to be left in the track and bypassed as a temporary measure, the Contractor shall install 5” temporary double bond wires around redundant insulated joints. The use of long bonds to bypass redundant insulated joints will only be permitted with express written permission of ONTC.

2.5 Track Bonding and Connections

2.5.1 Underground track circuit wires to be routed to a “bootleg” pedestal and installed in accordance with accepted S&C standards. An orange fiberglass marker is to be installed directly in front of or beside “bootleg” pedestals, to indicate their location.

2.5.2 Track circuit bootleg wire connections to the track shall be made with 5″ S-8 crimp connectors using pin brazing or plug type bonding techniques to attach to the rail.

2.5.3 Track wires shall be buried in the ballast in rubber hoses which in turn shall extend to a minimum of 10 ft. from gauge of rail, extending beyond this point into a direct burial trench, in accordance with accepted S&C standards..

2.5.4 Should it be necessary to replace bonds, the Contractor shall use 5″ bond wires. Bonds shall be applied across the joint on the rail head, or, between rails and splice bars joining individual rails. The use of long bonds to bypass redundant insulated joints will only be permitted with express written permission of ONTC.

2.5.5 Turnout and track bonding shall be performed using AREMA compliant track bonding material and equipment.

2.6 Cable Installation

2.6.1 All cables that are required to be installed under the track must be in a CSA approved steel duct or a CSA Schedule 80 HDPE (Heavy Duty Polyethylene) or PVC (Polyvinyl Chloride) duct placed at least 1.2 m below the base of the rail.

2.6.2 The duct shall extend a minimum of 1.2 m beyond all the rails it is placed under.

2.6.3 If being installed by excavating, all excavations must be performed under the supervision of ONTC.

2.6.4 Directional boring is an acceptable method but must not begin any closer than 3 m from the nearest rail. Shoring may be required at the discretion of ONTC.

2.6.5 All ducts for signal and communication cables that run parallel to the track shall be CSA approved HDPE or PVC. This requirement is not applicable to local cables such as at intermediate signals and road crossing signal systems.

2.6.6 Unless otherwise accepted by ONTC, all ducts shall be installed no more than 1.2 m from the property line (i.e. edge of corridor). Ducts or direct buried cable must be at least 1.2 m from gauge of the rail and at least 1.2 m below the base of the rail. All cables shall be installed either parallel or perpendicular to the track.

2.6.7 Minimum conduit size shall be 1.5″ and maximum fill capacity shall not exceed 75%.

2.6.8 Signal and communications trunk cables are to be installed in buried conduits. Refer to the Contract Drawings for details of required conduit installation locations and quantities.

2.6.9 Fiber Optic cables from the same origin location to different destination locations shall be installed in separate ducts within the duct bank to maintain diversity.

2.6.10 Vital and non vital fiber optic cables between the same origin and destination may be installed in the same duct.

2.6.10.1 Red-Power/Electrical.

2.6.10.2 Orange-Fibre Optic.

2.6.10.3 White-Signal.

2.6.10.4 White-Signal (spare).

2.6.11 Hydro service wires shall not be located in the same duct as the signal and communication cables.

2.7 Grounding and Surge Protection

2.7.1 Install surge/lightning protection in accordance with the AREMA Communications & Signals Manual recommendations, accepted S&C standards, ONTC standards, and accepted procedures and Contract Drawings.

2.7.2 Electrically ground all equipment, cables, junction boxes, antennae, towers, cases, and buildings/shelters in accordance with the AREMA Communications & Signals Manual recommendations, accepted S&C standards, ONTC's standards, and procedures and Contract Drawings.

2.7.3 Unless otherwise specified in the Contract Documents and Contract Drawings, internal ground connections shall be made with a green No. 6 AWG insulated copper wire and external ground connections shall be made with No. 6 AWG bare copper wire. Wire larger than 14 AWG shall be stranded.

2.7.4 Unless otherwise specified in the Contract Documents and Contract Drawings, ground networks for the signal housings must consist of at least four, 10 ft. long, 5/8″ diameter, copper-clad, steel ground rods placed at each corner of, and no less than 2 ft. from, any wayside housing or case. Ground rods must be installed no less than 10 ft. apart. The ground rods must be bonded together with #6 AWG bare stranded copper wire and have, as a minimum, two grounding conductors connected to the prime ground of the associated housing.

2.7.5 Grounding and bonding conductors must be connected to ground rods by connectors approved by ONTC. Connector types include: bolted clamps, compression connectors such as Ampact Tap System, Thomas & Betts Grounding system etc. or welding connections such as Caldweld One Shot.

2.7.6 The earth ground resistance of the made ground network, prior to the any of the operating systems being commissioned into service, shall not exceed 15 ohms. If testing indicates that the ground resistance is above 15 ohms, the Contractor shall install extra ground rods to bring the value to 15 ohms or lower.

2.7.7 Grounding and bonding connections must be buried at least 12″ below ground level. Ground electrode or ground wells shall be provided to facilitate inspection of the ground rod connections.

2.7.8 Metal cribbing, when used, must be bonded to one of the ground rods at the prime ground location.

2.7.9 Grounding and bonding conductors shall not be run parallel to, or in close proximity to, signals and communications circuit wiring.

2.7.10 Grounding and bonding conductors must exit the associated housing through a separate conduit assembly. Where this is not possible, grounding and bonding conductors may exit the housing through a separate hole provided the hole is equipped with a bushing.

2.7.11 Bungalow Faraday cage panels must be mounted in such a way that they form a complete electrical path with the bungalow structure.

2.7.12 Use of chemical ground rods shall not be permitted without the express permission from ONTC.

2.7.13 Cable locates shall be completed prior to installing ground rods. These locates are the Contractor's responsibility. The Contractor shall ensure that current locate information is being used for the Work site and Work being undertaken.

2.8 Locks

2.8.1 Housings and equipment shall be locked with Abloy high security style padlocks supplied by ONTC..

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section identifies the general requirements for testing and verification of Signals & Communications (S&C) equipment and circuits during installation or modification of S&C systems. All Work shall be completed to the standard expected of a competent North American railway S&C contractor.

1.1.2 This Section establishes the minimum standard of testing that shall be carried out. The Contractor's Tester in Charge shall be responsible for determining the sufficiency of such testing and shall define any supplementary testing required.

1.1.3 The minimum testing requirements listed in this Section shall be applied to new equipment and circuits and also to modified equipment in existing circuits. The Contractor shall be responsible for determining the sequence of testing in order to conduct all required tests in the most time efficient manner.

1.1.4 Where test procedures are clearly not applicable because equipment or functionality is not present in the system, the tests prescribed for that equipment or functionality shall not be required.

1.2 Reference Documents

1.2.1 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.2.2 Transport Canada Standards Respecting Railway Clearances (E-05).

1.2.3 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.2.4 American Railway Engineering and Maintenance of Way Association (AREMA) Communications & Signals Manual, latest version.

1.3 General Instructions Regarding Testing and Commissioning

1.3.1 The Contractor shall provide a Tester in Charge with requisite experience in the execution of the duties of a Tester in Charge in a North American S&C environment. This shall include experience commensurate with the technology, scope and complexity of the Work being tested. The Tester in Charge shall work under the supervision of a Professional Engineer licensed to practice in the Province of Ontario.

1.3.2 The Tester in Charge shall take responsibility for all testing and commissioning activities including the development and approval of appropriate test documents which prove and document the correct operation and safety of the S&C system being installed.

1.3.3 The Tester in Charge shall be subject to acceptance by ONTC.

1.3.4 The Contractor shall submit a Testing & Commissioning Plan for ONTC's acceptance within 60 business days of Contract award. This Testing & Commissioning Plan shall document the planned sequence, timelines, structure and extent of all testing proposed to verify and validate the Work. This document shall explicitly state the responsibilities of various parties to the test, including the Contractor, any Subcontractors or suppliers, any maintenance contractors, and ONTC.

1.3.5 Where Testing and Commissioning Plan proposes multiple stages or phases, the requirements of this Section apply to all stages or phases of the Work.

1.3.6 All testing activities must be governed by approved test procedures detailing the functional and commissioning tests to be performed. Test procedures must contain a summary of the purpose of the procedure, any prerequisites required to be met, a list of tools and resources required to implement the tests, a list of detailed test steps and a set of test results forms. The test result forms must be structured to allow the Contractor to later add specific test data to allow the generic forms to be used for specific equipment, subsystems or locations, as necessary. Generic test procedures must be produced by the Contractor and submitted to ONTC for acceptance at least 60 business days prior to the proposed test implementation date.

1.3.7 Tests shall be organized and performed in a logical, systematic manner to ensure that each signal location and the signal system operates safely and reliably prior to being placed in service. Tests shall be in compliance with accepted S&C standards.

1.3.8 Final testing and commissioning Work shall not proceed without ONTC's acceptance.

1.3.9 Other testing and commissioning plans, reports, test procedure and test results forms containing specific test data shall be developed by the Contractor a minimum of 30 business days prior to the Work and submitted to ONTC for acceptance. The Contractor shall provide a minimum of 10 business days' notice for any testing activities which require travel outside of the North Bay area by ONTC personnel.

1.3.10 The results of the tests and inspections shall be documented and recorded such that it can be proven that a system has been thoroughly tested and inspected and therefore the Contractor can attest to its safety and correctness.

1.3.11 The Contractor shall conduct all on-site testing during designated test periods, the precise available timing of which will be advised by ONTC.

1.3.12 Prior to commencement of testing or commissioning activities on “in-service” portions of the railway, permission must be received from the Rail Traffic Controller in charge of the territory and appropriate track protection shall be in place (such as a Testing Authority or Track Occupancy Permit). Time limits and territorial limits of protection shall be strictly respected.

1.3.13 Other Work activities within the area under test shall only be permitted with the approval of the Tester in Charge.

1.3.14 After commencement of Testing, the Tester in Charge shall approve any train movements through the area under test, in consultation with the Rail Traffic Controller controlling the territory. Any train movement shall be protected as deemed appropriate by the Tester in Charge and Rail Traffic Controller.

1.3.15 The Contractor shall provide all tools required to test and commission the S&C system. All tools that require calibration shall be calibrated prior to use by the Contractor. The Contractor shall keep a tool calibration record to ensure tools that require calibration are maintained and calibrated at the correct intervals.

1.3.16 The Contractor shall provide all on-site resources during testing and commissioning. This shall include resources from maintenance contractors or the operating railway, if required. The Contractor shall be responsible for all costs associated with this requirement.

1.3.17 The Contractor shall arrange for appropriate off-site support resources to ensure that testing and commissioning work is not delayed. These resources may include supplier technical support expertise. The Contractor shall be responsible for all costs associated with this requirement.

1.3.18 Where relays are referenced in these test procedures, the requirements shall apply to electronic circuits or logic performing the function.

1.3.19 When alterations are performed to existing in service circuitry and the existing circuit partially or completely forms part of a new circuit, it shall be the Contractor’s responsibility to verify that the existing circuitry to be re-used is correct in every way to the governing design:

1.3.19.1 For greater certainty, the Contractor shall be responsible for operational tests of modified equipment and circuits, as well as related equipment and circuits that could be affected by the modifications made.

1.3.20 Upon completion of testing, the system must be restored to the expected operation state within the allocated time window. If any switch restrictions are established or left in place for protective reasons, then those switches must be visually confirmed to be spiked and clamped in the correct position before service can be authorized to resume. When spikes and clamps are either added or removed from a switch that will be subject to revenue service moves an obstruction test must be performed for the restricted position in addition to any other tests required.

1.3.21 The Rail Traffic Controller shall be informed of any switch restrictions or other operational restrictions that are in place upon suspension or completion of testing. Such information shall also be formally submitted to ONTC and any operating railways or maintenance contractors affected immediately.

1.4 Failure to Successfully Complete Testing

1.4.1 In the event that the testing or commissioning into service is not successful due to an error or omission by the Contractor, remedial work and subsequent re-testing shall be undertaken at no charge to ONTC. ONTC's decision regarding timing of this work shall be final.

1.4.2 Unless otherwise approved by ONTC, testing and commissioning Work shall be fully completed or "rolled back" to the previous, safe state. ONTC's decision shall be final.

1.4.3 Any changes that are partially implemented shall be fully tested and documented, after approval by ONTC.

1.4.4 In the event that testing or commissioning into service is not completed due to severe weather or an "Act of God", all necessary steps shall be taken to "roll back" to a safe state and minimize the impact on operations.

1.5 Submittals

1.5.1 The Contractor shall submit the following documents for acceptance by ONTC. The Contractor shall note that these documents shall be submitted in the order listed and that each document is based upon the deliverables of the previous document and therefore each document shall be accepted by ONTC before the following document is submitted:

1.5.1.1 Testing and Commissioning Strategy.

1.5.1.2 Factory Acceptance Test procedures.

1.5.1.3 Post-Installation Check out procedures.

1.5.1.4 Site Acceptance Test procedures.

1.5.1.5 Commissioning Test procedures.

1.5.2 The Contractor shall submit the above documents a minimum of 20 business days prior to their required use.

1.5.3 The Contractor's submission schedule shall allow a minimum of 20 business days for review of each submission by ONTC.

1.5.4 If changes to these documents are required by ONTC, they shall be incorporated into the affected document and resubmitted for acceptance within five business days. ONTC shall have a minimum of five business days to review these submissions and may request additional changes if deemed necessary.

1.5.5 Materials shipment to site, installation, testing and commissioning Work shall not proceed unless all required submittals have been accepted by ONTC.

1.6 Testing and Commissioning Strategy

1.6.1 The Contractor shall prepare a Testing and Commissioning Strategy document describing in detail:

1.6.1.1 Proposed sequence of testing and commissioning work;

1.6.1.2 Proposed timing of all testing and commissioning, broken down to individual activities;

1. Such detailed breakdowns can be released individually but must be received by the ONTC no later than 10 days prior to each, respective testing milestone (FAT, PICO, SAT, etc.).

1.6.1.3 Resources required from ONTC.

1.6.1.4 Resources required from other contractors providing services to ONTC.

1.6.1.5 Who in the Contractor's organization is responsible for each activity and their contact information.

1.6.1.6 Where testing and verification will be carried out.

1.6.1.7 Procedures followed to ensure quality control on materials.

1.6.1.8 Post-receipt verification and testing of equipment, materials and/or systems.

1.6.1.9 Verification of wiring and other installation work.

1.6.1.10 Post-installation check-out.

1.6.1.11 Records and software/firmware version control.

1.6.1.12 Signal and Communications testing activities.

1.7 Factory Acceptance Test Procedures

1.7.1 Where equipment racks and/or bungalows/cases are assembled or wired in advance and shipped to site, the Contractor shall prepare a Factory Acceptance Test (FAT) procedures document which:

1.7.1.1 Identifies in detail the steps that will be followed to establish that the correct hardware has been installed in accordance with the Contract Documents and functions correctly in a factory environment.

1.7.1.2 Describes in detail the equipment that will be used to simulate field equipment or other existing racks in the bungalow and the verifications that will be done to confirm that the hardware individually and as a system has been installed in accordance with design and functions correctly in a factory environment.

1.7.1.3 Proposes detailed test procedures approved by the Tester-in-Charge for each major subsystem and function.

1.7.1.4 Includes a copy of the test sheets that will be used for these tests and retained for record purposes.

1.7.2 Upon completion of FAT, the Contractor shall submit copies of all FAT results to ONTC for detailed review within three working days.

1.7.3 Tests which failed and had to be repeated shall be clearly identified and the results of the re-test shall be included with Test Results. The reasons for the test failing and corrective actions taken shall be described.

1.7.4 The FAT performed above shall not be considered a substitute for comprehensive Site Acceptance Tests (SAT) to confirm correct installation and operation according to designs in the field.

1.8 Post-Installation Check out Procedures

1.8.1 The Contractor shall prepare a Post Installation Check Out procedure sufficient to identify the following for all equipment installed as part of the Work:

1.8.1.1 Correct installation of all components and correct components used.

1.8.1.2 Correct equipment location.

1.8.1.3 Correct wire size, fuse size, breaker size.

1.8.1.4 Follows check out/set-up procedures recommended by the equipment manufacturer.

1.9 Site Acceptance Test and Commissioning Procedures

1.9.1 The Contractor shall prepare a Site Acceptance Test (SAT) procedures document which:

1.9.1.1 Identifies in detail the steps that will be completed to establish that the correct hardware has been installed in accordance with designs and that it functions correctly in the field environment.

1.9.1.2 Proposes detailed test procedures approved by the Tester-in-Charge for each major subsystem and function, as well as the overall system.

1.9.1.3 Copies of the test sheets that will be used for these tests and retained for record purposes.

1.9.1.4 A specific description of the interactions required to test the field signal system with the rail traffic control system.

1.9.1.5 A specific description of what is required from the rail traffic control system contractor.

1.9.2 Upon completion of SAT, the Contractor shall submit copies of all test results to ONTC for detailed review within three working days.

1.9.3 Tests which failed and had to be repeated shall be clearly identified and the results of the re-test shall be included with Test Results. The reasons for the test failing and corrective actions taken shall be described.

1.9.4 The Contractor shall prepare a Detailed Commissioning Plan. This document shall identify in detail:

1.9.4.1 The steps that are required to commission the system.

1.9.4.2 The tests that are required prior to placing the system in service.

1.9.4.3 Expected operational impact.

1.9.4.4 Expected timelines.

1.9.4.5 Resources required from ONTC.

1.9.4.6 Resources required from other contractors providing services to ONTC.

1.10 System Commissioning (“In Service”)

1.10.1 The final decision to commission the system into service shall be made by ONTC.

1.10.2 At time of commissioning, the Contractor shall provide a copy of the handover certificate documenting that the condition and state of the system at the time it was placed in service. Any outstanding deficiencies shall be recorded on this Certificate. This Certificate shall be signed by the Contractors’ Project Manager and Tester-In-Charge.

1.10.3 At time of commissioning, the Contractor’s Project Manager and Tester-In-Charge shall sign the Safety Certificate documenting that the test

procedures were successfully completed and that they are in accordance with accepted industry S&C test procedures.

1.11 Deficiencies and Construction Records

1.11.1 All system deficiencies shall be resolved to the satisfaction of ONTC.

1.11.2 ONTC may classify system deficiencies as Major Deficiencies or Minor Deficiencies. ONTC's decision regarding classification is final.

1.11.3 Unless otherwise agreed by ONTC, the system shall not be placed into service with outstanding Major Deficiencies.

1.11.4 Unless otherwise agreed by ONTC, all Minor Deficiencies shall be resolved to ONTC's satisfaction within 48 hours.

1.11.5 Upon completion of commissioning work, Field Copies of plans shall be marked up to show the in-service configuration and equipment wiring. The Contractor shall make copies of these plans to allow As Installed plans to be created.

1.11.6 Unless otherwise agreed by ONTC, all final As Installed plans shall be returned to ONTC within 48 hours of Commissioning date. If multiple commissionings are involved, this requirement applies to each commissioning.

1.11.7 Contractor shall supply record documents in accordance with Section 34 42 06 Signal Documentation.

2. Basic Signal Inspections and Tests

2.1 General

2.1.1 Ensure all design used for installation and test purposes coincide with latest design information and that all revisions are up to date and expected.

2.1.2 Ensure all test meters and tools and properly calibrated.

2.2 Highway Grade Crossing Warning Devices

2.2.1 All inspection and testing for Highway Grade Crossing Warning Devices shall be made in accordance with ONTC's Signal System Inspections & Tests (SSIT), SSIT-1001 Testing Grade Crossing Warning Systems.

2.3 Wire and Cable Insulation Resistance

2.3.1 Electrically measure resistance of each cable, wire to wire and wire to ground. The minimum insulation resistance requirement must be established by the Contractor based on current industry standards and accepted by ONTC. This minimum figure is typically in the region of 500,000 ohms. The test shall be made for a minimum of one minute.

2.3.2 Any non-compliance with minimum requirements shall be immediately addressed through problem identification and replacement of defective cables or other components. Any cable or other component that does not fully meet the minimum requirements shall not be placed in service or shall be removed from service and ONTC notified, if already in service.

2.4 Wire and Cable Tests

2.4.1 Check all wires and cables are to the correct specification, tagged and terminated correctly.

2.4.2 Perform a circuit continuity test to ensure that each individual wire has been installed correctly and is intact between the origin and destination.

2.4.3 Check all terminals and contacts have the correct number of wires and wiring corresponding to circuit plan. This must be done after any installation activity and subsequent to any wiring alteration or circuit break in during cut over. Wire count must be performed on any new circuitry and after alterations to new or existing circuitry.

2.5 Signal Circuit Breakdown

2.5.1 Energize each vital circuit and check that each contact interrupts the circuit as intended.

2.5.2 Disconnect circuit branches as necessary when performing circuit breakdown to ensure only one circuit path is available.

2.5.3 Apply circuit breakdown test to all new circuits and contacts and also, where existing circuits are being modified, all existing circuits and contracts disturbed during wire changeover. Disturbed contacts are those existing contacts immediately adjacent to the break in point in modified circuits.

2.6 Storage Batteries

2.6.1 Confirm battery banks provide required number of hours of back-up at rated output current, as specified in and the Contract Documents and Contract Drawings.

2.7 Track Circuits

2.7.1 Ensure track circuits are installed and set up in accordance with manufacturer’s instructions and any related AREMA recommendations.

2.7.2 All track circuit shunt tests shall be conducted with a shunt that complies with AREMA recommended practices.

2.7.3 Shunt each end of each track circuit. Confirm only the corresponding track relay or microprocessor input (and no others) is de-energized while the track shunt is applied.

2.7.4 Perform cross shunt with adjacent track circuit (i.e. shunt is applied to one rail in the first track circuit and the opposite rail in the second track circuit) and confirm neither track circuit is affected.

2.7.5 Perform shunt tests to prove series and shunt fouling circuits through all turnouts.

2.7.6 Test the “loss of shunt” circuit. Confirm that a loss of shunt of five seconds or less will not permit the track relay to become energized.

2.7.7 Ensure track circuit bonding is installed correctly to design and where required by design maximum broken rail protection is achieved.

2.7.8 Ensure correct stagger is obtained at all insulated and transposition joints.

2.8 Circuit Grounds and Faults (Signal Circuits)

2.8.1 Perform voltage tests indicating:

2.8.1.1 No voltage reading to ground from positive and negative terminals of each battery bank. No voltage reading from each battery bank (positive and negative terminals) to each other battery bank at the location.

2.8.1.2 Where switch batteries are present, take ground readings with switches in motion, to both normal and reverse positions.

2.9 Ground Resistance Tests

2.9.1 Perform resistance measurements from ground bus to ground. The made ground network must be tested during dry weather.

2.9.2 Tests made to determine the resistance of the made ground must be performed with a direct-reading, three-point, Vibroground 263-type instrument or approved equal. Multimeters or other meters not designed to measure earth resistance shall not be used for this purpose.

2.9.3 Tests must be made from the prime ground buss in the housing, not from any of the installed ground rods.

2.9.4 All conductors, excepting the grounding conductors, must be disconnected from the prime ground buss at the time of testing and all tests must be recorded in the site log book.

2.10 System Features and Apparatus

2.10.1 Ensure field event recording (logging) devices function as intended. Download data from electronic storage devices to ensure device is functioning and all intended data is being correctly recorded.

2.10.2 Perform equipment specific tests in accordance with manufacturer’s instructions.

2.11 Other Signal Tests

2.11.1 The Contractor must perform all other kinds of signal tests in accordance with this Section, manufacturer's specifications and recommendations, authorities having jurisdiction, and to ONTC's satisfaction.

2.12 Regression Testing

2.12.1 Where software is being tested over a number of distinct testing periods ensure that regression tests are run to verify successful restoration of 'in service' software between test periods.

3. Electrical Inspections and Tests

3.1 General

3.1.1 Perform start-up and testing on all electrical systems and equipment, make adjustments and fine tune systems, and demonstrate how they conform to Contract requirements.

3.1.2 Testing methods and test results shall comply with the requirements of applicable CSA/ULC standards, Ontario Electrical Safety Code, local hydro, and Authorities Having Jurisdiction (AHJ) as well as manufacturer's recommendations.

3.1.3 Perform testing with systems completely connected, both loaded and unloaded.

3.1.4 For greater clarity, the tests specified in this Section shall be performed for new power services from electric utilities and shall be carried out for pre-wired housings/bungalows.

3.2 Electrical Distribution System

3.2.1 Control and switching: Test circuits for correct operation of devices, switches and controls.

3.2.2 Polarity tests: Test circuits for correct operation of devices and polarity sequence.

3.2.3 Voltage tests: Perform voltage test at last outlet of each circuit. Maximum drop in potential permitted 3% on 120 V and 208 V branch circuits: 3% on 208 V feeder circuits; and 3% on 600 V feeder circuits.

3.2.4 Phase balance: Measure load on each phase at each switchboard, splitter, distribution panel board and report results in writing to ONTC. Rearrange phase connections as necessary to balance load on each phase as instructed by ONTC. Rearrangement restricted to exchanging of connections at distribution points. After changes, submit record drawings indicating modified connections.

3.2.5 Supply voltage: Measure line voltage of each phase at load terminals of main breakers and report results in writing to ONTC. Perform supply voltage test to electrical equipment in use.

3.2.6 Conductors:

3.2.6.1 Continuity test: Perform continuity test on all circuit conductors including grounding and bonding conductors.

3.2.6.2 Dielectric test on 120/208 V equipment and wiring: Apply 500 V DC for one minute between phase conductors and between each phase conductor and ground. Test voltages for 600 V equipment and cables as recommended by manufacturers of equipment and cable.

3.2.6.3 Insulation resistance test: After completion of dielectric test, measure insulation resistance by approved resistance measuring instrument. Insulation resistance between connected system and ground: minimum values prescribed under Insulation Resistance in the Ontario Electrical Safety Code.

3.2.6.4 Remove and replace shorted, grounded or defective conductors.

3.2.7 General operations: Energize and put into operation electrical circuits and items. Make repairs, alternations, replacements, tests and adjustments necessary for complete and acceptable operating electrical system.

3.2.8 Distribution panels:

3.2.8.1 Verify and record information for each distribution panel as to:

1. Manufacturer.
2. Amp rating.
3. Voltage.
4. Phasing.
5. Correct operation of each breaker.
6. Labelling.

3.2.9 Lighting and receptacle circuits:

3.2.9.1 Verify and record following information for each lighting and receptacle circuit:

1. Phasing and polarity.
2. Insulation resistance to ground.
3. Secure connections.

3.2.10 Generator receptacle:

3.2.10.1 Generator receptacle test at factory:

1. The generator connection shall be tested in accordance with the Contract Documents.

3.2.10.2 Generator site acceptance before commissioning:

1. Arrange for personnel to temporarily supply an adequately powered generator for accurate testing. Test generator connection and correct operation in accordance with the Contract Documents & Contract Drawings.

3.2.10.3 Generator commissioning test:

1. Ensure Rail Traffic Control Centre (RTCC) is advised of test. Maintenance personnel must be in attendance when this test is performed.
2. Ensure equipment performs normally before test. Test switchover using maintenance supplied generator. Check with the RTCC that power failure incident was received. Allow maintenance personnel to check that equipment performs normally on generator power.
3. Switch back to normal power. Allow maintenance personnel to check that equipment performs normally.

3.3 Grounding

3.3.1 Verify resistance and continuity of driven electrodes, connections, grounding conductors, main bonding conductors and supplementary bonding conductors.

3.4 Control and Communications Wires and Cables

3.4.1 Check each cable and wire for continuity, short circuits and grounds. Ensure resistance to ground of circuit’s 50 megohms minimum.

3.4.2 Tests:

3.4.2.1 After installing cable but before splicing and terminating, perform insulation resistance test with megger on each conductor.

3.4.2.2 Check insulation resistance after each splice and/or termination.

3.4.2.3 Test continuity of wires, conductor resistance and capacitance.

3.4.2.4 Verify wiring interconnections by ringout.

3.4.2.5 During testing ensure terminations and accessory equipment disconnected.

3.4.2.6 During testing ground shields, ground wires and conductors not under test.

3.4.2.7 Restore termination connections, grounds, shields, ground wires and conductors after testing.

3.4.3 Provide ONTC with written list of test results showing location each test made, circuit tested and result of each test.

3.4.4 Remove and replace entire length of cable if cable fails to meet test criteria.

3.5 Control Panels and Cabinets

3.5.1 Verify system installations, connections and controls are complete and the product is in operable condition.

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

3.6 Ducts/Conduits

3.6.1 Test conduits and ducts installed but required left empty for clean bore. Install fish wire and cap.

3.6.2 Verify each underground duct or conduit to contain no blockages by pulling through appropriately sized mandrel in presence of ONTC.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section describes the requirements for signal documentation.

1.2 Submittals

1.2.1 The Contractor shall submit four copies of the following:

1.2.1.1 Full record documents and construction record documents for all installations, including system software, hardware, configuration and application detail.

1.2.1.2 Test results and records.

1.2.1.3 Warranty and guarantee documents.

1.2.2 The Contractor shall provide Construction record documents, test documents and warranty and guarantee documents prior to apply for Substantial Performance.

1.2.3 ONTC will make the final determination as to whether or not all record documents and construction record document have been submitted and placed in the required locations.

1.2.4 ONTC will make the final determination as to whether or not all test documents and original warranty and guarantee documents have been submitted and are acceptable.

2. Execution

2.1 Record Documents

2.1.1 Record documents shall include all design modifications, including stage works, issued for installation, test and commissioning documents. The Contractor shall maintain accurate record documents using the Contract Drawings marked up to show new work in red, existing retained work in black and recoveries in blue.

2.1.2 The Contractor shall place current record documents at each installed location, e.g. each signal bungalow, case, cabinet and other wayside locations, throughout the installation, testing and commissioning process, including all stage work.

2.2 Construction Record Documents (As-Installed)

2.2.1 The Contractor shall provide accurate Construction record documents by using the Contract Drawings marked up to show new work in red, existing retained work in black and recoveries in blue.

2.2.2 The Contractor shall ensure that Construction record documents, for maintenance purposes, are placed at each bungalow, case and other required locations at the commissioning and are updated prior to acceptance into service.

2.3 Test Documents

2.3.1 The Contractor shall provide test results and records in accordance with Section 34 42 05, Signal System Testing Requirements.

2.3.2 The Contractor shall ensure all test documents are signed and dated by the Contractor's tester-in-charge.

2.4 Warranty and Guarantee Documents

2.4.1 The Contractor shall provide original warranty and guarantee documents, complete with Subcontractor, supplier and/or manufacturer name, phone number address, contact person and catalogue data.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes the general requirements for Signals & Communications (S&C) materials required for the Work.

1.2 Reference Documents

1.2.1 CP_CN Specification for 600V Polyethelene Insulated and Jacketed Railway Signal Cable, CP100_1997 .

1.2.2 American Railway Engineering and Maintenance of Way Association (AREMA), Communications & Signals Manual, latest version.

1.2.3 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.2.4 Transport Canada Highway Crossings Protective Devices Standards (E-6).

1.2.5 Transport Canada Grade Crossing Standards (GCS).

1.2.6 Transport Canada Standards Respecting Railway Clearances (E-05).

1.2.7 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.3 Signals

1.3.1 General Requirements:

1.3.1.1 Signal masts shall be a base mounted type, for mounting directly to concrete foundations, steel foundations, and brackets. All hardware required for mounting shall be provided, including brackets where required. A separate mast shall be used for each direction.

1.3.1.2 Signal light units shall be assembled in accordance with the Contract Documents, Contract Drawings and GCS standards.

1.3.1.3 Signal light units shall be 200mm or 300mm Light Emitting Diode (LED) signal module type in accordance with GCS Article 14.1 and GCS Appendix A.

1.3.1.4 The LED signal module shall be designed to replace the existing signal unit holder, reflector, and lens in a highway-rail grade crossing signal unit housing, without requiring modification of the mechanical, structural, or electrical components of those housings.

1.3.1.5 Each signal housing and hood shall be made of aluminum. It shall have a hinged, removable door which, when required by the technology used, shall be provided with ventilation openings, top and bottom, covered with fine mesh stainless steel, copper or brass screen on the inside and protected with hoods to keep out precipitation. Doors shall have gaskets as specified in the AREMA Communications & Signals Manual, Part 15.2.10.

1.3.1.6 Doors shall be provided with a means of padlocking. The locking arrangement of the doors shall be so arranged that the doors cannot be locked until fully closed.

1.3.1.7 Each signal shall be provided with a minimum of 10 pairs of AAR type terminals for terminating No. 6 AWG through No. 9 AWG solid copper wires.

1.3.1.8 Signals shall be furnished complete with an entrance coupling.

1.3.1.9 All mounting hardware shall be furnished to provide a complete signal layout, including anchor bolts, nuts, washers, and other hardware to fasten the signal to the concrete foundation.

1.3.1.10 The inside of each light unit compartment shall be painted per the manufacturer's standard.

1.3.1.11 The finish coat of paint for backgrounds and hoods shall be dull black.

1.3.1.12 The finish coat of paint for all non-aluminium parts of the signal layout shall be aluminum.

1.4 Batteries

1.4.1 General Requirements:

1.4.1.1 Where two battery banks are used, all batteries shall be nickel cadmium type of sufficient ampere-hours, suitably de-rated for operation at -10°C, to provide eight hours continuous operation for the crossing warning devices (operating bank) and 48 hours for the operation of the track circuits or controllers (control bank), from a fully charged state.

1.4.1.2 Where one battery bank is used, all batteries shall be nickel cadmium type of sufficient ampere-hours, suitably de-rated for operation at -10°C, to provide 24 hours continuous operation for the crossing warning devices for the operation of the track circuits from a fully charged state.

1.4.1.3 Capacity rating shall be based on a five hour discharge rate at 25°C. Calculation for sizing of all batteries shall include a design margin of 15% and an aging factor of 10%. Batteries must be reliable within an ambient temperature range of -40°C to +70°C.

1.4.1.4 The use of primary batteries shall not be permitted for any application. Batteries shall meet or exceed AREMA C&S Manual Parts 9.1.1, 9.1.2, 9.1.3, 9.1.15 and 3.1.28.

1.4.1.5 Examples of acceptable low maintenance batteries designed for railway applications are the SAFT type SPL, SCM, and the Alcad type L, M, and H.

1.5 Relays

1.5.1 General Requirements:

1.5.1.1 The Contractor shall provide vital plug-in type relays in accordance with the Contract Documents and Contract Drawings. Only relays which have a history of use in North American Railway signalling shall be used.

1.5.1.2 The arrangement and location of relays shall be in accordance with the Contract Documents and Contract Drawings.

1.5.1.3 Contractor shall provide specification sheets for all the relay types.

1.5.1.4 Relays shall be mounted in standard relay racks. The relay plug boards shall include a test link or test terminal which would allow the relay to be tested without having to remove wires.

1.5.1.5 Relays shall be identified on the front by a tag bearing the name of the relay. The plug boards shall be identified by a tag on the back bearing the name of the relay.

1.5.1.6 Plug boards shall be equipped with identification plates that would prevent installation of the relay into the plug board.

1.5.1.7 Relays shall meet the requirements of AREMA C & S Manual.

1.5.1.8 Vital relays shall be tested before being placed into service to ensure operating voltages and currents fall within manufacturer’s acceptable stipulated parameters. Relays which do not meet the minimum manufacturer’s specifications shall not be used.

1.5.1.9 Relays shall be equipped with shock indicators and if there is an indication that the relay has been damaged it shall not be placed in service.

1.5.1.10 Records of tests performed on relays shall be placed in the site log book.

1.6 Wire and Cable

1.6.1 General Requirements:

1.6.1.1 All wire and cable shall meet the requirements of AREMA C&S Manual Part 10 and CP-100 SCM-S-0930-01specification.

1.6.1.2 Multi conductor cables shall have the insulation resistance measured wire to wire and wire to ground prior to being placed into service.

1.6.1.3 The Contractor shall submit the specification sheet for underground wire and cable and internal signal and case wire.

1.6.1.4 The Contractor shall submit the specification sheet for the type of underground conduits if other than galvanized steel pipe.

1.6.1.5 The Contractor shall submit specification sheet for the solder less terminals.

1.6.1.6 The Contractor shall leave a minimum 2 m spare cable at the entrance to each housing and signal apparatus.

1.6.1.7 The Contractor shall install “Caution” marker tape, with all underground cable installations, where the cable is not located in ducts.

1.6.1.8 The Contractor shall place tape 12″ directly above the buried cable. Above ground cable markers shall be installed indicating buried cable and be applicable at each side of culverts, bridges, between crossings.

1.6.1.9 Splices or any type of repair to internal wire or external wire and cable is prohibited without the ONTC's acceptance.

1.6.1.10 Ethylene-Propylene, Synthetic Rubber, Polyethylene or Cross-Linked Polyethylene insulated and jacketed cable plus Conventional Low Density Polyethylene (LDPE) and High Performance Linear Low Density Polyethylene (LLDPE) type insulation in accordance with CP-100 SCM-S-0930-01specification and shall be the only types permitted for underground and aerial use.

1.7 Case Wire

1.7.1 General Requirements:

1.7.1.1 All standard signal wire types for use on equipment housing and signal apparatus must be EFTE cable type. EFTE cable consists of single conductor size Signal Case Wire, 19 strands ASTM B-8 Class C tinned copper with ethylene tetraflouroethylene copolymer insulation (EFTE), in accordance with AREMA C&S Manual Part 10.3.14 and 10.3.24.

1.7.1.2 Wire sizes shown in the table below are the minimum sizes allowed:

Table 1: Minimum Wire Size

Internal House Wiring		
Typical Application	**AWG**	**EFTE Insulation Thickness**
Vital Relay and Electronic Wiring	16	015″
Battery Loops	10	020″
Track Circuits	10	020″
Lamp Lighting Circuits	10	020″
Battery Charging/Feed Circuits	6	030″

1.7.1.3 Should a discrepancy be found between the above table and the Contract Drawings, the Contract Drawings shall govern.

1.7.1.4 Wiring between equipment located on different housing walls in the signal housing shall be run in either overhead ladder-type cable trays or in a surface wire way. Special precautions

shall be taken to ensure that the surface wire way is suitably arranged at wall corners so as to provide complete mechanical protection to the wiring.

1.7.1.5 All conductors within surface wire way or cable trays shall be run straight and parallel unless otherwise specified as twisted wires on the circuit plans. Length of vital signal shall be kept as short as possible.

1.7.1.6 Surface wire way and cable trays may contain any number of conductors but the aggregate cross-sectional area of the conductors shall not exceed 70% of the interior cross sectional area of the wire way or tray.

1.7.1.7 Wires shall be laid loosely without stretching or crowding and shall not be doubled back.

1.7.1.8 Surface wire way shall be of the rigid PVC slotted-wall type, light gray in color, complete with PVC cover.

1.7.1.9 Wires exiting the housing shall be mounted on terminals with a one inch test link to facilitate testing of the circuits without having to remove wires from the terminals.

1.7.1.10 Only Aircraft & Marine Products (AMP) or approved equal compression terminals and properly calibrated tools shall be used for vital and non-vital circuit wiring.

1.7.1.11 Approved terminals are AMP, PIDG type, red, blue or yellow as dictated by size of wire in use.

1.7.2 Solid strand brand compression terminals shall be used for ground wires to 1/4″ AAR.

1.7.3 Compression tools shall be identified with a tag, sticker or other suitable indicator to ensure correct tool is used.

1.8 Spare Material

1.8.1 As a part of the Work, the Contractor may be requested to provide spare material. Upon request from ONTC, the Contractor shall procure new spare material using funding provided through the Cash Allowance for this Contract. This clause shall be exercised at ONTC’s discretion.

1.8.2 Any material ONTC provides the Contractor that is not utilized for the installation shall be classified as spare material and must be returned to ONTC.

1.8.3 Spare material provided under this Section shall be available to ONTC’s maintenance personnel prior to any of the systems being commissioned into service. Spare material shall be of the same type used in the installation, including hardware and software versions.

END OF SECTION

1. General

1.1 Summary

1.1.1 This Section includes the general requirements for the Signals & Communications (S&C) wayside housings (bungalows) and cases. All Work shall be completed to the standard of installation expected of a competent North American railway S&C contractor.

1.2 Reference Documents

1.2.1 Installation standards as approved under Section 01 11 00, 2.2.

1.2.2 American Railway Engineering and Maintenance of Way Association (AREMA), Communications & Signals Manual, latest version.

1.2.3 Transport Canada Railway Signal & Traffic Control Standards (E-17).

1.2.4 Transport Canada Highway Crossings Protective Devices Standards (E-6).

1.2.5 Transport Canada Grade Crossing Standards (GCS).

1.2.6 Transport Canada Standards Respecting Railway Clearances (E-05).

1.2.7 Transport Canada Wire Crossings and Proximity Regulations (E-11).

1.3 Miscellaneous Requirements

1.3.1 S&Cs equipment, systems, and associated materials shall be manufactured in accordance with AREMA Communications & Signals Manual recommendations and approved shop drawings, inspected and tested prior to shipment.

1.3.2 Equipment shall be installed as per the Contract Documents and Contract Drawings. Any questions or concerns shall be brought to the ONTC's attention for guidance or resolution.

1.4 General Requirements for Wayside Housings (Bungalows) and Cases

1.4.1 External cables shall be terminated on a Low Impedance Ground Plane (LIGP) or an optional Faraday cage entrance board.

1.4.2 Bungalows shall be constructed of aluminum in accordance with ASTM Specification B 209-04, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate. Aluminum panels shall be standard 5052-H2 quality one side bright finish sheet.

1.4.3 Formed aluminum shall be used for the frame construction of the housing including all floor joists, base frame, wall/roof panel joints and corner posts.

1.4.4 The framework for the floor of the housing shall consist of an all-aluminum base frame and a sub-floor consisting of interlocking aluminum panels.

1.4.5 The roof of the housing shall withstand snow loads of up to 100 lbs. per sq. ft. The floor shall be constructed to provide support for point equipment loading of 500 lbs. per linear ft. as required and an average area loading of not less than 150 lbs. per square ft.

1.4.6 The underside of the floor shall be insulated by using rigid foam insulation and covered with 0.102″ thick aluminum panel.

1.4.7 All exterior seams shall be weatherproof, ensuring that neither moisture nor dust can enter the house under all weather conditions.

1.4.8 Bungalows shall be fitted with at least two separate doors designed to swing out when facing the bungalow from outside. The door, door-frame, and hinges shall be capable of supporting a dead weight of 250 lbs at any point along the edge of the door farthest from the hinged axis of the door in addition to the weight of the door itself.

1.4.9 One door shall be used for entrance to the bungalow and the others to provide access to the rear of the main terminal board. The lower portion of the doors shall be equipped with an air vent. Aluminum wire mesh shall cover the interior side of the vent. Both doors are to incorporate vandal-resistant latching assemblies.

1.4.10 The entrance door shall have a security release feature which shall permit the opening of the door from the inside without the use of hand tools even if the door is locked from the outside. A three-point ramping type latch mechanism with heavy-duty door handle shall be provided to engage the door side frame at three places.

1.4.11 Door hinges shall be aluminum, 8″ in length and feature non-removable stainless steel hinge pins so that the pins cannot be removed to open the door. The hinges shall be permanently lubricated. The hinges must not be removable from the outside.

1.4.12 Doors will be equipped with a weatherproof seal and close snugly. A rain gutter, 1″ wide shall be provided over each door. The door handles shall be equipped with a weather guard to prevent freezing rain and snow from entering into lock and handle mechanisms.

1.4.13 All doors shall be equipped with a retaining hook, such as a 0.375″ diameter rod with retaining clip, to permit holding the door open at 90° to the closed position. The retaining hook shall be located at the bottom of the cable access door and at the top of the entrance door.

1.4.14 All external hardware used in the assembly of the housing shall be stainless or galvanized steel. All internal hardware used in the assembly of the house shall be stainless or zinc plated steel.

1.4.15 The housing assembly shall form part of the grounding system and must guarantee a low electrical impedance path. All joints and seams of the housing assembly shall be welded in accordance with CSA W59.21aluminum welding standards.

1.4.16 Bungalows shall be 102″ high with the inside clear vertical wall height not less than 88.5″ to permit the installation of equipment racks and to allow access to overhead cable troughs. The bungalow dimensions shall be 72” x 72”.

1.4.17 All exposed edges of aluminum ladder-type cable trays shall be covered with appropriate material to prevent damage to wire insulation. Wiring trays shall be electrically bonded to the bungalow skin.

1.4.18 Rigid foam insulation shall be provided on the ceiling, floor, doors and walls of the housing. The insulation shall be 1.25″ thick, complete with aluminum foil vapour barrier on each side. The minimum insulation value of the insulation material shall be R-12.

1.4.19 The interior walls and floor of the housing shall be completely faced with 0.75″ plywood. The plywood floor shall be painted with an acid resistant paint.

1.4.20 The floor of the housing shall be covered with 0.1875″ (3/16″) thick, non-slip, corrosive-resistant, electrically non-conductive, rubber safety matting. The matting shall not be glued or permanently affixed to the sub-floor.

1.4.21 The plywood facing of the interior walls of the housing shall be painted with two coats of white fire retardant paint. The exception will be a 4 ft. high section to the rear and side of the battery rack. This portion of the wall shall be painted with two coats of acid resistant paint.

1.4.22 The wall design of the housing shall be capable of supporting wall mounted equipment loading of 350 lbs. per linear foot measured in either the horizontal or vertical direction.

1.4.23 In general, all fixed equipment shall be directly mounted to plywood walls, backboards, or to equipment racks and surface wiring methods using CSA approved rigid PVC wiring duct system or wireway, to provide mechanical protection shall be utilized in the wiring of such equipment.

1.4.24 Bungalows and cases shall be identified by stencils identifying location and km point; crossing bungalows shall also show the road name. All bungalows shall have an identification plate showing, as a minimum, manufacturer, serial number and date of manufacture.

1.4.25 The Emergency Notification Sign is to be installed on the case or bungalow parallel to the roadway. The sign must be bilingual, clear and legible and shall provide information on the location of the crossing and ONTC’s emergency telephone number. It should adhere to the details outlined in section 8.5 in the GCS.

1.5 Standard Equipment

1.5.1 Bungalows shall be equipped with the following standard equipment:

1.5.1.1 Electrical distribution panel board and equipment including surge protector, circuit breakers, generator receptacle and associated wiring in accordance with the Contract Documents and Contract Drawings. All bungalows shall be equipped with the same make and model for common electrical equipment.

1.5.1.2 One CSA approved, thermostatically-controlled, squirrel cage, 120VAC, electric ventilating fan located on the wall that allows optimal airflow from the main entrance door. The fan shall be rated at least 250 SCFM. The exhaust fan shall be equipped with louvers which shall open automatically when the fan is operated. Fan and louvers shall be protected by a special aluminum, vandal, insect and bird-resistant, all-weather, exterior hood. A wall mounted thermostat shall be provided with the electric ventilator, having an adjustable range of between 20°C and 45°C and designed to turn on the ventilator to cool the bungalow down to the thermostat setting.

1.5.1.3 Heater and ventilator circuits shall be interlocked such that only one of the two systems can be operating at a time.

1.5.1.4 Industrial 48″ fluorescent lighting fixture(s), with wall switches and associated wiring in accordance with the Contract Documents and Contract Drawings.

1.5.1.5 One 11″ x 30″ fold down plan table capable of holding circuit drawings and test equipment shall be provided and shall be placed in close proximity to equipment to allow for test equipment to be used without the need for special length cables.

1.5.1.6 The light switch shall be mounted to the right of the door when entering the bungalow and located at a convenient height.

1.5.1.7 Duplex convenience receptacle(s) and associated power wiring in accordance with the Contract Documents and Contract Drawings. One duplex receptacle shall be mounted in close proximity to the folding plan tables. One receptacle must be mounted close to the front door below the light switch. The receptacle closest to the front door must be equipped with a Ground Fault Interrupter.

1.5.1.8 An industrial-type, dual-voltage (120 or 240 VAC), space heater and adjustable wall mounted thermostat shall be provided if not included in the wall mounted air conditioner unit. Table 2 shows the wattage of the space heater required for each type of bungalow.

Table 1: SP01 - Housing Size and Space Heater Wattage

Bungalow Size (ft.)	Space Heater Wattage (w)
4 x 4	1,500
6 x 6	5,000
6 x 8	5,000
8 x 8	5,000
8 x 10	5,000
8 x 12	5,000
8 x 16	5,000

1.5.1.9 A two-tier, double-shelf battery rack measuring 30″ high and 12″ wide. Table 3 shows the length of battery rack for each type of bungalow. Support brackets shall be either stainless steel or formed aluminum. The frame of the battery tray shall be designed using formed aluminum or hardwood. The shelves of the battery rack shall be made from hardwood and covered with the same rubber matting used on the bungalow floor.

Table 3: Housing Size and Battery Tray Dimensions

Bungalow Size (ft.)	Length of Battery Tray (in.)
4 x 4	44
6 x 6	48
6 x 8	60
8 x 8	72
8 x 10	72
8 x 12	110
8 x 16	110

1.6 Low Impedance Ground Plane

1.6.1 One or more Low Impedance Ground Planes (LIGP) shall be installed directly over the top of the housing main cable chute(s). The LIGP shall be constructed of 0.100″ aluminum.

1.6.2 A 0.75″ plywood backing shall be affixed to the back of each LIGP. The plywood backing shall be painted with two coats of white fire retardant paint. The structure of the LIGP and plywood backing must be strong enough to support the total weight of lightning arrestors, AREMA terminal strips, and the internal and external signal cable connections.

1.6.3 Aluminum cable tie bars shall be provided on each side of the LIGP. These tie bars shall accommodate the easy construction of cable trees along the LIGP. Each tie bar shall be capable of independently bearing a dead weight of 175 lbs. Wire tie locations shall be provided every 12″ on

the plywood backing.

1.6.4 Plywood backing shall have pre-drilled 0.5″ diameter holes as illustrated in the Contract Documents and Contract Drawings showing the terminal arrangement for the LIGP. The aluminum back plane shall have pre-stamped 0.625″ (5/8″) diameter holes (centres lined up with those of the holes described above, and 0.0625″ (1/16″) diameter terminal strip guide holes (four per 12 post terminal strip, two per equalizer block). The 0.0625″ (1/16″) holes shall be positioned to allow the terminal centres to line up with the 0.625″ (5/8″) diameter hole centres.

1.6.5 Each LIGP shall be supplied with one ground through-bolt assembly for each center 12 post strip positions in accordance with accepted S&C standards for Signal Housings. The ground through-bolt assembly shall consist of a 2 ¼″ nickel plated AREMA bolt with two 7/8″ nickel plated washers and four AREMA terminal nuts.

1.6.6 Each LIGP shall be electrically bonded to the aluminum skin of the housing in at least two places using exothermically welded electrical connections.

1.7 Faraday Cage

1.7.1 “Faraday Cage(s)” shall be installed directly over top of the housing cable chute(s) and welded all around the bungalow aluminum frame. The walls of the cage shall completely close off the cable chute. The ceiling of the cage shall also be closed off. The interior of the cage shall be all aluminum.

1.7.2 Faraday cage panels shall be provided to fill all the spaces of the side of the cage facing the interior of the housing that has been designated as the terminal board. The panels shall be mounted in such a way that they form a complete electrical path with the bungalow structure.

1.7.3 The structure of the terminal board shall be strong enough to support the weight of each panel and the associated lightning arrestors, AREMA terminal strips, and the internal and external signal cable connections.

END OF SECTION

Mileage	Sub Code	Road	MuniTwp	Projected Speed Zone	Protection to be added/changed
1.36	TSD	Hwy 11 & 17	North Bay	15	Add gates
4.87	TSD	Hydro Station Road	North Bay	40	Replace system/add gates
11.70	TSD	Widdifield Station Rd	North Bay	55	Add gates
76.20	TSD	Spruce Drive	Temagami	65	Replace system/add gates
99.78	TSD	Bass Lake Road	Coleman Twp	50	Add gates
106.19	TSD	Niven St	Temiskaming Shores	60	Add gates
106.95	TSD	Albert Street	Temiskaming Shores	60	Replace system
124.68	TSD	Highway 562 - Thornloe		65	Replace system
128.89	TSD	Temp Hwy 11 By Pass			Install system
134.99	TSD	Highway 569 - Heaslip	Evanturel Twp	65	Replace system
135.91	TSD	Highway 624 - Larder Highway	Evanturel Twp	65	Replace system
0.81	RSD	Hwy 11/GP Spur	Englehart	10	Replace system
14.52	RSD	Boston Creek		30	Replace system
20.88	RSD	Jardine			Add gates
57.82	RSD	Hwy 572/Holtyre	Black River Matheson	65	Replace system/add gates
66.36	RSD	4th Avenue			Add gates
67.37	RSD	Burton Road	Black River Matheson	35	Replace system
79.33	RSD	Monteith Road	Iroquois Falls	55	Replace system/add gates
86.37	RSD	Hwy 11 Porquis			Design review and Add gates
94.08	RSD	Barber's Bay	Timmins	60	Add gates
97.73	RSD	Connaught	Timmins	55	Replace system
100.44	RSD	Dugwall	Timmins	55	Replace system
103.49	RSD	Hoyle	Timmins	55	Add gates
104.32	RSD	Kidd Creek			Add gates ?
108.28	RSD	Halnor	Timmins		Replace system
109.30	RSD	Falcon Street	Timmins		Replace system
0.00	DVSH	Shop crossing	Cochrane		Replace system
0.78	DVSH	Porquis			Add gates
1.78	DVSH	Hopkins Road			Add gates
5.04	DVSH	Nellie Lake			Add gates
1.05	KAP	Western Avenue	Cochrane	10	Replace system

11.75	KAP	Hwy 668/Hunta		25	Replace system
69.46	KAP	McPherson Ave	Town of Kapuskasing	10	Replace system
70.50	KAP	Bonnieview Road	Town of Kapuskasing	10	Replace system
110.05	KAP	Second Ave	Mattice - Val Côté	30	Replace system/add gates
121.78	KAP	Hallewood Ave		30	Replace system/add gates
46.52	KLSD	Avenue Provencher	Arntfield	30	Add gates
50.77	KLSD	Rang St-Cyr (6e-et-7e)	Arntfield	30	Add gates
53.61	KLSD	Beauchastel Ave	Arntfield	30	Add gates

Notes:

- List is subject to change.

- Design review will determine if gates are required.

- Crossing installs or upgrades may be added to meet the GCS on all Subdivisions.

PART 3 – RFP SPECIFICATIONS
SCHEDULE 3-A-2
REFERENCE DRAWINGS

Refer to the reference drawings, as outlined below, and which are attached to this Schedule 3-A-2.

REFERENCE DRAWING

Drawing Name	Description	No. of Pages
E-001 and Reference Documents	Main Electrical Distribution - Single Line Diagram and Utility Pole Detail, together with Customer Information and Customer Work Reference Pages	3 pages
KAPU054.48FB_SL	Automatic Crossing Warning System without Gates – Signal and Track Layout	1 page
KAPU054.48FA_SW	Automatic Crossing Warning System without Gates	18 pages
KAPU054.48FA_PC	Automatic Crossing Warning System without Gates – XP4 Program Configuration Sheet	2 pages
KAPU054.48FA_JP	Automatic Crossing Warning System without Gates – Jumper Track Disable Schematic	2 pages
TEMA128.66FD_SL	Automatic Crossing Warning System with Gates – Signal and Track Layout	1 page
TEMA128.66FD_SW	Automatic Crossing Warning System with Gates	20 pages
TEMA128.66FD_PC	Automatic Crossing Warning System with Gates – XP4 Program Configuration Sheet	2 pages
TEMA128.66FD_JP	Automatic Crossing Warning System with Gates – Jumper Track Disable Schematic	2 pages

TABLE 1: INCOMING BREAKER SIZES					
SERVICE SIZE	BREAKER A	CABLE A			
	120/240V	QTY	SIZE	TYPE	INS.
100A	100A/2 POLE	3C	#2	RWU90	1kV
200A	200A/2 POLE	3C	#4/0	RWU90	1kV

TABLE 2: CABLES FOR 120/240V DISTRIBUTION (CABLE B) 240V 2 POLE - MAX CABLE LENGTH (m)					
	LOAD SIZE				
CABLE SIZE	1.5 kVA	3 kVA	6 kVA	9 kVA	12 kVA
3C #12	89	45	23	15	12
3C #10	142	71	36	24	18
3C #8	225	113	57	38	29
3C #6	358	179	90	60	45
3C #4	569	285	143	95	72
3C #2	904	452	226	151	113
3C 1/0	1437	719	360	240	180
3C 2/0	1812	906	453	302	227
3C 4/0	2880	1440	720	480	360

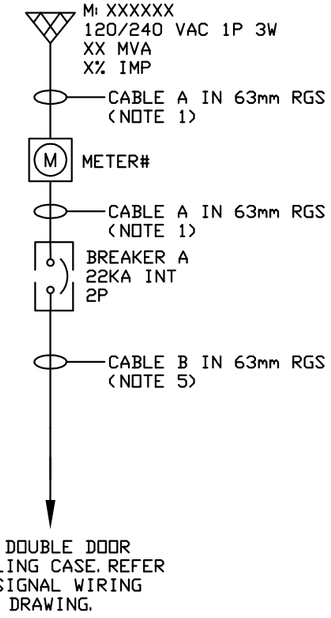
LEGEND:

(M) UTILITY METERING COMPLETE WITH METERING BASE SUITABLE FOR SERVICE DIRECTION (OVERHEAD OR UNDERGROUND)

SERVICE CONNECTION FROM UTILITY

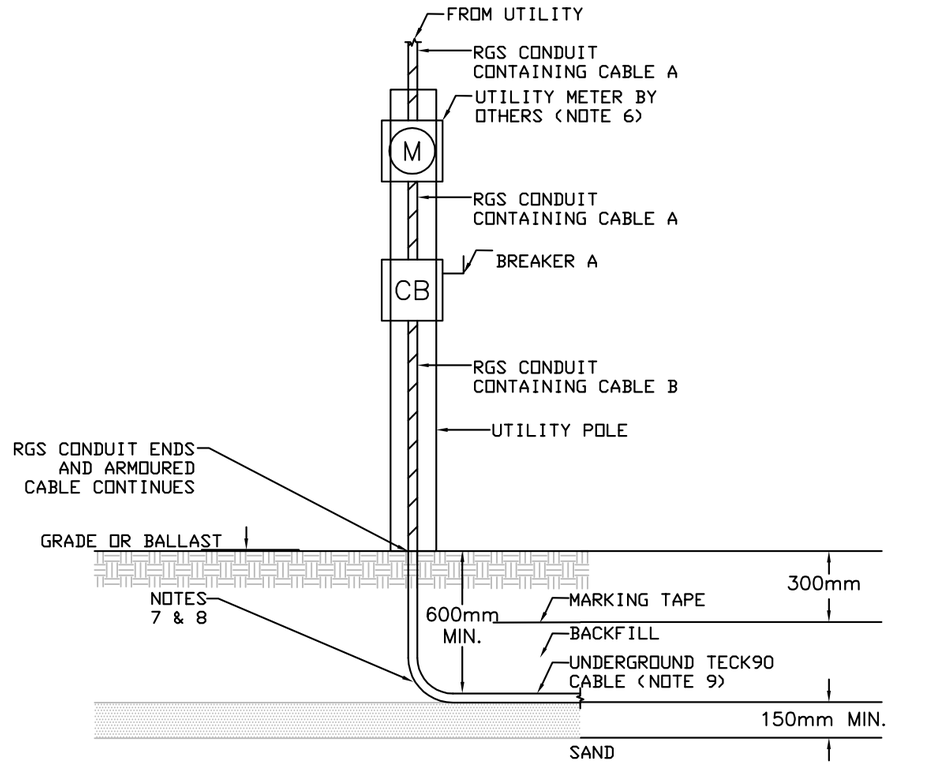
FIXED CIRCUIT BREAKER/DISCONNECT

CB FIXED CIRCUIT BREAKER/DISCONNECT



SINGLE LINE DIAGRAM — 1 / E001

MAIN ELECTRICAL DISTRIBUTION



UTILITY POLE DETAIL — 2 / E001

MAIN ELECTRICAL DISTRIBUTION

NOTES:

1. CABLE FOR SERVICE ENTRANCE SHALL BE SUPPLIED ACCORDING TO TABLE 1, AND THE LOCAL UTILITY REQUIREMENTS, AS APPLICABLE.
2. ALL EQUIPMENT SHALL BE CSA CERTIFIED AND SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS OF THE OESC.
3. ALL CABLES SHALL BE COPPER AND BE SUPPLIED WITH 1kV RATED INSULATION, UNLESS OTHER WISE NOTED.
4. THIS IS A TYPICAL DESIGN, AND SHALL BE UTILIZED IN SITUATIONS WHERE THE LOAD IS A BALANCED, 120/240V LOAD.
5. ALL INSTALLATION CABLE LENGTHS SHOWN IN TABLE 2 ARE FOR REFERENCE ONLY. CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE MAXIMUM ALLOWABLE VOLTAGE DROP, AS DEFINED BY THE OESC, IS MET.
6. UTILITY METER TO BE INSTALLED AT 1800mm ABOVE GROUND.
7. THE BENDING RADIUS OF THE CABLE SHALL NOT BE LESS THAN THE MANUFACTURER'S RECOMMENDED BENDING RADIUS OR REQUIREMENT OF THE ONTARIO ELECTRICAL SAFETY CODE, WHICH EVER IS GREATER.
8. CABLES SHALL BE BURIED IN A BEDDING OF SAND. IF THERE IS NOTHING IN THE SOIL LARGER THAN 6mm, THEN THE NATIVE SOIL CAN BE USED AS A BEDDING.
9. DIRECT BURIED CABLE DEPTH BASED ON INSTALLATION IN A VEHICULAR AREAS.

NOT TO SCALE

ENGINEER SEAL:

N			-

PEVISIONS

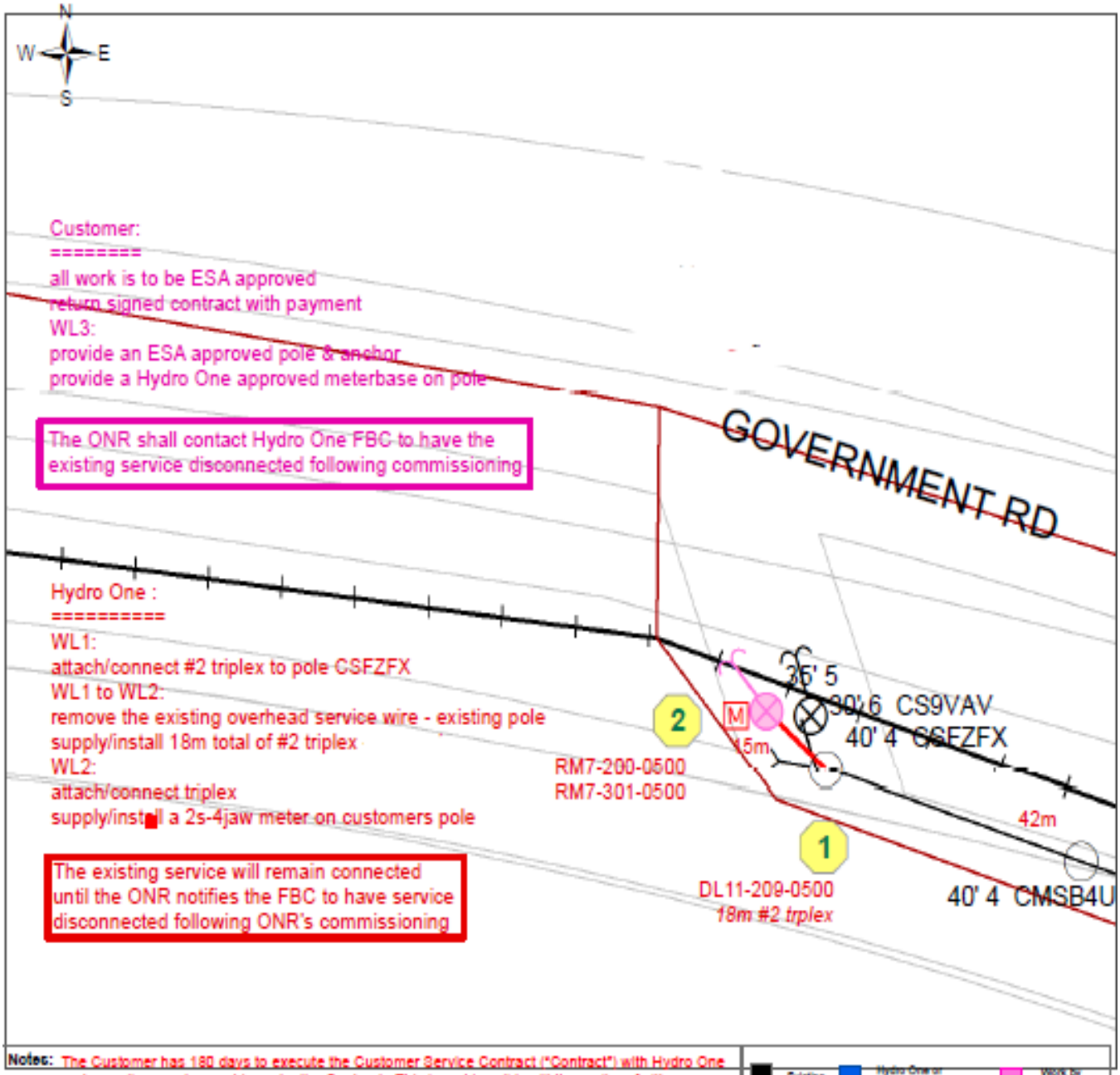
O.N. Rail

MAIN ELECTRICAL DISTRIBUTION SINGLE LINE DIAGRAM AND UTILITY POLE DETAIL

DWG No:	SHT.	REV.
E-001	1/1	A

Electronic Layout — Schedule A

Customer Information		Service Location & Contractor Information		General Information	
Customer: Ontario Northland		911 Address:		Preparation Date:	
Address: 555 Oak St E North Bay ON P1B 8E3		Lot: 7	Concession: 2	Rate Class: General Service - Non Urban Energy - GSe	
		Township: Fauquier		D.S.: Fauquier	
		RP#:	Sublot:	Customer Cable: No	Feeder: F3
Primary #		Contractor: na		Service Size: 100 Amps	Switch: 33
Bus.:	Fax:	Ph #: na	Fax: na	Acct #:	Transformer: 56



Notes: The Customer has 180 days to execute the Customer Service Contract ("Contract") with Hydro One and pay all amounts payable under the Contract. This layout is valid until the earlier of either: (a) 180 days from the date of Contract execution and receipt of Customer payment; or (b) 360 days from the "Preparation Date" identified on the layout. The Customer may have to pay for a re-design (which means the Customer will receive a new layout) should the Customer: (a) not execute the Contract with Hydro One and pay all amounts payable under the Contract within the 180 day timeframe referenced in the Contract; and/or (b) make changes to their requirements which requires Hydro One to make revisions to the work that needs to be performed by Hydro One or the Customer.

- All work to be done to Electrical Safety Code

Existing | Hydro One or Contractor Section 3.0 | Work by Customer

Hydro One Only Section 2.0 | Work by Others (Bell or LDC)

X Remove - Hydro One or Contractor Section 3.0 | X Remove - Hydro One Only - Section 2.0

X Remove - By Customer | X Remove - By Others (Bell or LDC)

SECTION 4: Customer Work: **Customer Work:**

(Customer Work
that must be performed by you,
at own expense,
using Qualified Contractor)

You shall perform the work identified on the Schedule B, as work to be performed by the Customer and where a Hydro One transformer is to be installed on a Customer-owned pole or Customer-owned transformer pad, you shall construct transformer grounding that meets Hydro One's design and technical standards and specifications and transfer ownership of the transformer grounding to Hydro One (collectively, the "Customer Work").

If your service request requires Hydro One owned underground cables, you must perform that Customer Work in accordance with the Secondary Underground Trenching Specifications attached to this Contract to ensure that all requirements are met for your service connection.

You are required to install a Hydro One approved Meter Base. Hydro One's list of approved meter bases is updated from time to time and we make our most current version available on our website at the following link: https://www.hydroone.com/businessservices_/Documents/Meter-Socket-Base.pdf.

You are also required to obtain an Authorization to Connect, as well as any other required inspections and authorizations from the Electrical Safety Authority ("ESA").

You can contact the ESA at 1-877-372-7233 to arrange for an electrical inspection and any other required inspections or authorizations. You can also obtain a fee estimate at that time. It's easily done over the phone and will allow you to proceed with your electrical work.

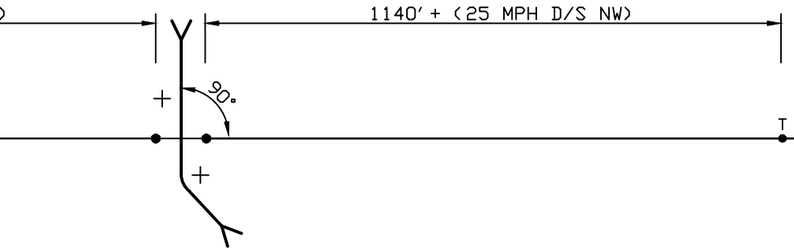
Once you have completed your Customer Work, please contact the ESA again for the actual electrical inspection. The ESA will advise you when they have completed their inspection and will send a copy of your Authorization to Connect directly to our Field Business Centre office. We will then contact you to discuss the scheduling of your service connection.

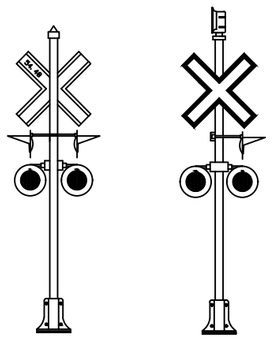
D'AMOURS ROAD

NORTH

TO HEARST

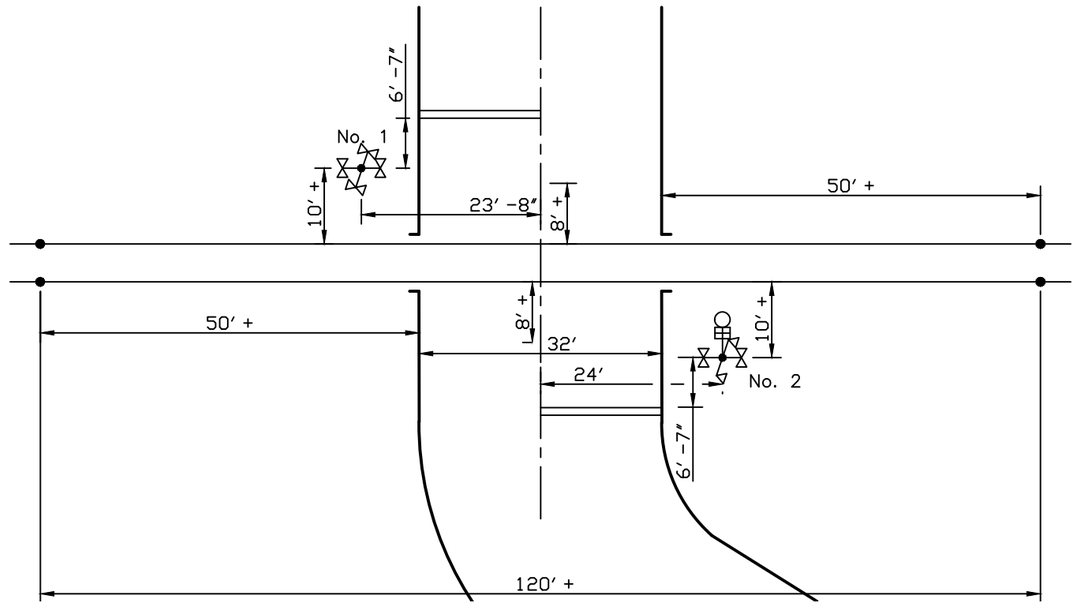
TO COCHRANE





No. 1 No. 2

DETAIL OF WARNING DEVICES



NOT TO SCALE

NOTES:

1. CLEARANCE DISTANCE DOES NOT EXCEED 45'
2. MOTION SENSOR DEVICE (BI-DIRECTIONAL)
3. WARNING TIME CALCULATED USING GCS SECTION 16.1.1

LEGEND:

T
— TERMINATION SHUNT

— TRACK CONNECTION

DESIGN CRITERIA FOR AUTOMATIC CROSSING WARNING SYSTEM

TIME IN SECONDS	MAIN			
	N APP.	S APP.		
BASIC OPERATING TIME (BOT)	20	20		
CLEARANCE TIME (CT)	1	1		
ADVANCED PRE-EMPT TIME (APT)	0	0		
REACTION TIME (RT)	5	5		
BUFFER TIME (BT)	5	5		
GATE DOWN TIME (5 minus CT)	–	–		
TOTAL TIME	31	31		
SPEED (MPH)	25	25		
DISTANCE (FEET)	1140	1140		

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
SIGNAL & TRACK LAYOUT

DWG No:	SHT.	REV.
KAPU054. 48FB_SL	1/1	B

SHEET NO.	DESCRIPTION
1	INDEX
2	TRACK LAYOUT
3	TRACK CIRCUITS
4	MISCELLANEOUS CIRCUITS
5	LIGHTING CONTROL CIRCUITS
6	FLASHING LIGHT #1 & #2 CONTROL CIRCUITS
7	AC POWER DISTRIBUTION #1
8	AC POWER DISTRIBUTION #2
9	DC POWER DISTRIBUTION
10	P. O. E. CIRCUITS
11	ElectroLogIXS XP4 UNIT LAYOUT
12	XP4 MODULE USAGE
13	XP4 I/O CHART
14	MAIN TERMINAL BOARD (SIDE B)
15	SIDES "A" & "C"
16	SIDE "D"
17	TOP VIEW & GROUNDING
18	REVISION HISTORY

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
INDEX

DWG No: KAPU054. 48FA001_SW

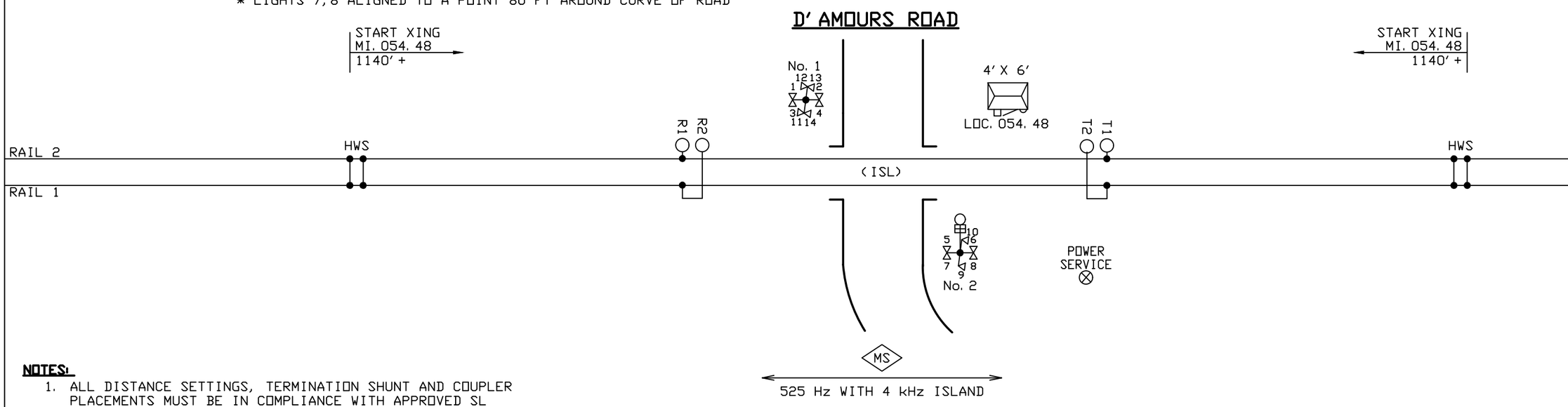
SHT. 01/18

REV. FA

FLASHING LIGHT UNITS ALIGNMENT TABLE

PRIMARY FRONT LIGHTS FOR VEHICLES									
SIG #	LIGHT #	ROUNDEL		ROAD SPEED		MINIMUM DISTANCE		ALIGNMENT DISTANCE	
		SIZE	TYPE	KM/H	MPH	M	FT	M	FT
1	1, 2	12"	LED	50	31	18*	60*	18	60
2	7, 8	12"	LED	50	31	24*	80*	24	80
INTERMEDIATE LIGHTS FOR VEHICLES									
SIG #	LIGHT #	ROUNDEL		ROAD SPEED		MINIMUM DISTANCE		ALIGNMENT DISTANCE	
		SIZE	TYPE	KM/H	MPH	M	FT	M	FT
1	11, 12	12"	LED	N/A	N/A	NOTE 2		40	130
1	13, 14	12"	LED	N/A	N/A	NOTE 2		31	100
2	9, 10	12"	LED	N/A	N/A	NOTE 2		76	250
BACK LIGHTS FOR VEHICLES									
SIG #	LIGHT #	ROUNDEL		ROAD SPEED		MINIMUM DISTANCE		ALIGNMENT DISTANCE	
		SIZE	TYPE	KM/H	MPH	M	FT	M	FT
1	3, 4	12"	LED	N/A	N/A	N/A	N/A	15	50
2	5, 6	12"	LED	N/A	N/A	N/A	N/A	15	50

* LIGHTS 1, 2 ALIGNED TO A POINT WHEN VEHICLES WOULD ENTER D'AMOURS ROAD APPROACH ON NORTH SIDE
* LIGHTS 7, 8 ALIGNED TO A POINT 80 FT AROUND CURVE OF ROAD



NOTES:

1. ALL DISTANCE SETTINGS, TERMINATION SHUNT AND COUPLER PLACEMENTS MUST BE IN COMPLIANCE WITH APPROVED SL DRAWINGS AND VERIFIED IN THE FIELD PRIOR TO COMMISSIONING
2. TO BE ALIGNED AS PER CANADIAN GCS SECTION 14.4
3. FOR SIGNAL 1, LIGHTS 1 & 2 FACE THE TRANS CANADA HIGHWAY ROAD INTERSECTION THAT IS PARALLEL TO THE TRACK

LEGEND:

HWS — DENOTES HARDWIRE SHUNT

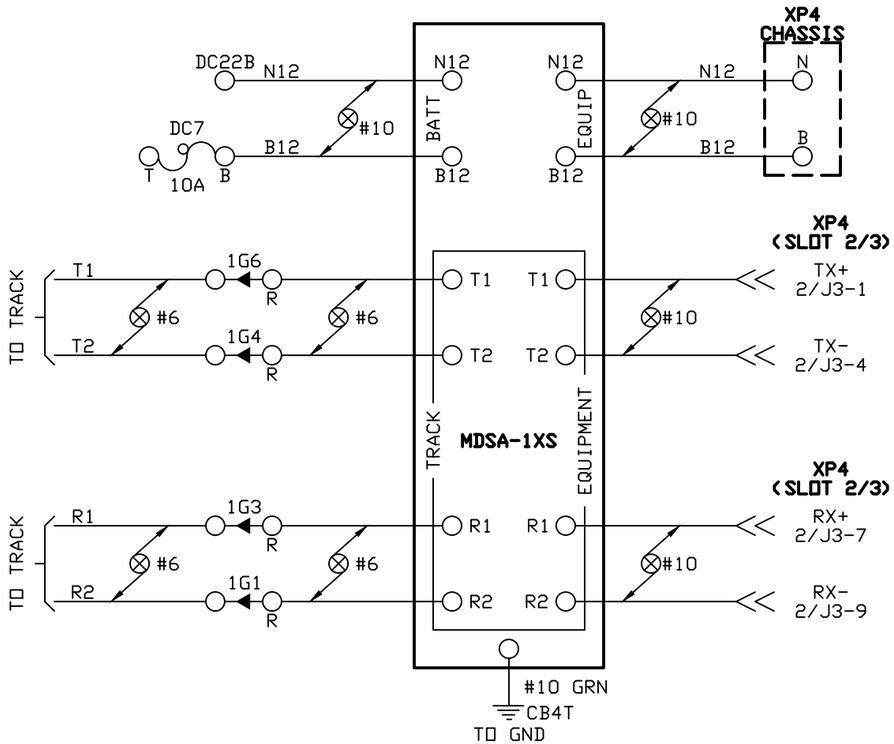
MS — DENOTES BI-DIRECTIONAL MOTION SENSOR DEVICE

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D' AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
TRACK LAYOUT

DWG No:	SHT.	REV.
KAPU054. 48FA002_SW	02/18	FA



LEGEND:

TWISTED PAIR

>> - DENOTES CONNECTOR ON XP4 PERSONALITY MODULE

NOTE:

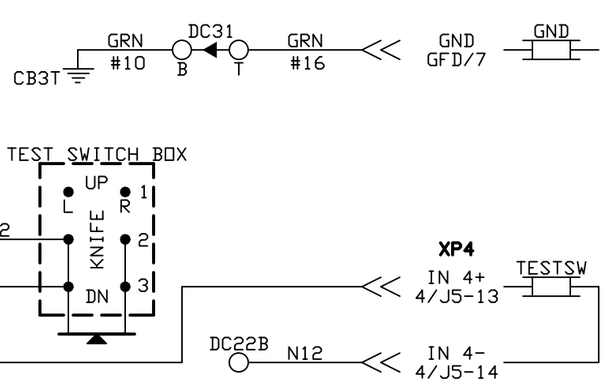
1. R1 & T1 OF EACH TRACK CIRCUIT MUST BE CONNECTED TO SAME RAIL
2. R2 & T2 OF EACH TRACK CIRCUIT MUST BE CONNECTED TO SAME RAIL
3. TRANSMITTER LEADS (T1, T2) MUST BE CONNECTED ON THE HOUSING SIDE OF THE CROSSING.
4. IT IS ESSENTIAL TO USE THE SIZE OF WIRE INDICATED ON THE PLAN

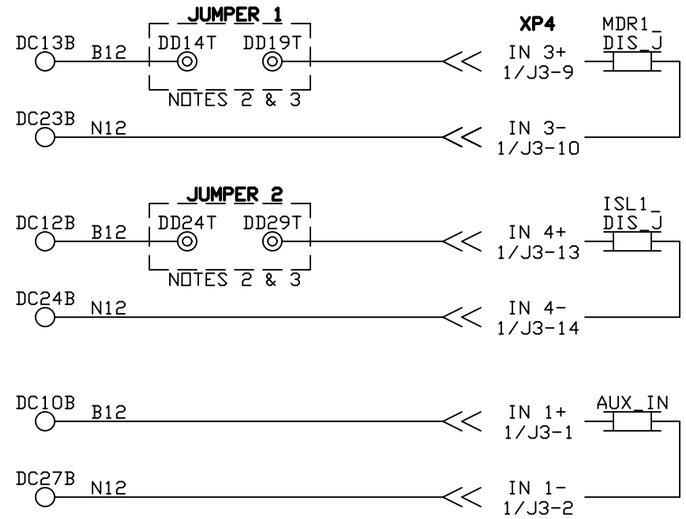
ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
TRACK CIRCUITS

DWG No:	SHT.	REV.
KAPU054.48FA003_SW	03/18	FA





LEGEND:

>> - DENOTES CONNECTOR ON XP4 PERSONALITY MODULE

◎ - DENOTES CAP AND SHIELD

NOTES:

1. UNMARKED WIRES TO BE #16
2. CAPS AND SHIELDS ON MDR/ISL DISCONNECT TERMINALS ARE TO HELP PREVENT UNINTENDED DEACTIVATIONS. THEY ARE TO BE LEFT ON WHENEVER DISCONNECT TERMINALS ARE NOT BEING USED.
3. **FOLLOW ONR SIGNAL STANDARDS WHEN TAKING TRACK OUT OF SERVICE**

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
MISCELLANEOUS CIRCUITS

DWG No:	SHT.	REV.
KAPU054. 48FA004_SW	04/18	FA

XP4
IXC-20S+ (SLOT 4)

J6

LB2	20	
LB2	19	
LB2	18	
LB2	17	
LO2	16	
LO2	15	
LO2	14	
LO2	13	
—	12	
LN2	11	
LN2	10	
—	9	
—	8	
—	7	
GO2-	6	
GO2+	5	
—	4	
—	3	
GO1-	2	
GO1+	1	

GETS CABLE
P/N 075047-001

J4

LB1	20	
LB1	19	
LB1	18	
LB1	17	
LO1	16	
LO1	15	
LO1	14	
LO1	13	
BELB	12	
LN1	11	
LN1	10	
BELN	9	
BELL	8	
RLY1	7	
—	6	
—	5	
GTN	4	
GTN	3	
GTB	2	
GTB	1	

GETS CABLE
P/N 075046-001

XIP-20B

J6

20	LAMP2 B	
19	LAMP2 B	
18	LAMP2 B	
17	LAMP2 B	
16	LAMP2 OUT+	
15	LAMP2 OUT+	
14	LAMP2 OUT+	
13	LAMP2 OUT+	
12	——	
11	LAMP2 N	
10	LAMP2 N	
9	——	
8	——	
7	——	
6	GATE2 OUT-	
5	GATE2 OUT+	
4	——	
3	——	
2	GATE1 OUT-	
1	GATE1 OUT+	

J4

20	LAMP1 B	
19	LAMP1 B	
18	LAMP1 B	
17	LAMP1 B	
16	LAMP1 OUT+	
15	LAMP1 OUT+	
14	LAMP1 OUT+	
13	LAMP1 OUT+	
12	BELL B	
11	LAMP1 N	
10	LAMP1 N	
9	BELL N	
8	BELL OUT+	
7	RELAY COIL1	
6	——	
5	——	
4	GATE N	
3	GATE N	
2	GATE B	
1	GATE B	

LAMP OUTPUTS
- LAMP1+ — T13
- LAMP1+ BACKUP — T12
- LAMP2+ — T14

BELL OUTPUT+ — T11

GATE CONTROL OUTPUTS
- GC2+ — T10
- GC2- — T9
- GC1+ — T7
- GC1- — T8

BATTERY INPUTS
- DC16B B12 #10 — T1 LAMP1+/ BELL+
- T2 LAMP2+
- DC16B B12 #10 — T3 GATE BATT+
- DC28B N12 #10 — T4 LAMP1-/ BELL-
- T5 LAMP2-
- DC28B N12 #10 — T6 GATE BATT-

- 1F18 R — #10 — 1L1 #6
- 1F16
- DC25B — N12 #10 — 1F15 R — 1EN #6
- 1F13 R — #10 — 1L2 #6
- 1F12 R — SPARE #6
- 1F10 R — SPARE
- 1G18 R — #10 — 2L1 #6
- 1G16
- DC29B — #10 N12 #10 — 1G15 R — 2EN #6
- 1G13 R — #10 — 2L2 #6
- 1G12 R — #10 — 2BELL #6
- DC29B — N12 #10 — 1G10 R — N12 #6
- 1G9 R — SPARE
- #6
- 1G7 R — SPARE

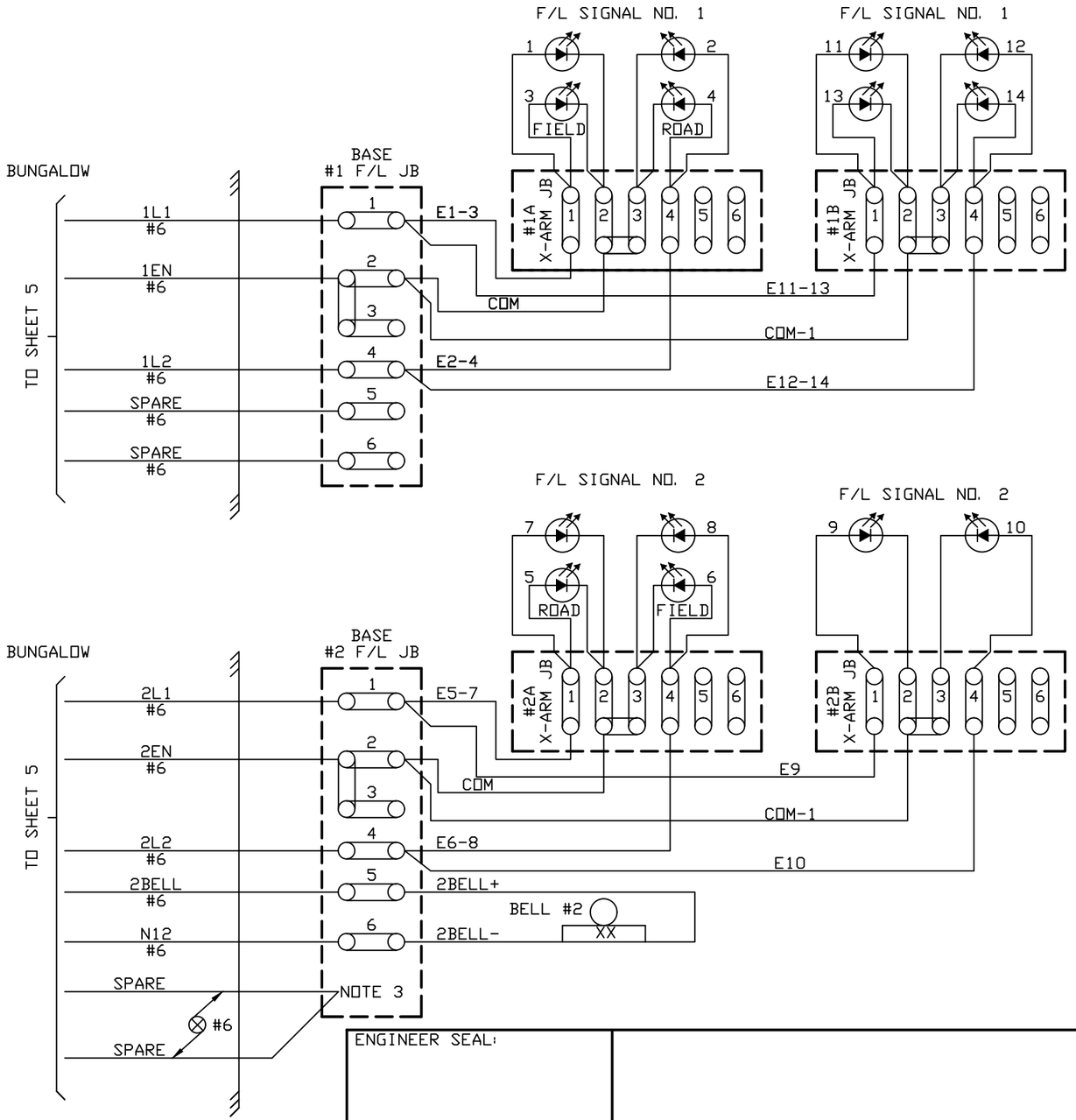
TO SHEET 6

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D' AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
LIGHTING CONTROL CIRCUITS

DWG No:	SHT.	REV.
KAPU054.48FA005_SW	05/18	FA



NOTES:

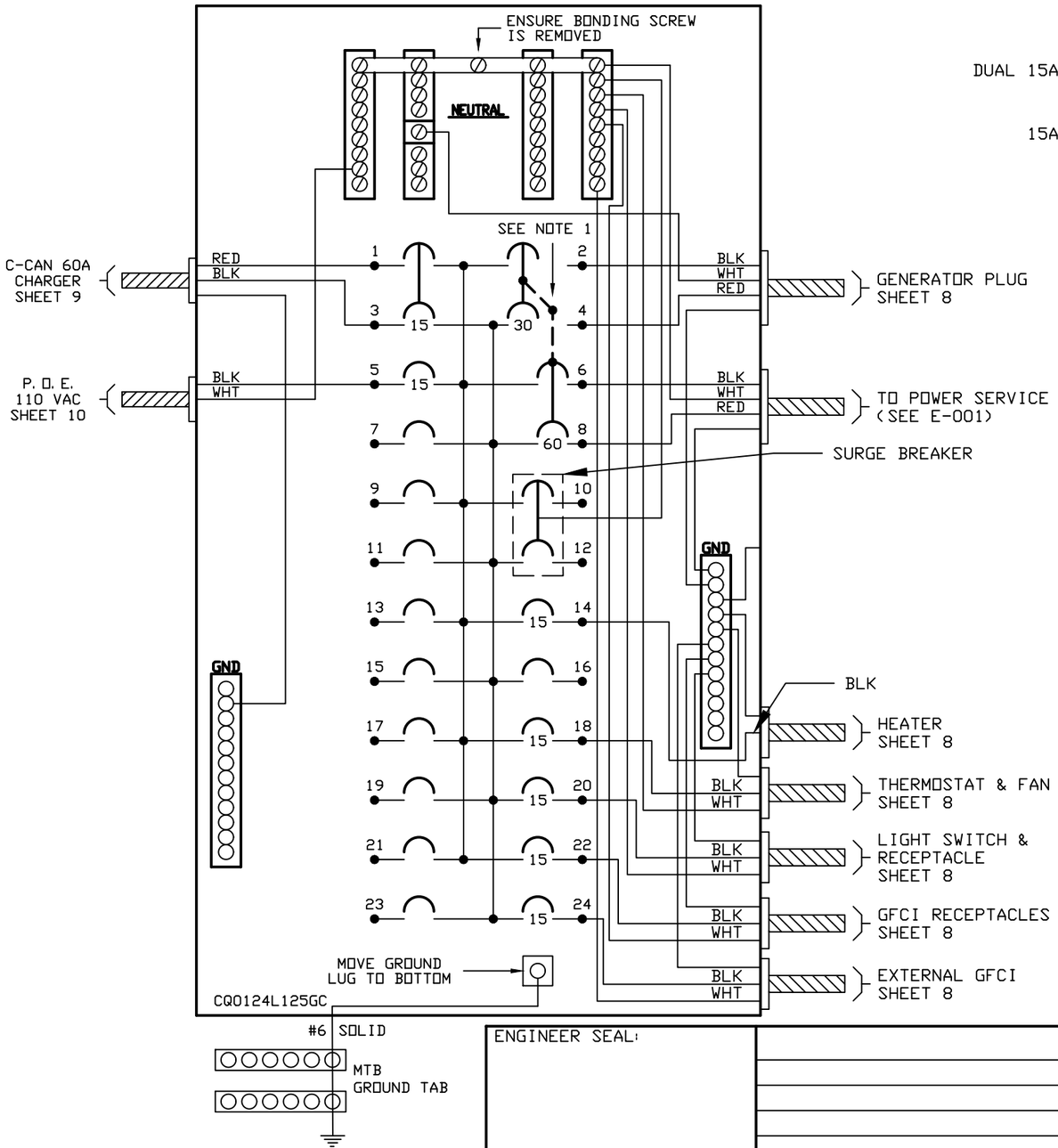
1. (LED) IS SYMBOL ONLY. INSTALL ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
2. LIGHT FIXTURES PORTRAYED ON TOP IN ABOVE DIAGRAM REPRESENT MAST FRONT LIGHTS.
3. SPARE NOT TERMINATED IN JUNCTION BOX #2.

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
FLASHING LIGHT #1 & #2 CONTROL CIRCUITS

DWG No:	SHT.	REV.
KAPU054. 48FA006_SW	06/18	FA



BREAKER ASSIGNMENT

DUAL 15A BREAKER QO215

15A BREAKER QO115

1	CHARGER	GENERATOR PLUG	2	DUAL 30A BREAKER QOM30L WITH MECHANICAL INTERLOCK TRANSFER SWITCH P/N QO2DTJ & RETAINER KIT P/N PK4DTIM4LA
3	CHARGER	GENERATOR PLUG	4	
5	P. O. E.	POWER SERVICE	6	DUAL 60A BREAKER QOM60XL PK4. KIT INCLUDES QO2DTI
7		POWER SERVICE	8	
9		SURGE BREAKER	10	SURGE BREAKER QO21755B
11		SURGE BREAKER	12	
13		HEATER	14	15A BREAKER QO115
15			16	
17		VENT FAN	18	15A BREAKER QO115
19		LIGHTS	20	15A BREAKER QO115
21		GFCI RECEPTACLES	22	15A BREAKER QO115
23		EXT. GFCI RECEPTACLE	24	15A BREAKER QO115

NOTES:

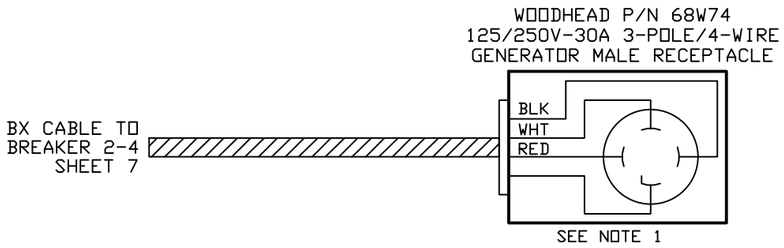
1. MECHANICAL INTERLOCK TRANSFER SWITCH P/N QO2DTI & RETAINER KIT P/N PK4DTIM4LA
2. UNMARKED GROUND WIRES ARE BARE COPPER
3. KEEP GROUND WIRES AS STRAIGHT AND AS SHORT AS POSSIBLE

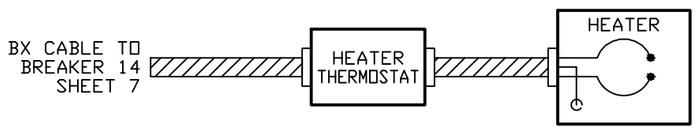
ENGINEER SEAL:

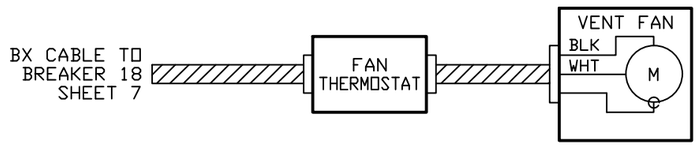
Ontario Northland

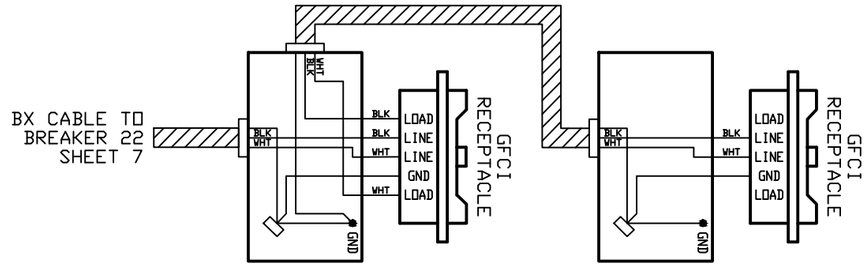
AUTOMATIC CROSSING WARNING SYSTEM
D' AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
AC POWER DISTRIBUTION #1

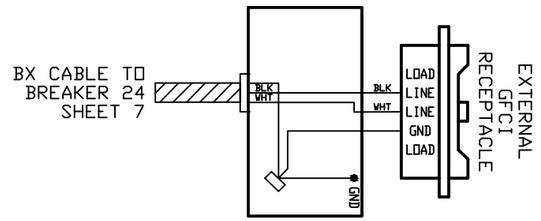
DWG No:	SHT.	REV.
KAPU054. 48FA007_SW	07/18	FA

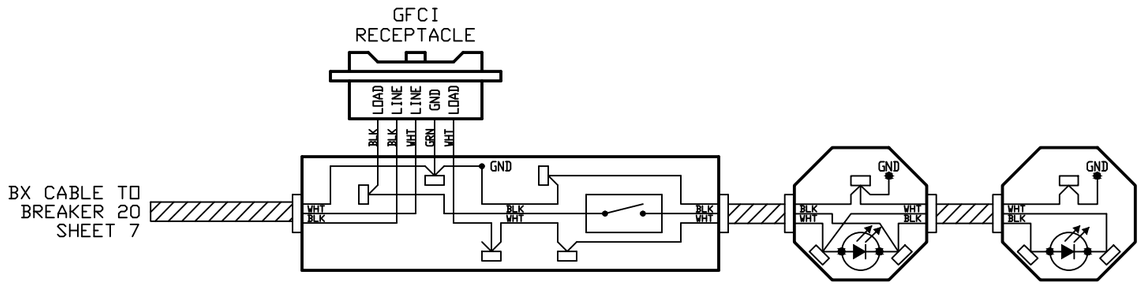












NOTES:

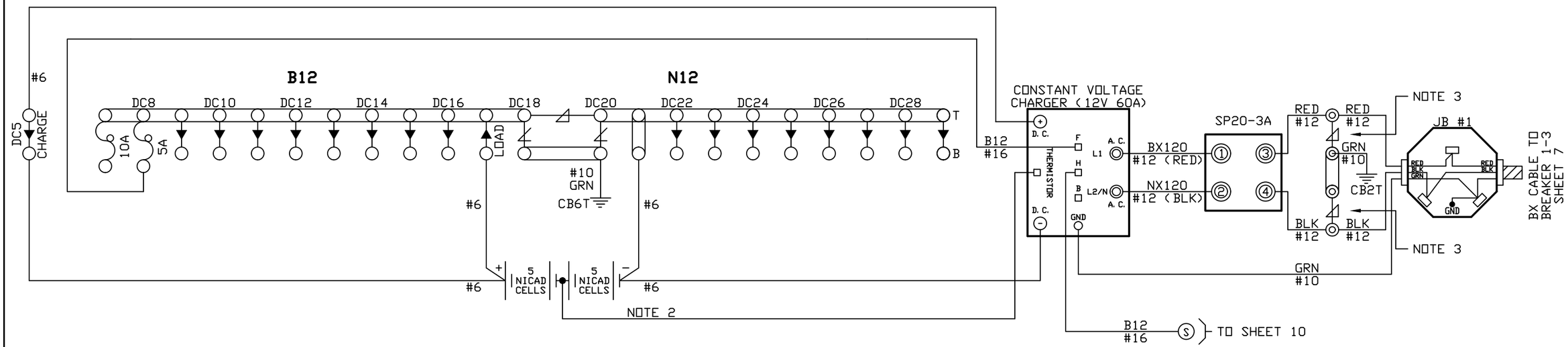
1. GENERATOR RECEPTACLE TO BE USED WITH FLOATING NEUTRAL GENERATOR ONLY

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D' AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
AC POWER DISTRIBUTION #2

DWG No:	SHT.	REV.
KAPU054. 48FA008_SW	08/18	FA



LEGEND:

◎ - DENOTES CAP AND SHIELD

NOTES:

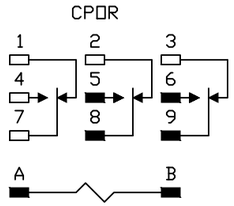
1. ARRESTERS MUST BE MOUNTED VERTICALLY OR HORIZONTALLY WITH THE TEETH POINTING UP SO THAT GRAVITY WILL DROP MOLTEN METAL AWAY FROM THE GAP DURING A SURGE
2. USE THERMISTOR WIRE PROVIDED BY MANUFACTURER
3. SP20-3A WITH EQUALIZERS SIEMENS P/N NYK-40004480707AX
4. UNMARKED AC GROUND WIRES ARE BARE COPPER

ENGINEER SEAL:

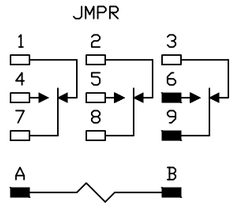
Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
DC POWER DISTRIBUTION

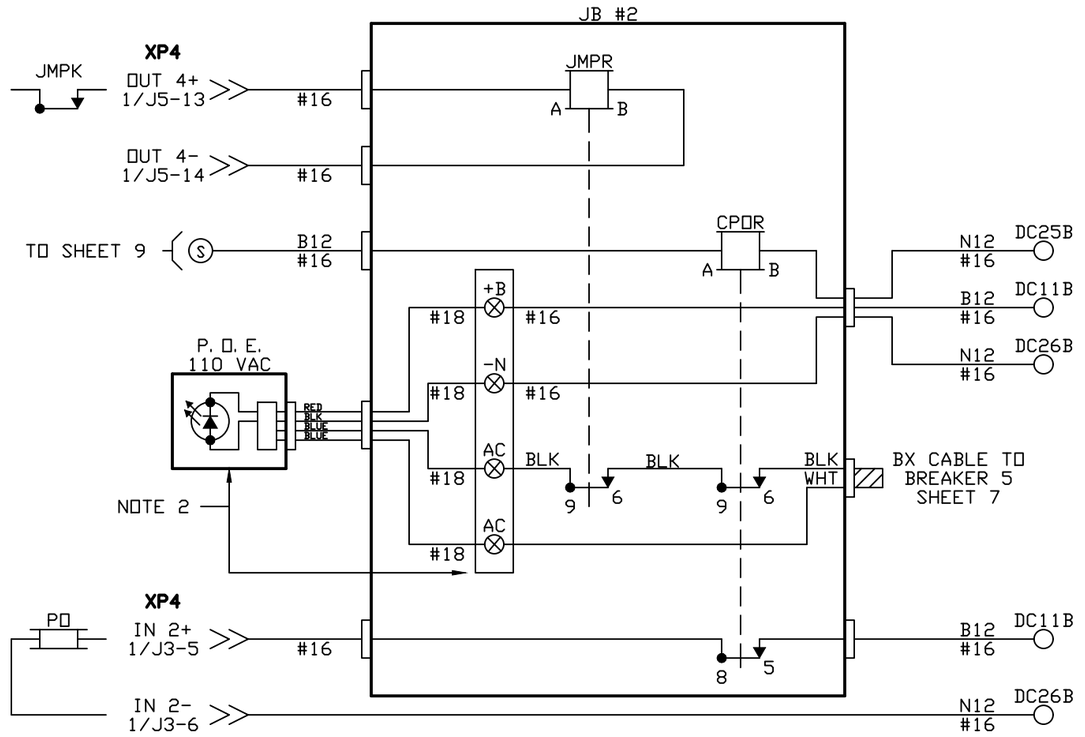
DWG No:	SHT.	REV.
KAPU054.48FA009_SW	09/18	FA



KUP 14
POTTER BRUMFIELD RELAY
(DEENERGIZED)
(NOTE 3)



KUP 14
POTTER BRUMFIELD RELAY
(DEENERGIZED)
(NOTE 4)



LEGEND:

>> - DENOTES CONNECTOR ON XP4 PERSONALITY MODULE

⊗ - DENOTES WAGO TERMINAL

NOTES:

1. UNMARKED AC GROUND WIRES ARE BARE COPPER
2. VELCORP GEMS P. O. E. P/N LC2-001WB_WG4 WITH WAGO 4 POSITION CONNECTOR
3. CPOR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12
4. JMPR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12

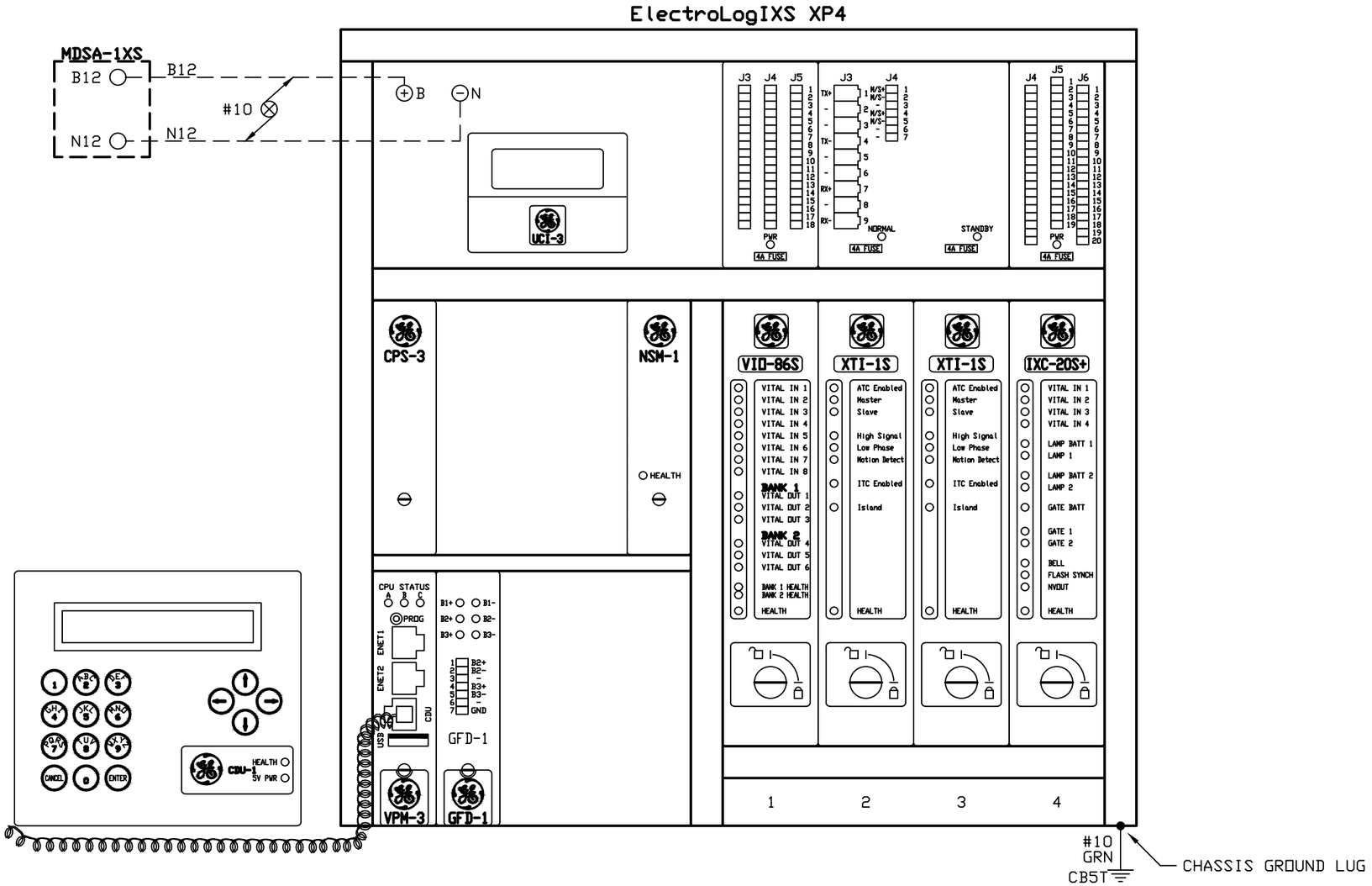
ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
P. O. E. CIRCUITS

DWG No:	SHT.	REV.
KAPU054. 48FA010_SW	10/18	FA

ElectroLogIXS XP4



LEGEND:

⊗ - DENOTES TWISTED PAIR

NOTE:

1. FERRITE CORE EMI FILTER TO BE INSTALLED ON POWER WIRES.

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
ElectroLogIXS XP4 UNIT LAYOUT

DWG No:	SHT.	REV.
KAPU054.48FA011_SW	11/18	FA

VIO-86S
PERSONALITY MODULE
(SLOT 1)

IN 1+	AUX_IN	✱	1
IN 1-	N12	✱	2
IN 2+	PO	✱	5
IN 2-	N12	✱	6
IN 3+	MDR1_DIS_J	✱	9
IN 3-	N12	✱	10
IN 4+	ISL1_DIS_J	✱	13
IN 4-	N12	✱	14
IN 5+			17
IN 5-			18

(J3)

IN 6+			1
IN 6-			2
IN 7+			5
IN 7-			6
IN 8+			9
IN 8-			10
OUT 6+			17
OUT 6-			18

(J4)

OUT 1+			1
OUT 1-			2
OUT 2+			5
OUT 2-			6
OUT 3+			9
OUT 3-			10
OUT 4+	JMPK	✱	13
OUT 4-	NJMPK	✱	14
OUT 5+			17
OUT 5-			18

(J5)

XTI-1S
NORMAL/STANDBY PERSONALITY MODULE
(SLOT 2 & SLOT 3)

TX+	T1	✱	1
TX-	T2	✱	4
RX+	R1	✱	7
RX-	R2	✱	9

(J3)

M/S 1+			1
M/S 1-			2
M/S 2+			4
M/S 2-			5

(J4)

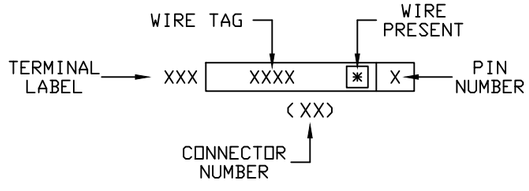
IXC-20S+
PERSONALITY MODULE
(SLOT 4)

IN 1+			1	NEVER WIRE TO THIS INPUT
IN 1-			2	
IN 2+			5	
IN 2-			6	
IN 3+			9	
IN 3-			10	
IN 4+	TESTSW	✱	13	
IN 4-	N12	✱	14	
FSI			17	
FSO			18	
NVO	XP4_HEALTH		19	

(J5)

GFD-1
MODULE
(SLOT 5)

1			B2+
2			B2-
4			B3+
5			B3-
7	✱	GND	GND



LEGEND:

VIO-86S - VITAL INPUT/OUTPUT MODULE
XTI-1S - CROSSING TRACK INTERFACE MODULE
IXC-20S+ - INTEGRATED CROSSING CONTROL MODULE
GFD-1 - GROUND FAULT DETECTOR

ENGINEER SEAL:

N

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
XP4 MODULE USAGE

DWG No:	SHT.	REV.
KAPU054. 48FA012_SW	12/18	FA

XP4 (4-SLOT CHASSIS)

SLOT NO.	TYPE OF MODULE	INPUTS 1	2	3	4	5	6	7	8	OUTPUTS 1	2	3	4	5	6
1	VIO-86S	AUX_IN	PO	MDR1_ DIS_J	ISL1_ DIS_J	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	JMPK	SPARE	SPARE

SLOT NO.	TYPE OF MODULE	TX	RX
2 - 3	XTI-1S	TK1_TX (T)	TK1_RX (R)

SLOT NO.	TYPE OF MODULE	INPUTS 1	2	3	4	NONVITAL NVO
4	IXC-20S+	RESERVED	SPARE	SPARE	TESTSW	XP4_ HEALTH

NOMENCLATURE DEFINITION TABLE

SOFTWARE NAME	DEFINITION
AUX_IN	AUXILIARY INPUT
PO	POWER OFF INPUT
MDR1_DIS_J	TRACK 1 MDR DISABLE JUMPER INPUT
ISL1_DIS_J	ISLAND 1 DISABLE JUMPER INPUT
JMPK	BATTERY SUPPLIED TO ANY DISABLE INPUT
TK1_TX	TRACK 1 MDR TRANSMIT
TK1_RX	TRACK 1 MDR RECEIVE
TESTSW	TEST SWITCH INPUT
XP4_HEALTH	XP4 HEALTH INDICATION OUTPUT

LEGEND:

VIO-86S - VITAL INPUT/OUTPUT MODULE
XTI-1S - CROSSING TRACK INTERFACE MODULE, NORMAL/STANDBY
IXC-20S+ - INTEGRATED CROSSING CONTROL MODULE

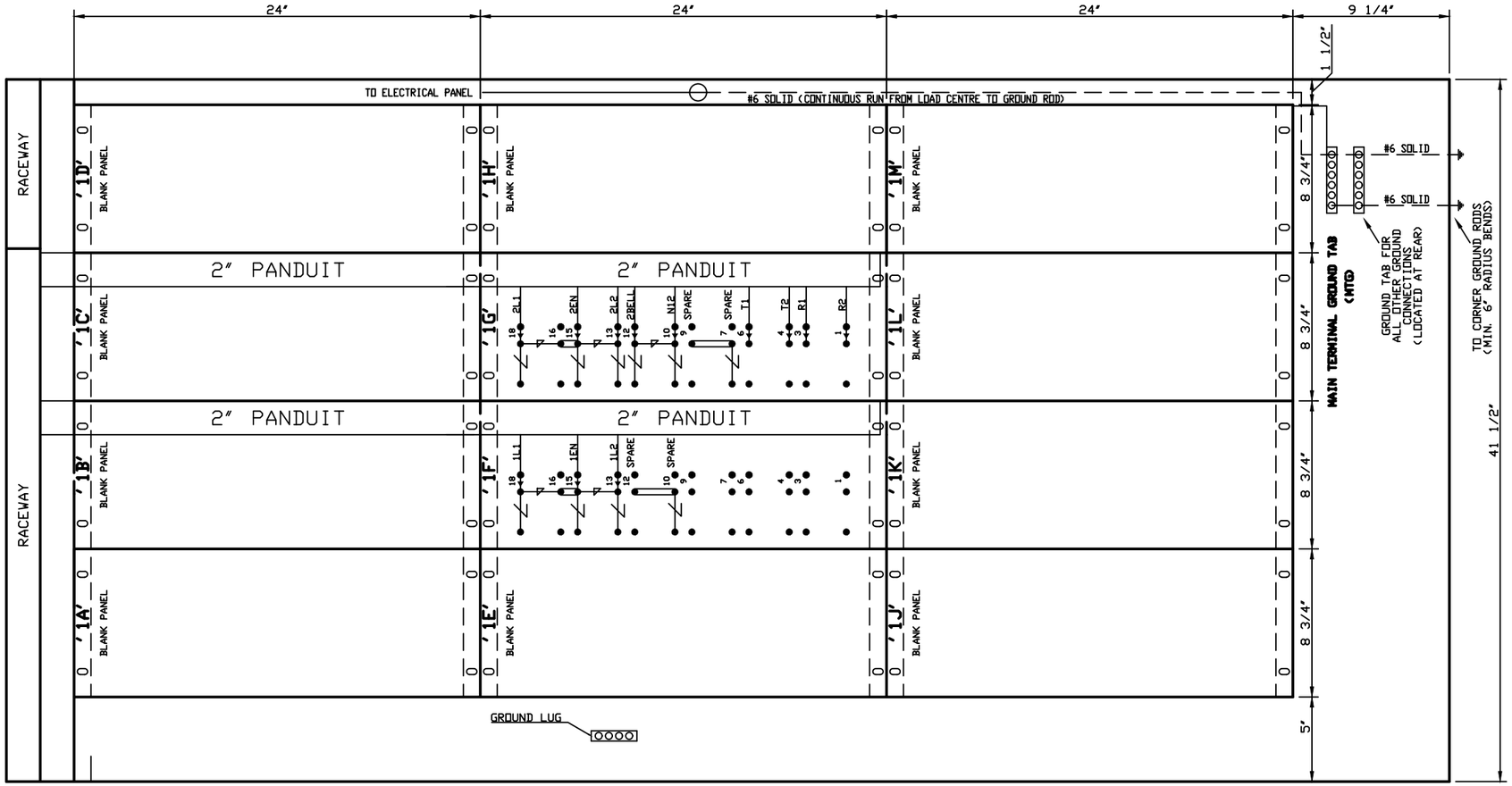
ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
XP4 I/O CHART

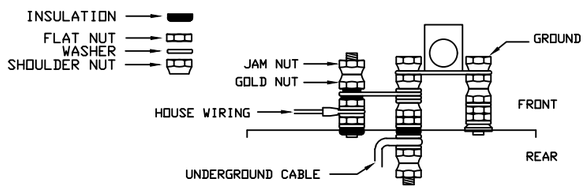
DWG No: KAPU054. 48FA013_SW | SHT. 13/18 | REV. FA

MAIN TERMINAL BOARD



CABLE CONSIST & TERMINATION CHART

TERMINAL PANEL	CABLE TERMINATED	CABLE DESTINATION
1F	1 - 5C #6 CABLE	1 F/L SIGNAL
1G	1 - 5C #6 CABLE 1 - 2C #6 TWISTED 2 - 2C #6 TWISTED	2 F/L SIGNAL SPARE SIGNAL TRACK CIRCUITS

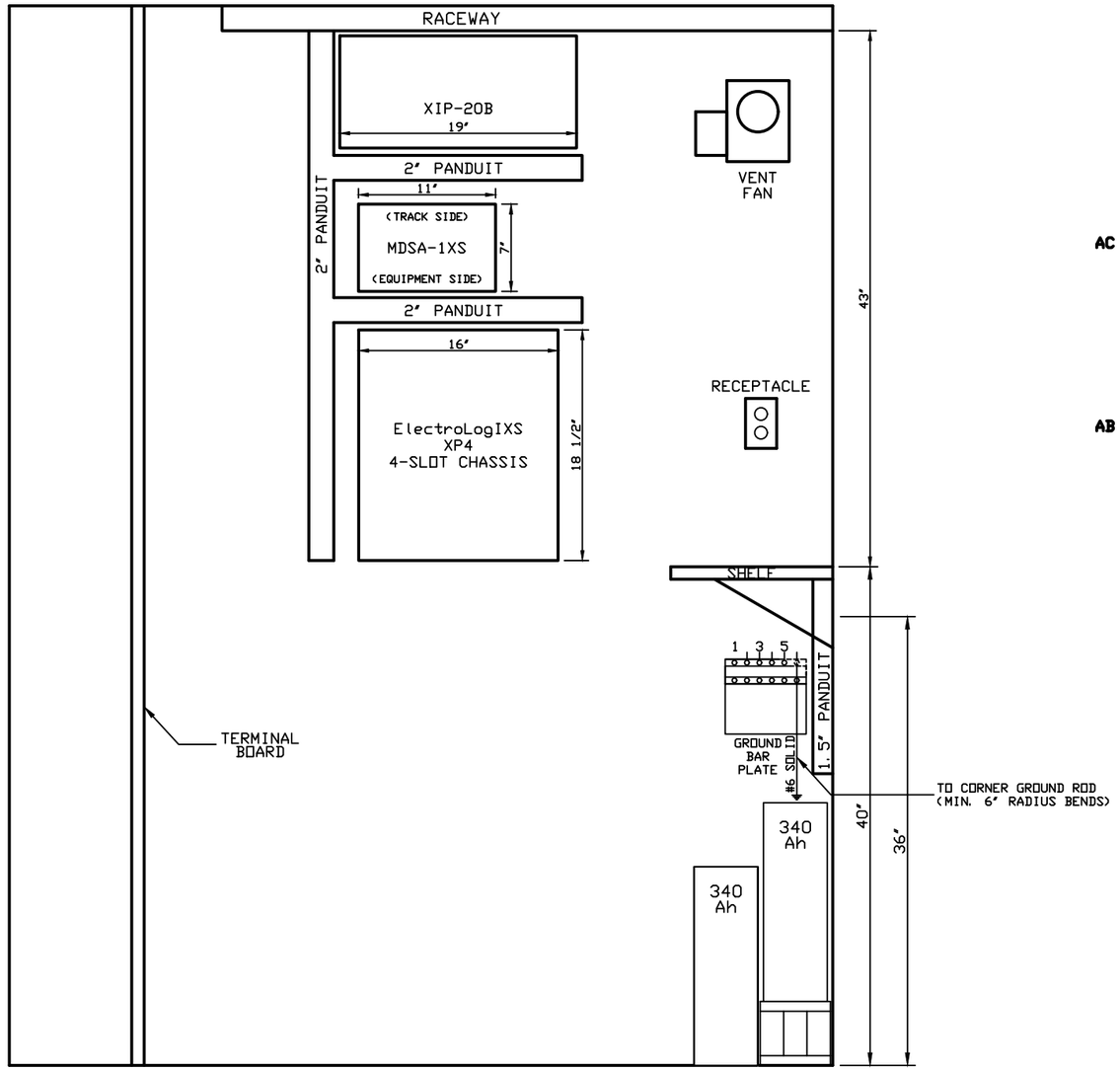


ENGINEER SEAL:

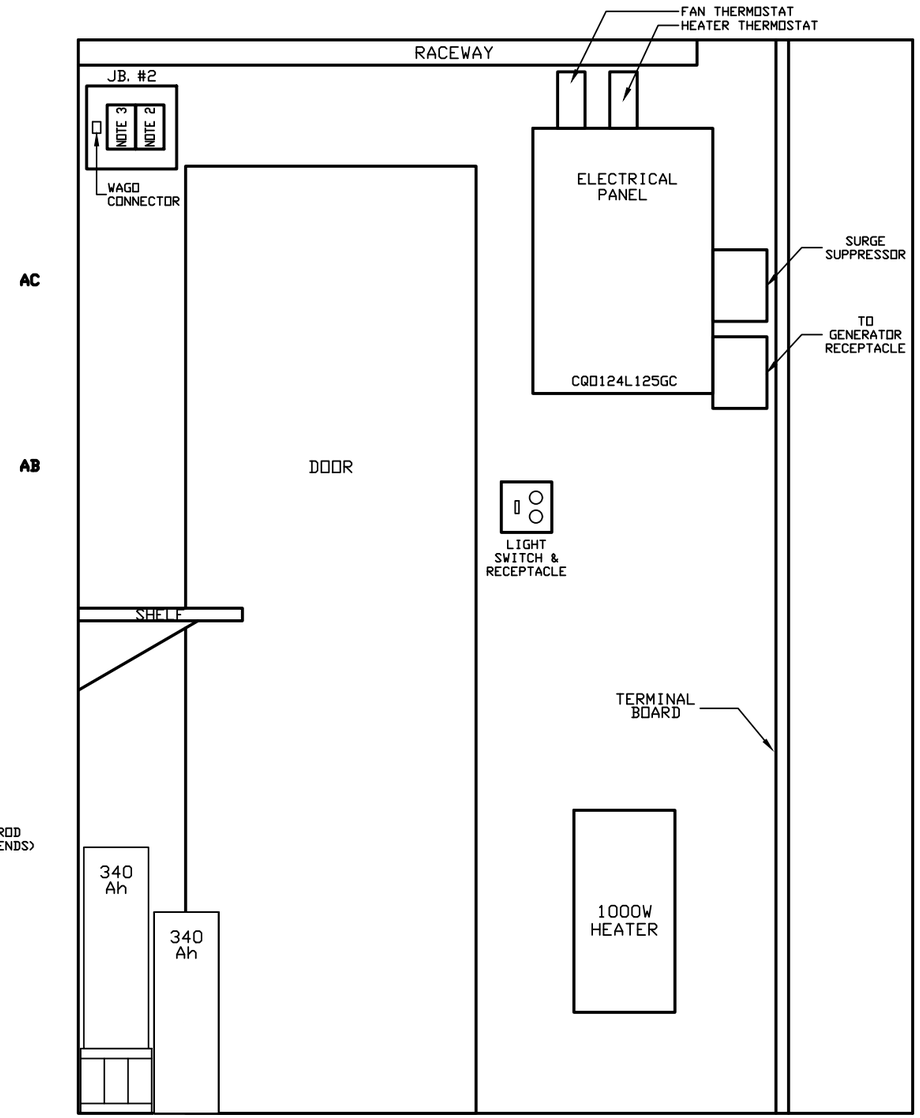
Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
MAIN TERMINAL BOARD

DWG No:	SHT.	REV.
KAPU054.48FA014_SW	14/18	FA



SIDE 'C'



SIDE 'A'

NOTES:

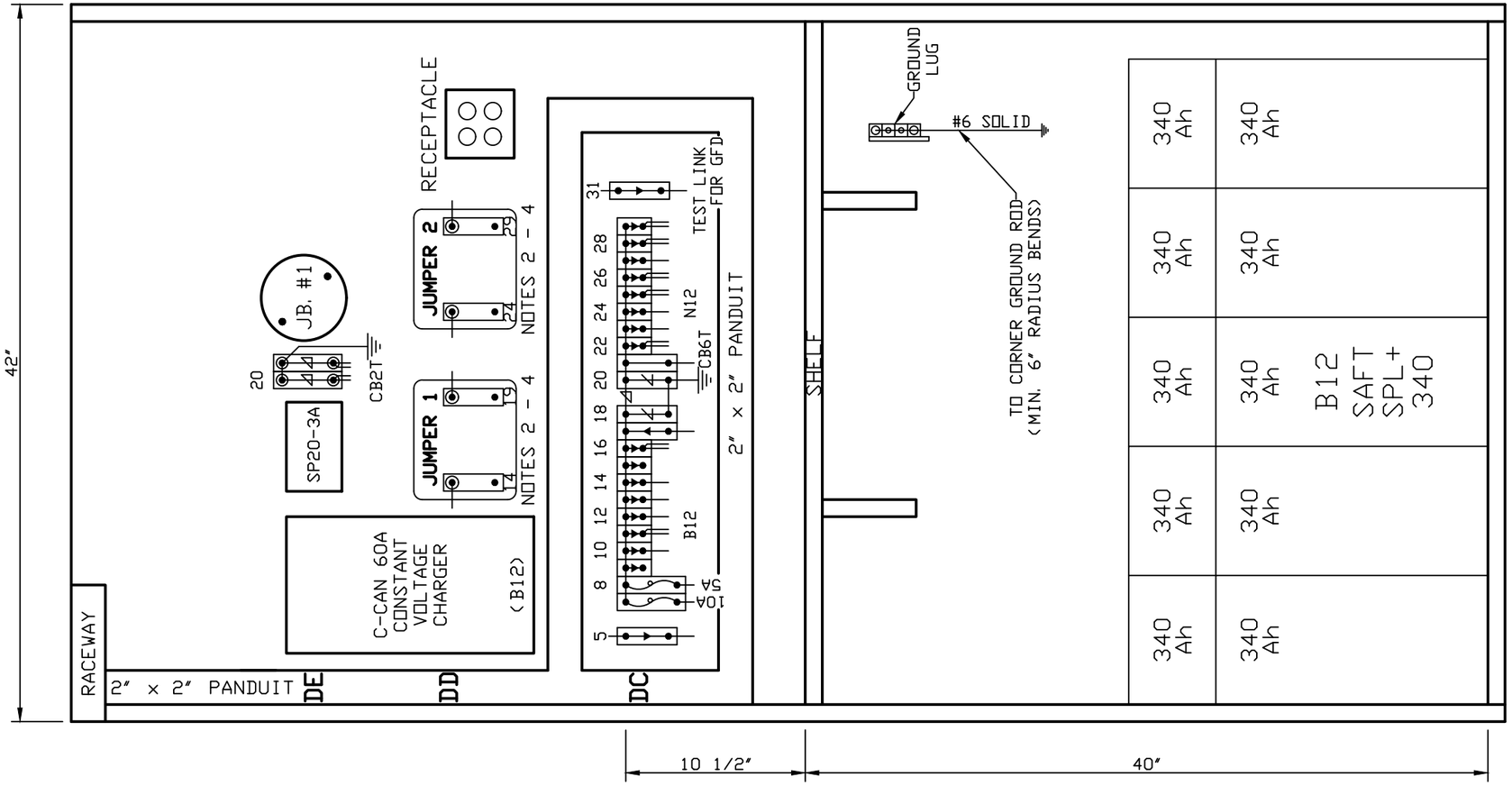
1. SURGE PROTECTION SHOULD BE BONDED TO BUNGALOW.
2. CPDR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12
3. JMPR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
SIDES 'A' & 'C'

DWG No:	SHT.	REV.
KAPU054.48FA015_SW	15/18	FA



NOTES:

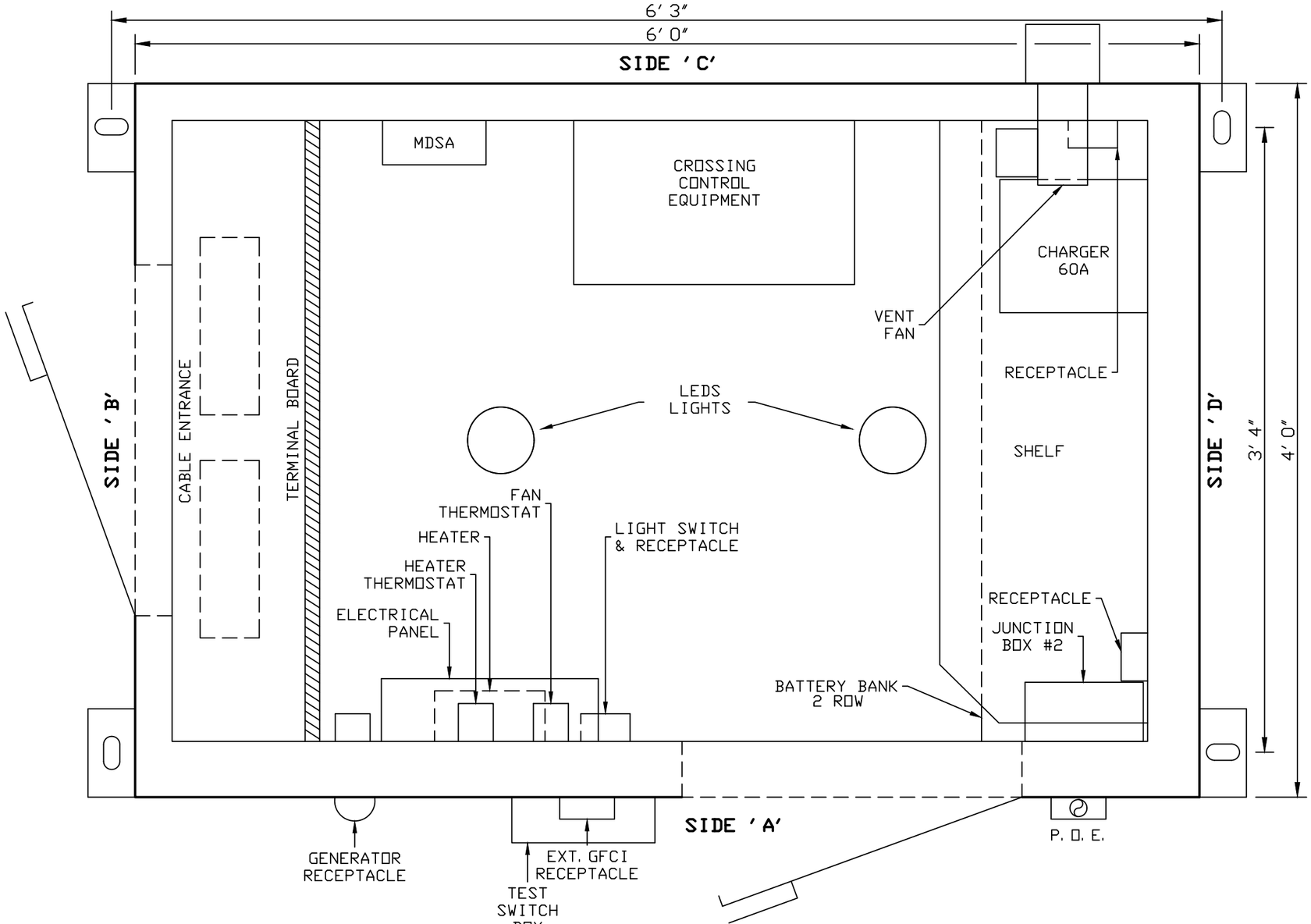
1. SURGE PROTECTION SHOULD BE BONDED TO BUNGALOW.
2. **FOLLOW ONR SIGNAL STANDARDS WHEN TAKING TRACK OUT OF SERVICE.**
3. TRACK/ISLAND DEACTIVATION JUMPER PANEL. ALL PANELS TO HAVE A YELLOW SURFACE.
4. CAPS & SHIELD ON MDR/ISL DEACTIVATION TERMINALS ARE TO HELP PREVENT INTENDED DEACTIVATIONS. THEY ARE TO BE LEFT ON WHENEVER DEACTIVATION TERMINALS ARE NOT BEING USED.
5. EVERY ATTEMPT MUST BE MADE WHILE WIRING TO PLACE THE AC WIRING SEPARATE FROM THE DC WIRING BY USING SEPARATE TROUGHS AND PANDUITS.

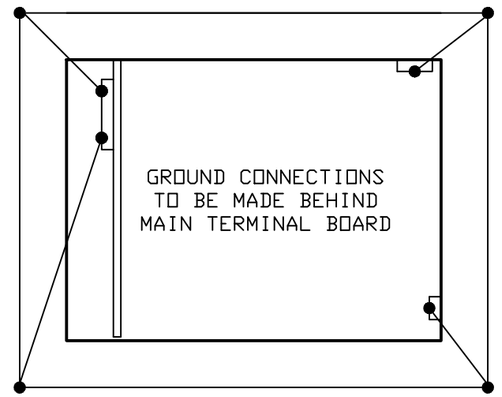
ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D' AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
SIDE 'D'

DWG No:	SHT.	REV.
KAPU054. 48FA016_SW	16/18	FA





BUNGALOW GROUNDING

NOTES:

1. SURGE PROTECTION SHOULD BE BONDED TO BUNGALOW.
2. DIAGONAL BOLT SPACING FOR 4' X 6' BUNGALOW - 84.96"

ENGINEER SEAL:

N

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
TOP VIEW & GROUNDING

DWG No:	SHT.	REV.
KAPU054.48FA017_SW	17/18	FA

REV.	DATE	NAME	COMMENTS AND NOTES
PA	2023-02-16	AECOM	INSTALL NEW BUNGALOW WITH XP4
FA	2023-11-01	HATCH	AS INSTALLED

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
REVISION HISTORY

DWG No:	SHT.	REV.
KAPU054.48FA018_SW	18/18	FA

APPLICATION SOFTWARE INFORMATION		
NAME	CHECKSUM	CRC
onr_xing_1t_xp4_01.00v	**742F**	**184A**
onr_xing_1t_xp4_01.00nv	**6A00**	**AE9A**
onr_xing_1t_xp4_01.00 (NOTE 1)	**126B**	**6BC7**

ELECTROLOGIXS DIP SHUNT SETTINGS

CHASSIS ID DIP SHUNTS – CHASSIS DIP SHUNT LOCATED ON BACKPLANE UNDERNEATH UCI-3 MODULE

ID0 ⊗1 ⊗2 ⊗3 ⊗4 ⊗5 ⊗6 ⊗7 ○8 **ID7**

CHASSIS ID NUMBER = **01**

○ NOT PUNCHED (= BINARY 1) ⊗ PUNCHED OUT (= BINARY 0)

COMM SETTINGS – ETHERNET GENERAL SETTINGS	
ETHERNET PORT 1 (NOTE 2)	
IP ADDRESS	192.168.0.11
SUBNET MASK	255.255.255.0
DHCP SERVER	ENABLED
DHCP SERVER IP POOL START	192.168.0.12
DHCP SERVER IP POOL END	192.168.0.43
DHCP SERVER DEFAULT GATEWAY	192.168.0.11
ETHERNET PORT 2	
IP ADDRESS	192.168.1.12
SUBNET MASK	255.255.255.0
DHCP SERVER	DISABLED
DEFAULT GATEWAY	0.0.0.0

I/O SLOTS – IXC-20S+ SETTINGS			
ADJUSTMENT	**DEFAULT**	**RANGE**	**SLOT 4**
CROSSING FLASH RATE	60 FPM	45-65	60 FPM
LAMP REGULATION	ON	ON or OFF	OFF
LAMP 1 OUTPUT VOLTAGE	10.0V	10.0-15.0	F/A
LAMP 2 OUTPUT VOLTAGE	10.0V	10.0-15.0	F/A
GATE 1 DELAY	0 sec.	3-20	NOT USED
GATE 2 DELAY	0 sec.	3-20	NOT USED

I/O SLOTS – GFD-1 SETTINGS					
ADJUSTMENT	**DEFAULT**	**RANGE**	**BATTERY 1**	**BATTERY 2**	**BATTERY 3**
BATTERY NAME	BATTERY #	N/A	B12	N/A	N/A
CALIBRATED VOLTAGE	N/A	N/A	14.2	N/A	N/A
GROUND FAULT THRESHOLD	2kΩ	2-20	F/A (NOTE 4)	N/A	N/A
GROUND FAULT TIME	5 sec.	5-30	5 sec.	N/A	N/A
LOW BATT. ALARM VOLTAGE	8.0V	8.0-16.5	11.0V	N/A	N/A
HIGH BATT. ALARM VOLTAGE	8.0V	8.0-16.5	16.5V	N/A	N/A

VITAL TIMER SETTINGS			
VITAL TIMER	**MINIMUM**	**MAXIMUM (DEFAULT)**	**VALUE (MIN:SEC)**
MIN_ACT_T	00:20	01:00	00:20 (NOTE 3)
S4_HLTH_T	00:05	00:10	00:05

NOTES:

1. CHECKSUM & CRC OF THE "MULTI-APPLICATION" EPROM (INCLUDES BOTH THE VITAL & NON-VITAL APPLICATIONS IN ONE FILE). EPROM LABELED WITH THE MULTI-APPLICATION CHECKSUM & CRC.
2. ETHERNET PORT 1 TO BE USED FOR DIAGNOSTICS.
   LOGIN ID = admin PASSWORD = admin
3. MINIMUM ACTIVATION TIMER ENSURES WARNING DEVICES ARE OPERATED FOR A MINIMUM TIME ONCE ACTIVATED. MIN_ACT_TE SHOULD BE THE TOTAL TIME MINUS EQUIPMENT REACTION AND BUFFER TIME.
4. SET GROUND FAULT THRESHOLD SO THAT LEAKAGE CURRENT VALUE DISPLAYED DOES NOT EXCEED 2mA.
   LEAKAGE CURRENT = CALIBRATED VOLTAGE / GROUND FAULT THRESHOLD.
5. F/A = FIELD ADJUST (AS AND WHEN REQUIRED).

REVISIONS

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI.054.48 KAPUSKASING SUBDIVISION
XP4 PROGRAM CONFIGURATION SHEET #1

DWG No:	SHT.	REV.
KAPU054.48FA001_PC	01/02	FA

XTI-1S APPROACH SETTINGS - BASIC APPROACH SETTINGS

ADJUSTMENT	DEFAULT	RANGE	TRACK 1
APPROACH TRACK FREQUENCY (FREQ)	N/A	86-979	525 Hz
MASTER/SLAVE OPERATION (TKMS)	MASTER	MASTER or SLAVE	MASTER
TRANSMITTER GAIN	0	0-255	AUTO SET BY XP4
TRANSMITTER CHECK ADJUSTMENT (TCA)	0Ω	-7 to 13	F/A
TRANSMITTER CHECK IMPEDANCE	0Ω	-7 to 13	AUTO SET BY XP4
APPROACH TRACK DIRECTION MODE (DIR)	BI	UNI or BI	BI
LUMPED IMPEDANCE ADJUSTMENT (LIA)	0	-9 to +9	F/A
NARROW BAND SHUNT COMPENSATION (NBSRX)	100 Rx	0-100	F/A
TRACK ISLAND ASSIGN	DISPLAY ONLY		ISL1_ASSIGN
APPROACH LENGTH (APLEN)	9999 ft.	250-9999	1140 ft.
AUTO Rx (ARX)	ENABLED	ENABLED or DISABLED	ENABLED

XTI-1S APPROACH SETTINGS - ADVANCED APPROACH SETTINGS

ADJUSTMENT		DEFAULT	RANGE	TRACK 1
MD TIMER	ENABLE (MDEN)	DISABLED	ENABLED or DISABLED	ENABLED
	DELAY (MDTT)	10 min.	10-60	10 min.
FALSE SHUNT	ENABLE (FSEN)	DISABLED	ENABLED or DISABLED	ENABLED
	Rx (FSRx)	70 Rx	0-80	70 Rx
	DELAY (FST)	10 min.	0-60	10 min.
APPROACH RELEASE	ENABLE (AREN)	DISABLED	ENABLED or DISABLED	ENABLED
	Rx (ARRx)	70 Rx	0-80	70 Rx
	DELAY (ART)	10 min.	0-60	10 min.
LOS TIME (LOS)		16 sec.	4-99	16 sec.
IJ-LOS TIME (IJ LOS)		5 sec.	4-99	5 sec.
APPROACH SETTING (NSVS)		NORMAL	NORMAL, SHORT or VERY SHORT	F/A

XTI-1S APPROACH SETTINGS - ISLAND SETTINGS

ADJUSTMENT	DEFAULT	RANGE	ISLAND 1
ISLAND ENABLED (ISEN)	ENABLED	ENABLED or DISABLED	ENABLED
ISLAND DISABLE TIMEOUT	2 hr.	1-24 hr.	2 hr. (NOTE 2)
ISLAND FREQUENCY (IFREQ)	N/A	4-8	4 KHz
LOS COUNT (ILOS)	0.5	0.5-4.0	0.5
FAULT DELAY (FDEL)	1	1-2	1
TRANSMITTER GAIN	0	0-255	AUTO SET BY XP4

MDR CONFIGURATION SETTINGS AND TRACK PARAMETERS

ADJUSTMENT		DEFAULT	RANGE	MDR1
WARNING TIME (TT - ERT - APT)*		99 sec.	23-99	26 sec.
CW / MD MODE		MD	CW or MD	MD
ADVANCED PREEMPT TIME		30 sec.	0-99	N/A
CWE WARNING TIME		80 sec.	0-80	N/A
AUX RECOVERY DELAY TIME		5 sec.	0-99	N/A
				SLOT 2 TRACK 1
TRACK ASSIGNED		ASSIGNED	ASSIGNED or NOT ASSIGNED	ASSIGNED
OFFSET DISTANCE		0 ft.	0-9999	0 ft.
MD RESTART		0 Rx	0-99	15 Rx
SUDDEN SHUNT ZONE		0 Rx	0-99	0 Rx
POSITIVE START	ENABLE (PSEN)	DISABLED	ENABLED or DISABLED	DISABLED
	DETECTION (PSRx)	0 Rx	0-80	N/A
	ACTIVE TIME (PST)	0 min.	0-60	N/A
POST JOINT DETECT	ENABLE (PJEN)	ENABLED	ENABLED or DISABLED	DISABLED
	DETECTION (PJRx)	15 Rx	15-80	N/A
	DELAY (PJDT)	15 sec.	4-99	N/A
CJ-LOS	MODE	STANDARD	STND, MAN, OR AUTO	STANDARD
	Rx LEVEL	15 Rx	15-80	N/A
	TIME	99 sec.	5-99	N/A

*TT = TOTAL WARNING TIME
*ERT = EQUIPMENT REACTION TIME
*APT = ADVANCED PRE-EMPTION TIME (UNLESS THE MDR IS ASSIGNED AS A PRE-EMPTION START)

REVISIONS

NOTES:

1. F/A = FIELD ADJUST (AS AND WHEN REQUIRED).
2. ISLAND DISABLE TIMEOUT IS NOT UTILIZED. WHENEVER THE ISLAND IS JUMPERED OUT, IT WILL ONLY RECOVER ONCE THE JUMPER IS REMOVED.

ENGINEER SEAL:

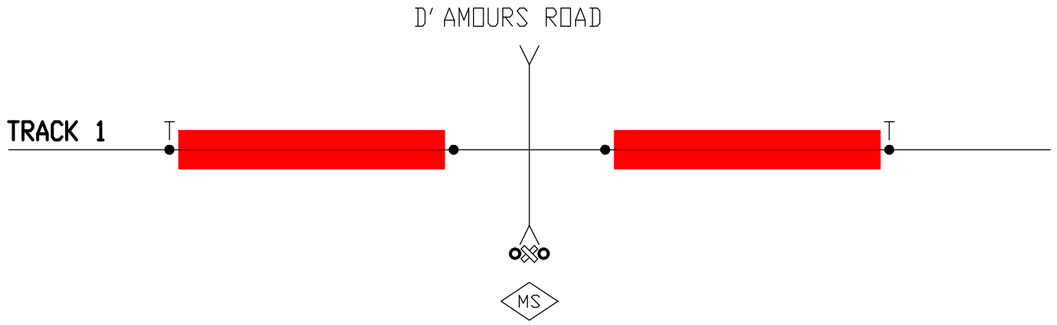
Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D'AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054.48 KAPUSKASING SUBDIVISION
XP4 PROGRAM CONFIGURATION SHEET #2

DWG No:	SHT.	REV.
KAPU054.48FA002_PC	02/02	FA

TO HEARST

TO COCHRANE



JUMPER 1

(TRACK CIRCUIT 1 MDR)

- JUMPER 1 WILL DISABLE THE CROSSING ACTIVATION CIRCUITS HIGHLIGHTED ON TRACK 1.

*** REFER TO SECTION SSIT-1002 WARNING SYSTEM - DEACTIVATION OF THE ONR SIGNAL STANDARDS FOR ANY CROSSING DEACTIVATIONS.

*** MAKE SURE ALL JUMPERS ARE REMOVED AND THE TRACK CIRCUITS HAVE BEEN TESTED BEFORE PLACING CROSSING BACK INTO SERVICE.

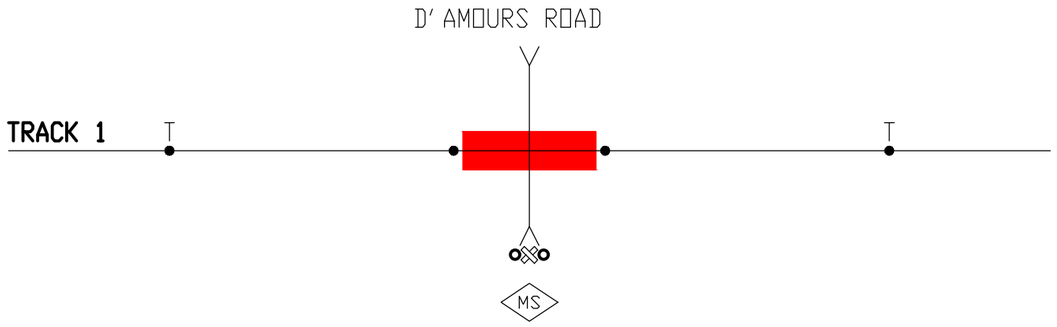
REVISIONS

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D' AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
JUMPER 1 TRACK DISABLE SCHEMATIC

DWG No:	SHT.	REV.
KAPU054. 48FA001_JP	01/02	FA



JUMPER 2

(TRACK 1 ISLAND)

- JUMPER 2 WILL DISABLE THE CROSSING ACTIVATION CIRCUITS HIGHLIGHTED ON TRACK 1.

NOTE:

WHEN DISABLING TRACK 1 ISLAND, TRACK CIRCUIT 1 MDR MUST ALSO BE DISABLED.

*** REFER TO SECTION SSIT-1002 WARNING SYSTEM - DEACTIVATION OF THE ONR SIGNAL STANDARDS FOR ANY CROSSING DEACTIVATIONS.

*** MAKE SURE ALL JUMPERS ARE REMOVED AND THE TRACK CIRCUITS HAVE BEEN TESTED BEFORE PLACING CROSSING BACK INTO SERVICE.

REVISIONS

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
D' AMOURS ROAD
MOONBEAM, ONTARIO
MI. 054. 48 KAPUSKASING SUBDIVISION
JUMPER 2 TRACK DISABLE SCHEMATIC

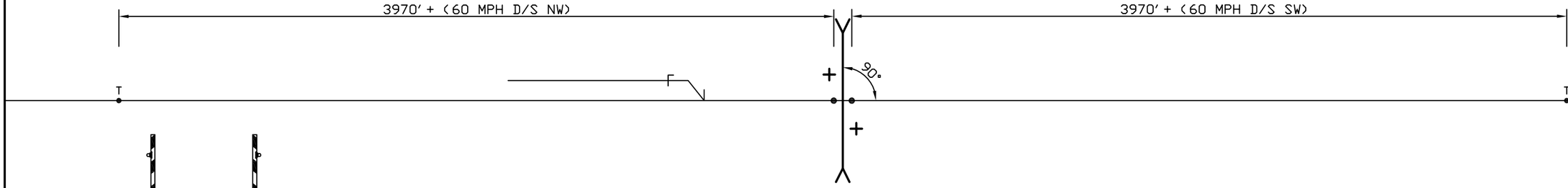
DWG No:	SHT.	REV.
KAPU054. 48FA002_JP	02/02	FA

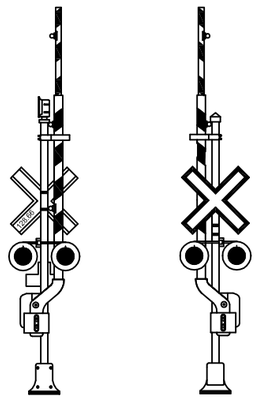
NORTH

10TH STREET

NORTH BAY

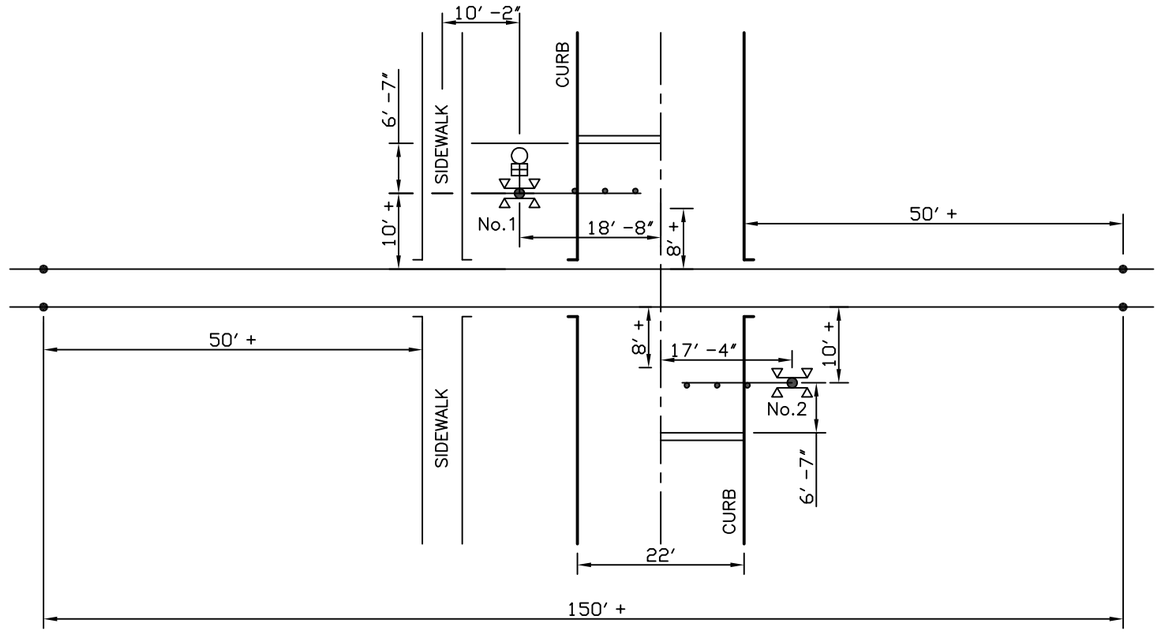
ENGLEHART





No. 1 No. 2

DETAIL OF WARNING DEVICES



NOT TO SCALE

NOTES:

1. CLEARANCE DISTANCE DOES NOT EXCEED 35’
2. CONSTANT WARNING DEVICE (BI–DIRECTIONAL)
3. WARNING TIME CALCULATED USING GCS SECTION 16.1.1
4. DESIGN VEHICLE: TRACTOR–SEMITRAILERS (WB–20)
5. GENERAL EAST APPROACH GRADIENT: 0%
   GENERAL WEST APPROACH GRADIENT: 2%

LEGEND:

T
TERMINATION SHUNT

TRACK CONNECTION

DESIGN CRITERIA FOR AUTOMATIC CROSSING WARNING SYSTEM

TIME IN SECONDS	MAIN			
	N APP.	S APP.		
ADVANCED PRE–EMPT TIME (APT)	0	0		
GATE DELAY	19	19		
GATE DECENT	11	11		
GATE HORIZONTAL	5	5		
REACTION TIME (RT)	10	10		
TOTAL TIME	45	45		
SPEED (MPH)	60	60		
DISTANCE (FEET)	3970	3970		

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
SIGNAL AND TRACK LAYOUT

DWG No:	SHT.	REV.
TEMA128.66FD_SL	1/1	D

SHEET NO.	DESCRIPTION
1	INDEX
2	TRACK LAYOUT
3	TRACK CIRCUITS
4	MISCELLANEOUS CIRCUITS
5	SIGNAL CONTROL CIRCUITS #1
6	SIGNAL CONTROL CIRCUITS #2
7	SIGNAL #1 CIRCUITS
8	SIGNAL #2 CIRCUITS
9	AC POWER DISTRIBUTION #1
10	AC POWER DISTRIBUTION #2
11	DC POWER DISTRIBUTION
12	P.O.E.& GATE HEATER CIRCUITS
13	ElectroLogIXS XP4 UNIT LAYOUT
14	XP4 MODULE USAGE
15	XP4 I/O CHART
16	MAIN TERMINAL BOARD (SIDE B)
17	SIDES "A" & "C"
18	SIDE "D"
19	TOP VIEW & GROUNDING
20	REVISION HISTORY

ENGINEER SEAL:

			-

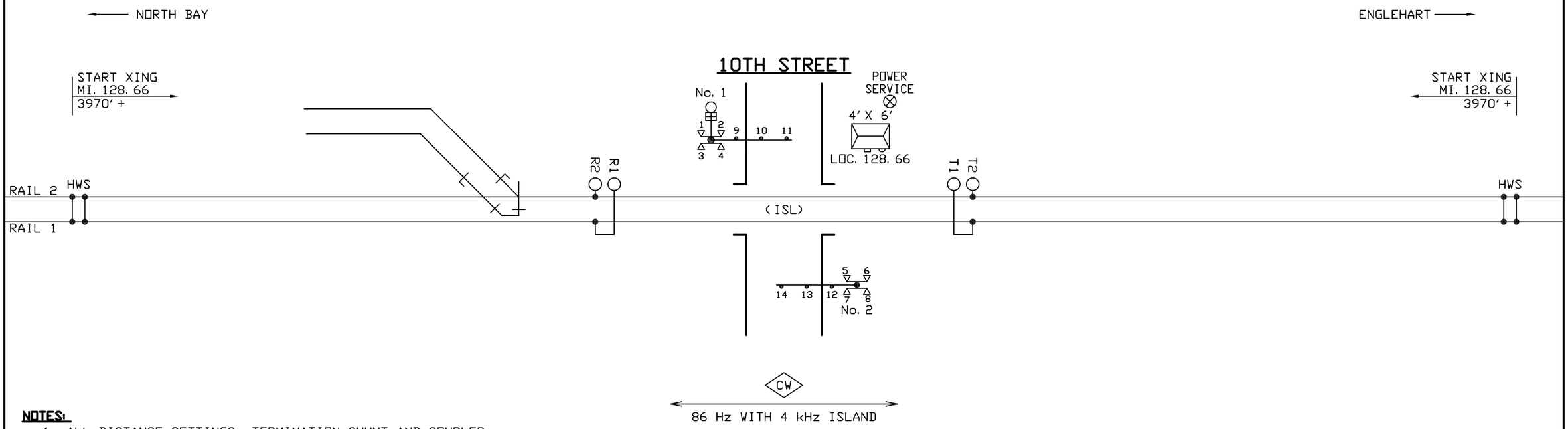
Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
INDEX

DWG No:	SHT.	REV.
TEMA128.66FA001_SW	01/20	FA

FLASHING LIGHT UNITS ALIGNMENT TABLE

PRIMARY FRONT LIGHTS FOR VEHICLES									
SIG #	LIGHT #	ROUNDEL		ROAD SPEED		MINIMUM DISTANCE		ALIGNMENT DISTANCE	
		SIZE	TYPE	KM/H	MPH	M	FT	M	FT
1	1, 2	12"	LED	40	25	44	145	63	206
2	7, 8	12"	LED	40	25	45	148	65	213
BACK LIGHTS FOR VEHICLES									
SIG #	LIGHT #	ROUNDEL		ROAD SPEED		MINIMUM DISTANCE		ALIGNMENT DISTANCE	
		SIZE	TYPE	KM/H	MPH	M	FT	M	FT
1	3, 4	12"	LED	N/A	N/A	N/A	N/A	15	50
2	5, 6	12"	LED	N/A	N/A	N/A	N/A	15	50



NOTES:

1. ALL DISTANCE SETTINGS, TERMINATION SHUNT AND COUPLER PLACEMENTS MUST BE IN COMPLIANCE WITH APPROVED SL DRAWINGS AND VERIFIED IN THE FIELD PRIOR TO COMMISSIONING

LEGEND:

HWS — DENOTES HARDWIRE SHUNT

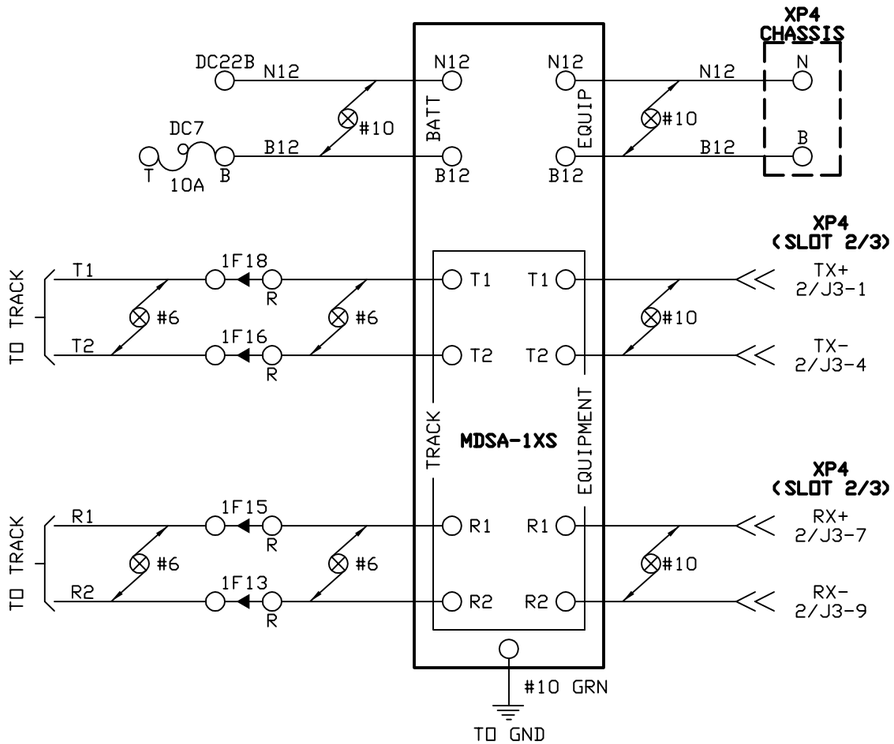
CW — DENOTES BI-DIRECTIONAL CONSTANT WARNING DEVICE

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128. 66 TEMAGAMI SUBDIVISION
TRACK LAYOUT

DWG No:	SHT.	REV.
TEMA128. 66FA002_SW	02/20	FA



LEGEND:

TWISTED PAIR

>> - DENOTES CONNECTOR ON XP4 PERSONALITY MODULE

NOTE:

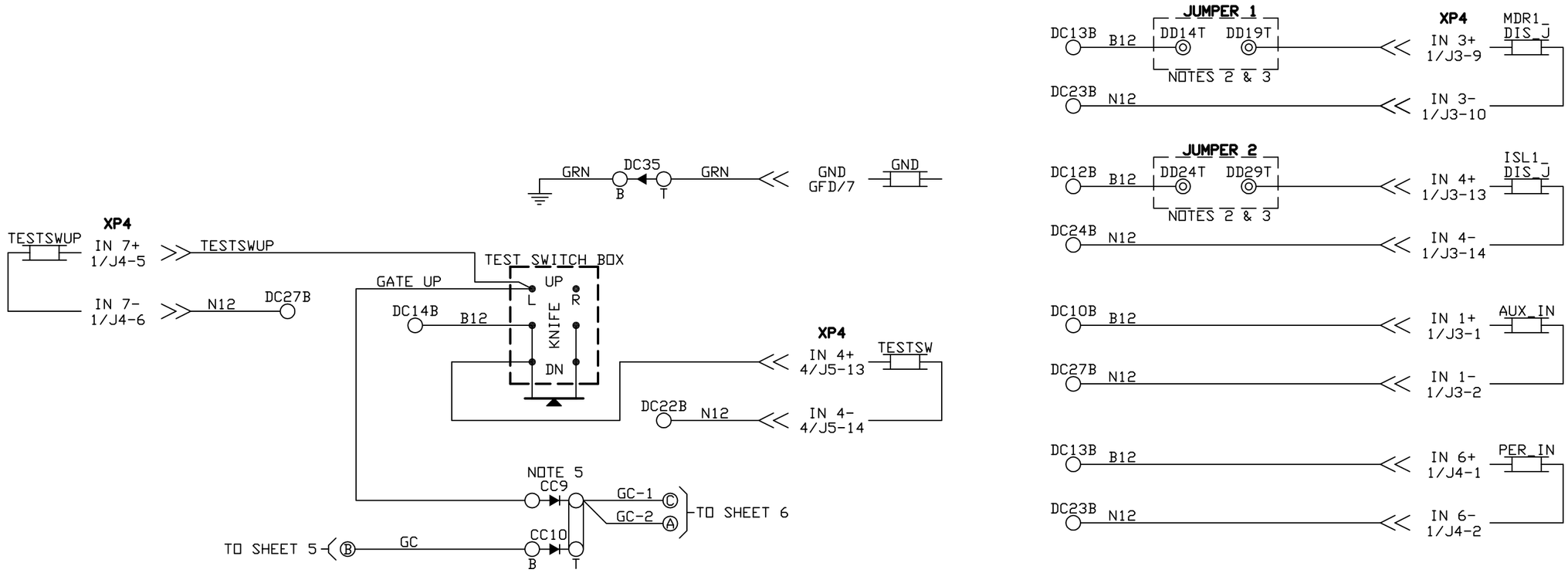
1. R1 & T1 OF EACH TRACK CIRCUIT MUST BE CONNECTED TO SAME RAIL
2. R2 & T2 OF EACH TRACK CIRCUIT MUST BE CONNECTED TO SAME RAIL
3. TRANSMITTER LEADS (T1, T2) MUST BE CONNECTED ON THE HOUSING SIDE OF THE CROSSING.
4. IT IS ESSENTIAL TO USE THE SIZE OF WIRE INDICATED ON THE PLAN

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
TRACK CIRCUITS

DWG No:	SHT.	REV.
TEMA128.66FA003_SW	03/20	FA



LEGEND:

>> - DENOTES CONNECTOR ON XP4 PERSONALITY MODULE

◎ - DENOTES CAP AND SHIELD

NOTES:

1. UNMARKED WIRES TO BE #16
2. CAPS AND SHIELDS ON MDR/ISL DISCONNECT TERMINALS ARE TO HELP PREVENT UNINTENDED DEACTIVATIONS. THEY ARE TO BE LEFT ON WHENEVER DISCONNECT TERMINALS ARE NOT BEING USED
3. **FOLLOW ONR SIGNAL STANDARDS WHEN TAKING TRACK OUT OF SERVICE**
4. UNTIL ALL PERSONNEL ARE TRAINED ON THE USE OF THE FLAGGING/GATE UP SWITCH, CC9 MUST REMAIN UNSTRAPPED
5. ⊣◀ DENOTES RECTIFIER - SIEMENS P/N 8008A299006

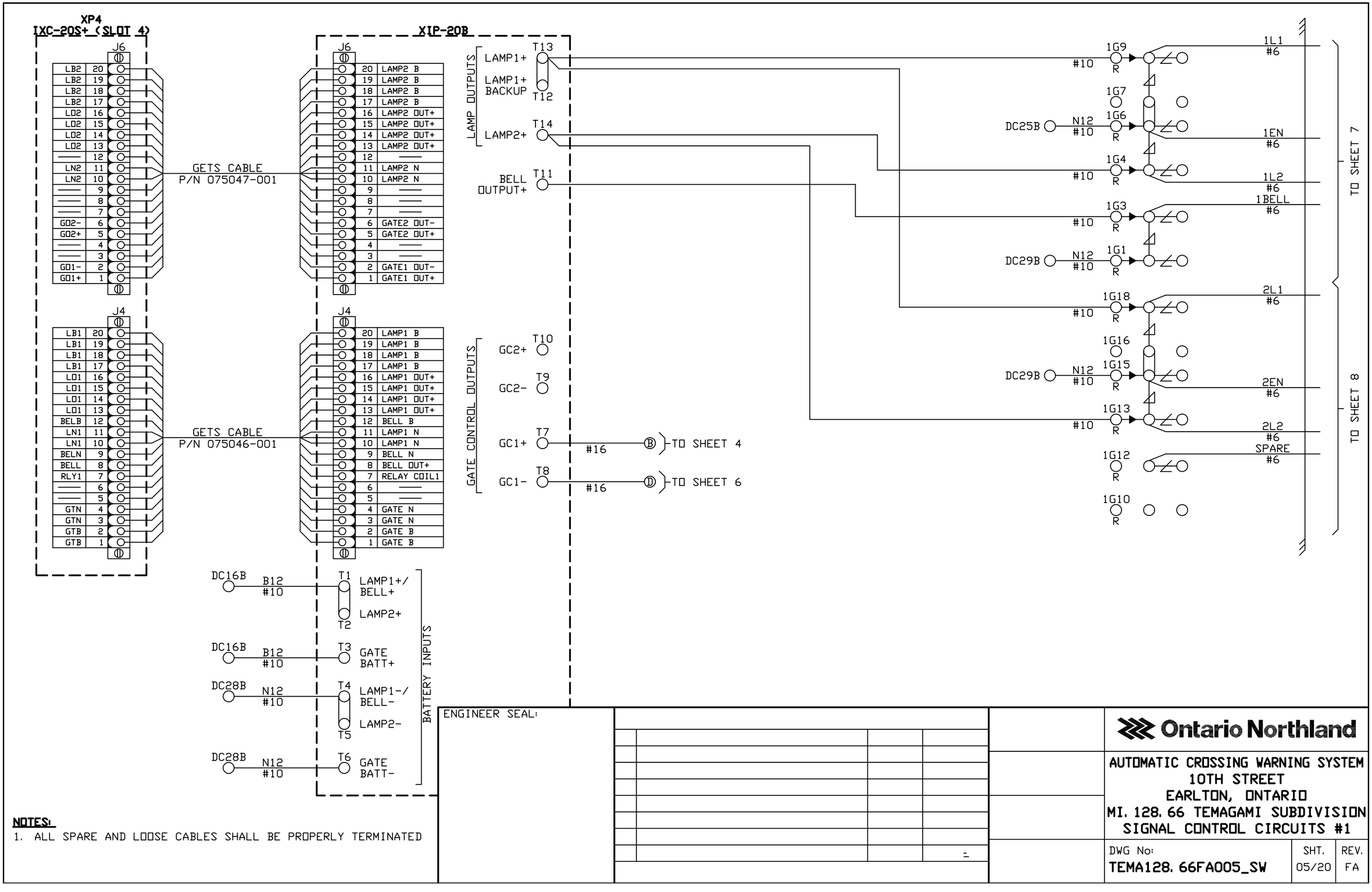
ENGINEER SEAL:

			-

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
MISCELLANEOUS CIRCUITS

DWG No:	SHT.	REV.
TEMA128.66FA004_SW	04/20	FA



NOTES:

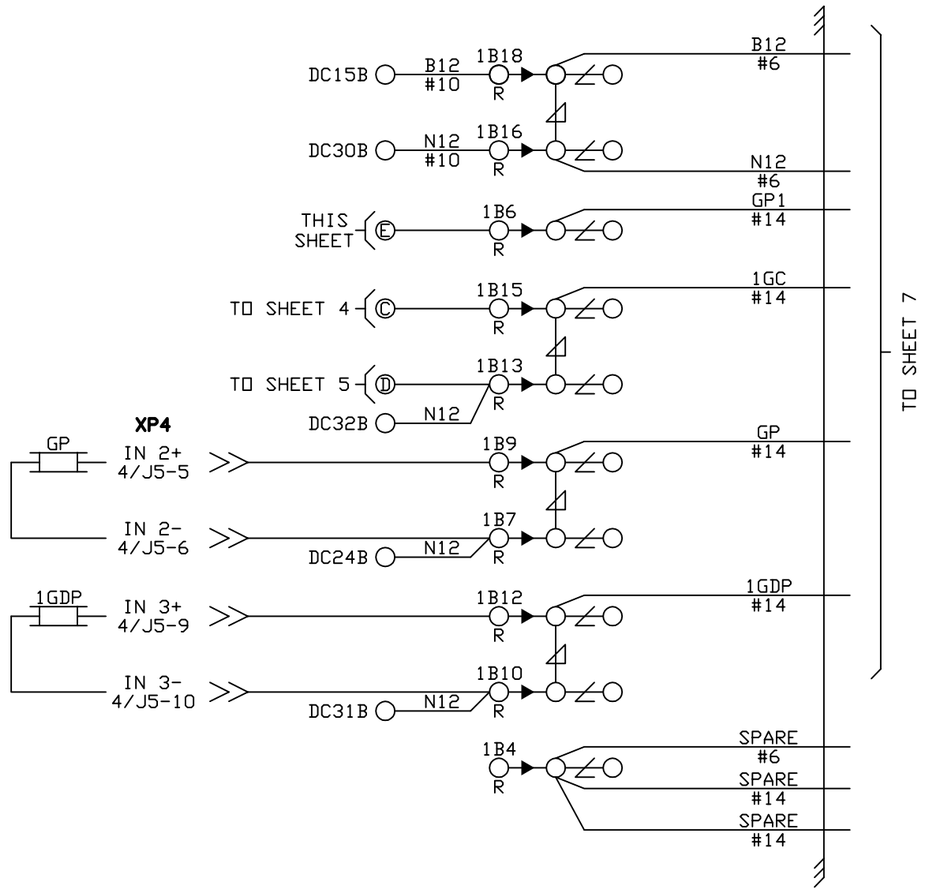
1. ALL SPARE AND LOOSE CABLES SHALL BE PROPERLY TERMINATED

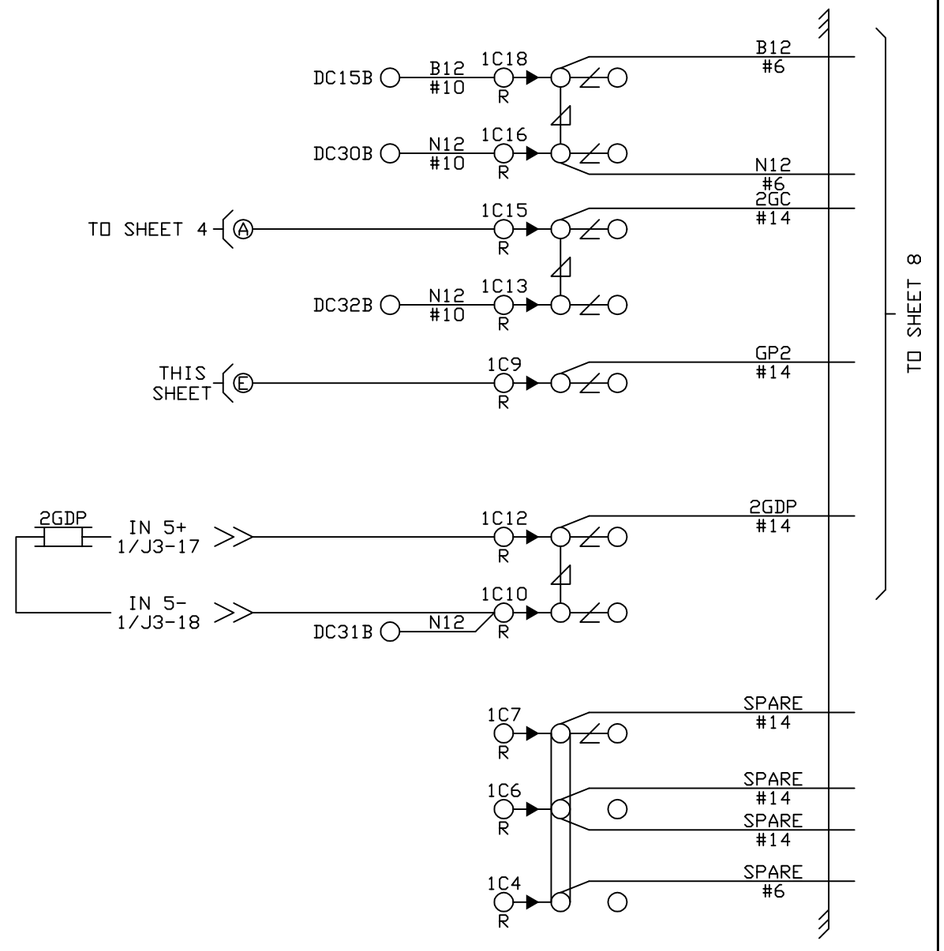
ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
SIGNAL CONTROL CIRCUITS #1

DWG No:	SHT.	REV.
TEMA128.66FA005_SW	05/20	FA





NOTES:

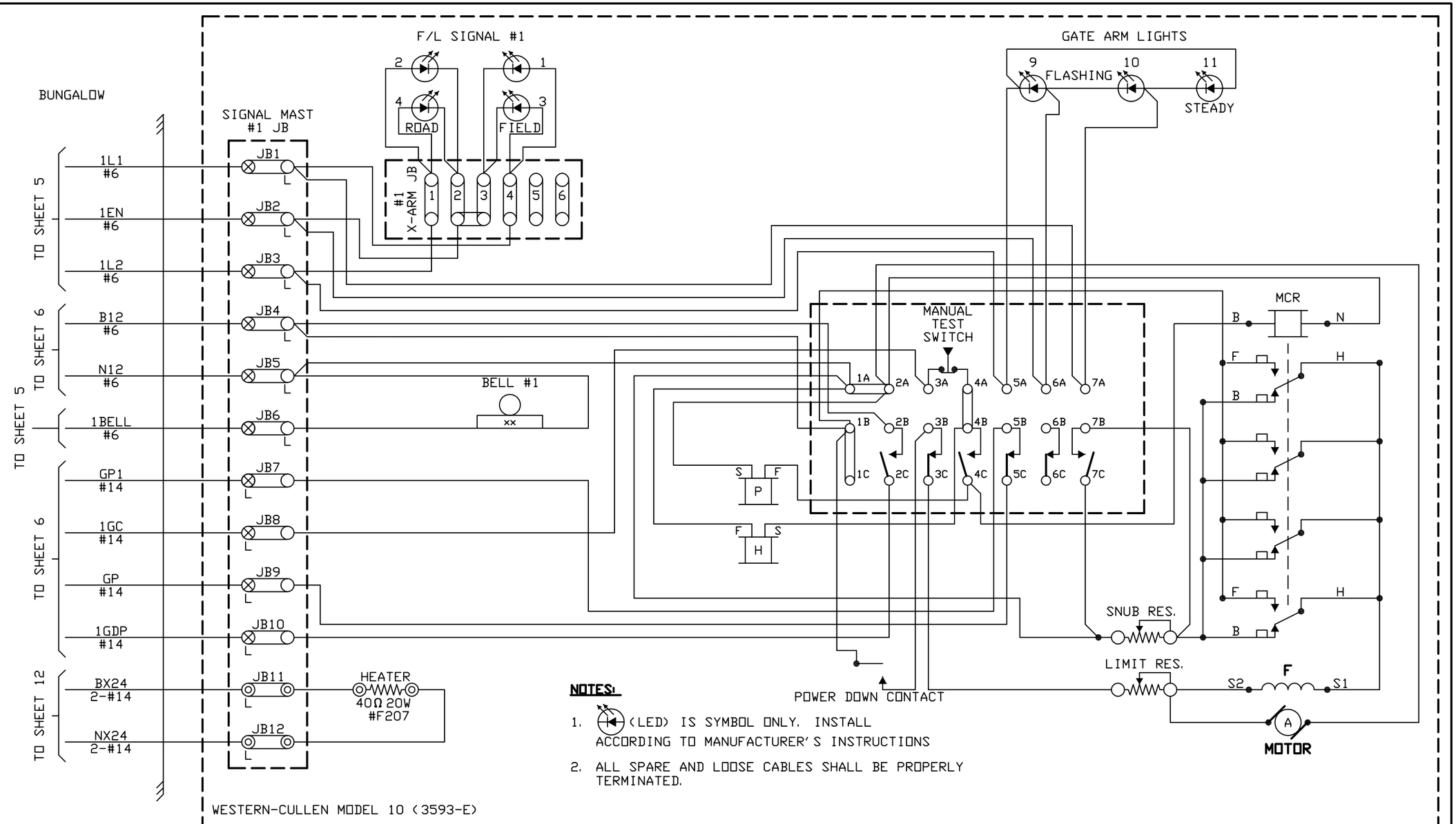
1. UNMARKED WIRES TO BE #16
2. ALL SPARE AND LOOSE CABLES SHALL BE PROPERLY TERMINATED

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
SIGNAL CONTROL CIRCUITS #2

DWG No:	SHT.	REV.
TEMA128.66FA006_SW	06/20	FA



NOTES:

1. (LED) IS SYMBOL ONLY. INSTALL ACCORDING TO MANUFACTURER'S INSTRUCTIONS
2. ALL SPARE AND LOOSE CABLES SHALL BE PROPERLY TERMINATED.

GATE TERMINAL NUMBER	CONTACT CLOSED	CONTACT FUNCTION
1		
2	0°- 10°	GATE DOWN
3	45°- 90°	POWER DOWN
4	0°- 86°	POWER UP
5	82°- 90°	GATE CLEAR
6	10°- 90°	BELL
7	0°- 10°	SNUB

LEGEND:

◎ = DENOTES CAP & SHIELD

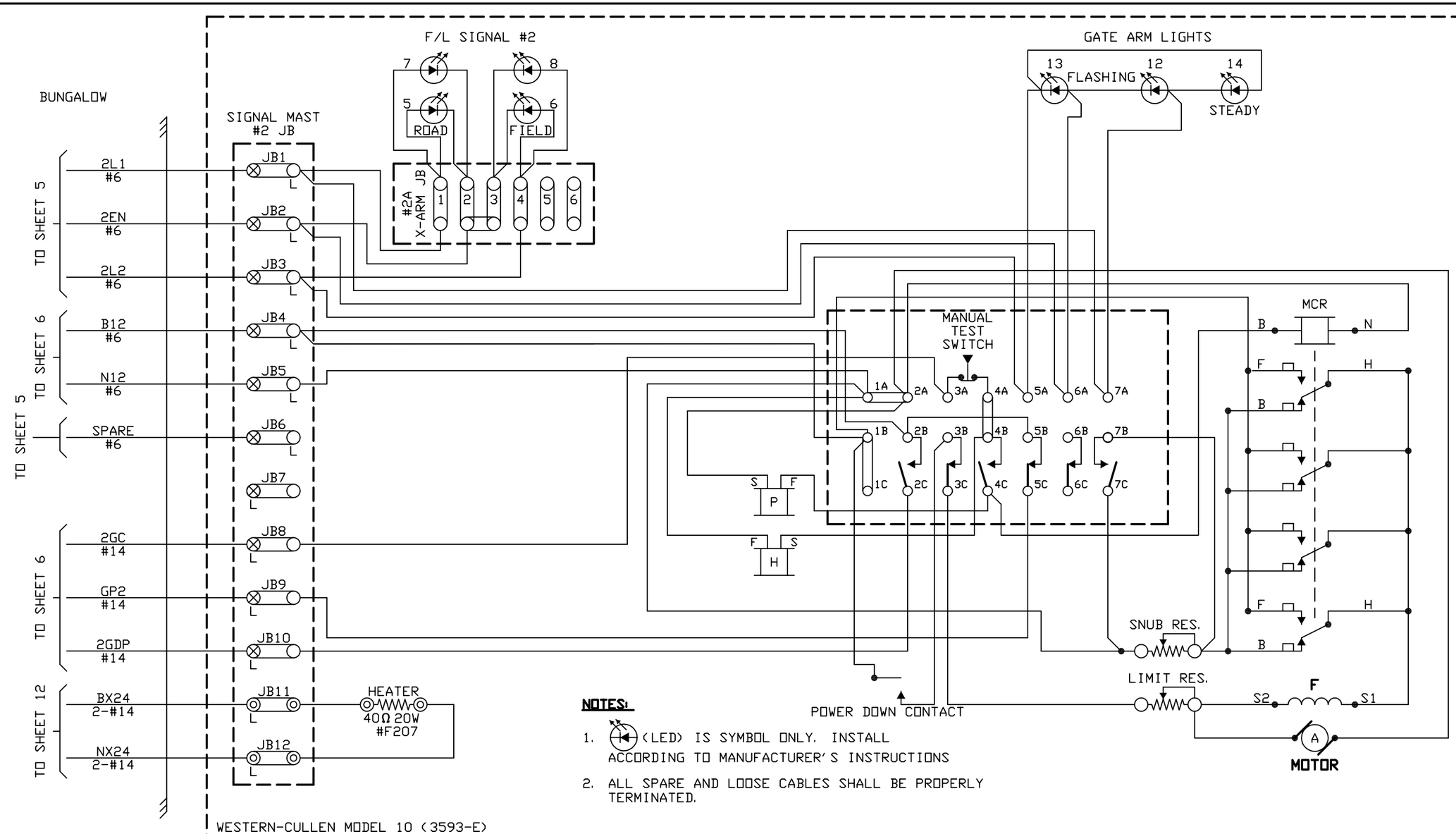
⊗ = GOLD TEST NUT

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
SIGNAL #1 CIRCUITS

DWG No:	SHT.	REV.
TEMA128.66FA007_SW	07/20	FA



NOTES:

1. (LED) IS SYMBOL ONLY. INSTALL ACCORDING TO MANUFACTURER'S INSTRUCTIONS
2. ALL SPARE AND LOOSE CABLES SHALL BE PROPERLY TERMINATED.

GATE TERMINAL NUMBER	CONTACT CLOSED	CONTACT FUNCTION
1		
2	0°- 10°	GATE DOWN
3	45°- 90°	POWER DOWN
4	0°- 86°	POWER UP
5	82°- 90°	GATE CLEAR
6	10°- 90°	BELL
7	0°- 10°	SNUB

LEGEND:

◎ = DENOTES CAP & SHIELD

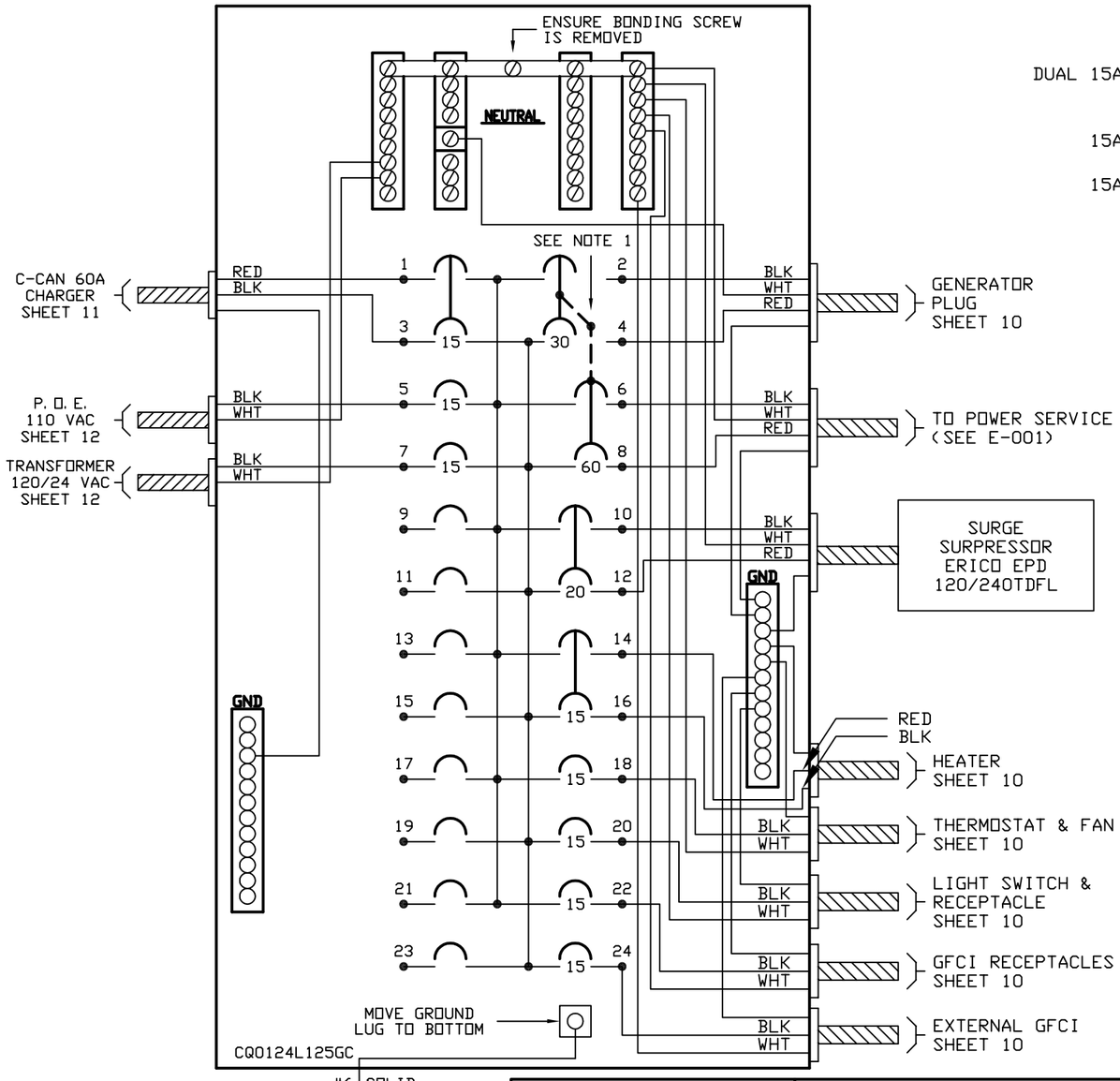
⊗ = GOLD TEST NUT

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
SIGNAL #2 CIRCUITS

DWG No:	SHT.	REV.
TEMA128.66FA008_SW	08/20	FA



BREAKER ASSIGNMENT

DUAL 15A BREAKER QO215	1	CHARGER	GENERATOR PLUG	2
	3	CHARGER	GENERATOR PLUG	4
15A BREAKER QO115	5	P. O. E.	POWER SERVICE	6
15A BREAKER QO115	7	TRANSFORMER 120/24 VAC	POWER SERVICE	8
	9		SURGE SUPRESSOR	10
	11		SURGE SUPRESSOR	12
	13		HEATER	14
	15		HEATER	16
	17		VENT FAN	18
	19		LIGHTS	20
	21		GFCI RECEPTACLES	22
	23		EXT. GFCI RECEPTACLE	24

DUAL 30A BREAKER QOM30L WITH MECHANICAL INTERLOCK TRANSFER SWITCH P/N QO2DTJ & RETAINER KIT P/N PK4DTIM4LA

DUAL 60A BREAKER QOM60XL PK4. KIT INCLUDES QO2DTI

DUAL 20A BREAKER QO220

DUAL 15A BREAKER QO215

15A BREAKER QO115

15A BREAKER QO115

15A BREAKER QO115

15A BREAKER QO115

NOTES:

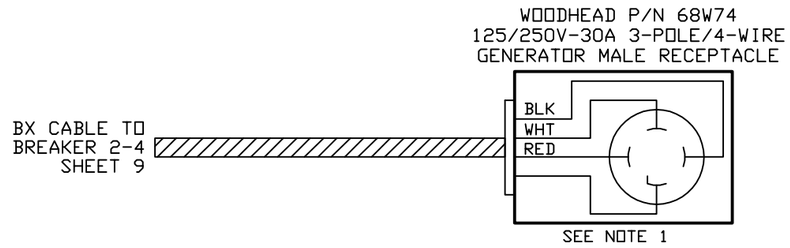
1. MECHANICAL INTERLOCK TRANSFER SWITCH P/N QO2DTI & RETAINER KIT P/N PK4DTIM4LA
2. UNMARKED GROUND WIRES ARE BARE COPPER
3. KEEP GROUND WIRES AS STRAIGHT AND AS SHORT AS POSSIBLE

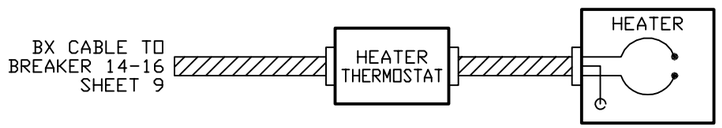
ENGINEER SEAL:

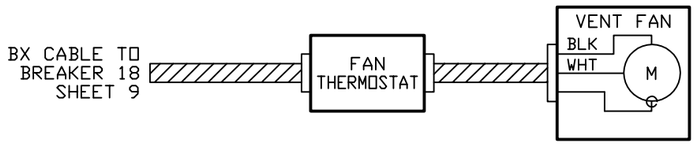
Ontario Northland

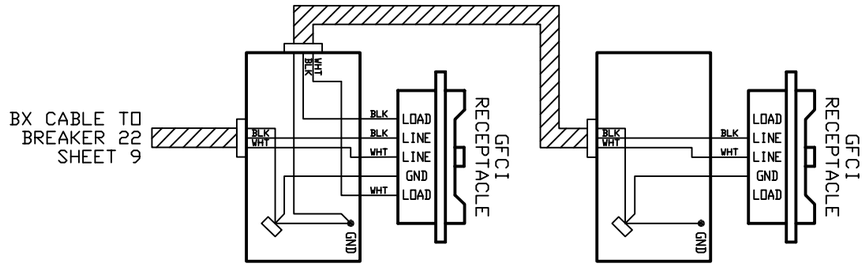
AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
AC POWER DISTRIBUTION #1

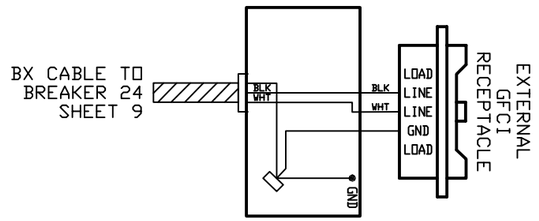
DWG No:	SHT.	REV.
TEMA128.66FA009_SW	09/20	FA

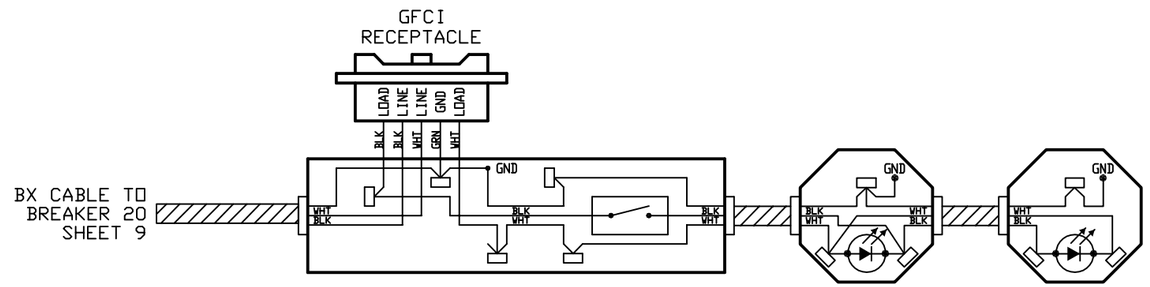












NOTES:

1. GENERATOR RECEPTACLE TO BE USED WITH FLOATING NEUTRAL GENERATOR ONLY

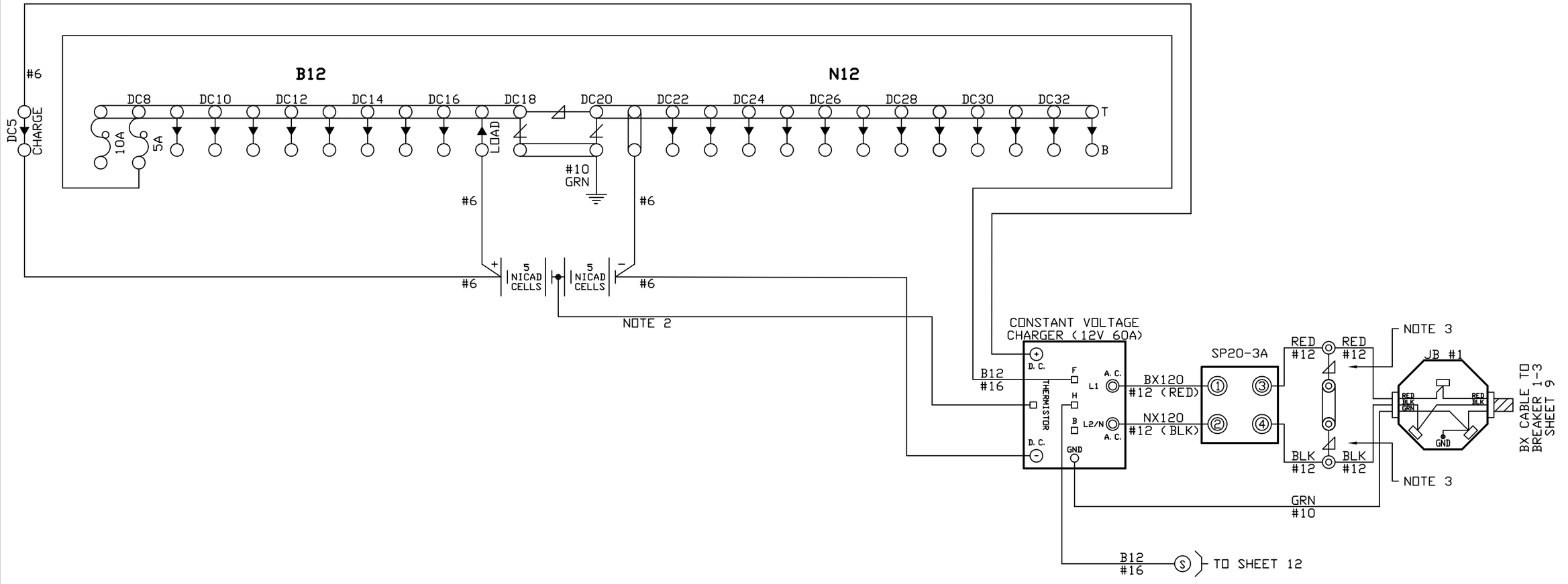
ENGINEER SEAL:

			-

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
AC POWER DISTRIBUTION #2

DWG No:	SHT.	REV.
TEMA128.66FA010_SW	10/20	FA



LEGEND:

◎ - DENOTES CAP AND SHIELD

NOTES:

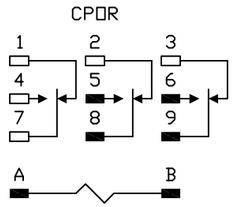
1. ARRESTERS MUST BE MOUNTED VERTICALLY OR HORIZONTALLY WITH THE TEETH POINTING UP SO THAT GRAVITY WILL DROP MOLTEN METAL AWAY FROM THE GAP DURING A SURGE
2. USE THERMISTOR WIRE PROVIDED BY MANUFACTURER
3. SP20-3A WITH EQUALIZERS SIEMENS P/N NYK-40004480707AX
4. UNMARKED AC GROUND WIRES ARE BARE COPPER

ENGINEER SEAL:

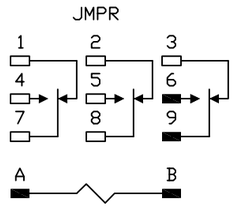
Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
DC POWER DISTRIBUTION

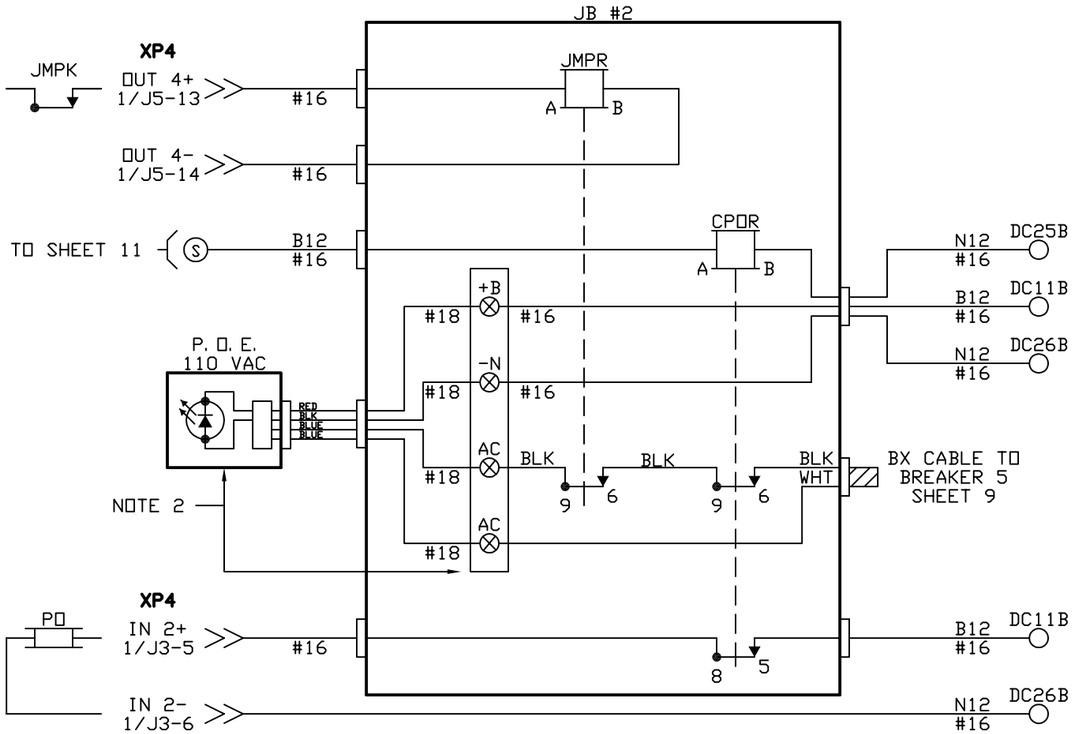
DWG No:	SHT.	REV.
TEMA128.66FA011_SW	11/20	FA

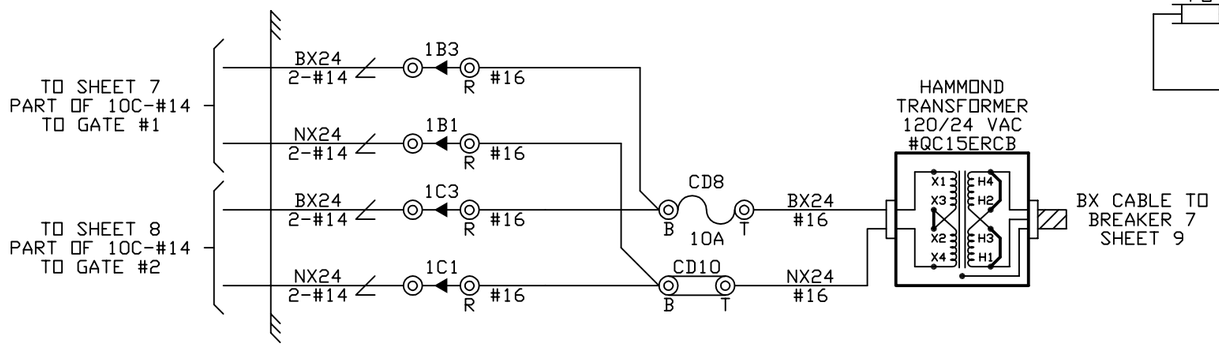


KUP 14
POTTER BRUMFIELD RELAY
(DEENERGIZED)
(NOTE 3)



KUP 14
POTTER BRUMFIELD RELAY
(DEENERGIZED)
(NOTE 4)





LEGEND:

>> - DENOTES CONNECTOR ON XP4 PERSONALITY MODULE

⊗ - DENOTES WAGO TERMINAL

◎ - DENOTES CAP AND SHIELD

NOTES:

1. UNMARKED AC GROUND WIRES ARE BARE COPPER
2. VELCORP GEMS P. O. E. P/N LC2-001WB_WG4 WITH WAGO 4 POSITION CONNECTOR
3. CPOR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12
4. JMPR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12

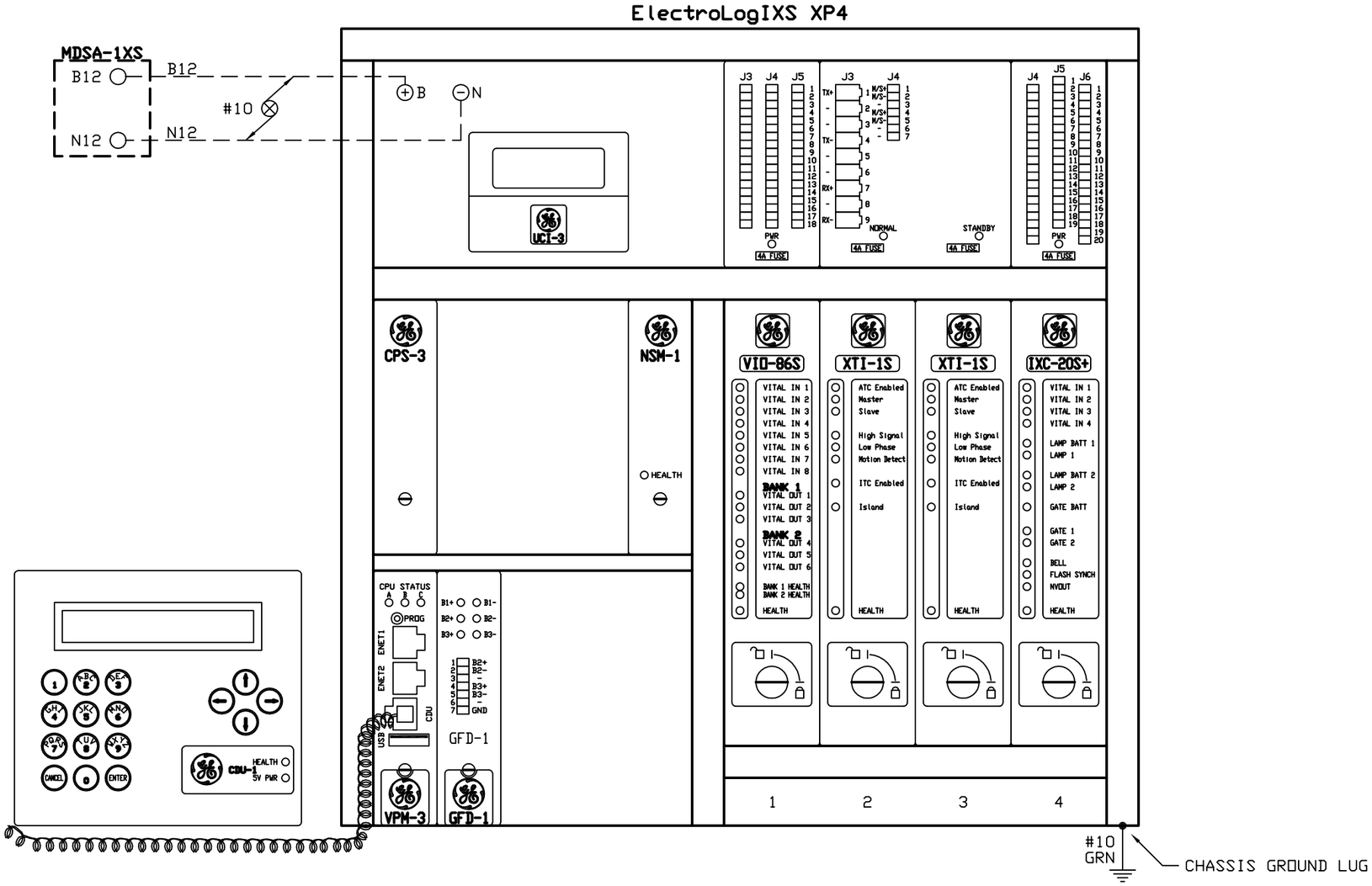
ENGINEER SEAL:

			-

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
P. O. E. & GATE HEATER CIRCUITS

DWG No:	SHT.	REV.
TEMA128.66FA012_SW	12/20	FA



LEGEND:

⊗ - DENOTES TWISTED PAIR

NOTE:

1. FERRITE CORE EMI FILTER TO BE INSTALLED ON POWER WIRES.

ENGINEER SEAL:

			-

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
ElectroLogIXS XP4 UNIT LAYOUT

DWG No:	SHT.	REV.
TEMA128.66FA013_SW	13/20	FA

VIO-86S
PERSONALITY MODULE
(SLOT 1)

IN 1+	AUX_IN	✱	1
IN 1-	N12	✱	2
IN 2+	PO	✱	5
IN 2-	N12	✱	6
IN 3+	MDR1_DIS_J	✱	9
IN 3-	N12	✱	10
IN 4+	ISL1_DIS_J	✱	13
IN 4-	N12	✱	14
IN 5+	2GDP	✱	17
IN 5-	N12	✱	18

(J3)

IN 6+	PER_IN	✱	1
IN 6-	N12	✱	2
IN 7+	TESTSWUP	✱	5
IN 7-	N12	✱	6
IN 8+			9
IN 8-			10
OUT 6+			17
OUT 6-			18

(J4)

OUT 1+			1
OUT 1-			2
OUT 2+			5
OUT 2-			6
OUT 3+			9
OUT 3-			10
OUT 4+	JMPK	✱	13
OUT 4-	NJMPK	✱	14
OUT 5+			17
OUT 5-			18

(J5)

XTI-1S
NORMAL/STANDBY PERSONALITY MODULE
(SLOT 2 & SLOT 3)

TX+	T1	✱	1
TX-	T2	✱	4
RX+	R1	✱	7
RX-	R2	✱	9

(J3)

M/S 1+			1
M/S 1-			2
M/S 2+			4
M/S 2-			5

(J4)

IXC-20S+
PERSONALITY MODULE
(SLOT 4)

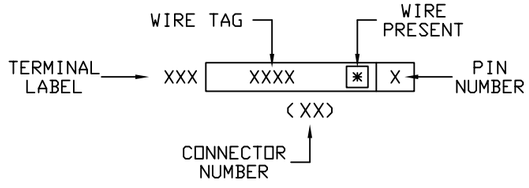
IN 1+			1
IN 1-			2
IN 2+	GP	✱	5
IN 2-	N12	✱	6
IN 3+	1GDP	✱	9
IN 3-	N12	✱	10
IN 4+	TESTSW	✱	13
IN 4-	N12	✱	14
FSI			17
FSO			18
NVO	XP4_HEALTH	✱	19

NEVER WIRE TO THIS INPUT

(J5)

GFD-1
MODULE
(SLOT 5)

1			B2+
2			B2-
4			B3+
5			B3-
7	✱	GND	GND



LEGEND:

VIO-86S - VITAL INPUT/OUTPUT MODULE
XTI-1S - CROSSING TRACK INTERFACE MODULE
IXC-20S+ - INTEGRATED CROSSING CONTROL MODULE
GFD-1 - GROUND FAULT DETECTOR

ENGINEER SEAL:

			-

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
XP4 MODULE USAGE

DWG No:	SHT.	REV.
TEMA128.66FA014_SW	14/20	FA

XP4 (4-SLOT CHASSIS)

SLOT NO.	TYPE OF MODULE	INPUTS 1	2	3	4	5	6	7	8	OUTPUTS 1	2	3	4	5	6
1	VIO-86S	AUX_IN	PO	MDR1_ DIS_J	ISL1_ DIS_J	2GDP	PER_IN	TESTSWUP	SPARE	SPARE	SPARE	SPARE	JMPK	PER (NOT USED)	SPARE

SLOT NO.	TYPE OF MODULE	TX	RX
2 - 3	XTI-1S	TK1_TX (1T)	TK1_RX (1R)

SLOT NO.	TYPE OF MODULE	INPUTS 1	2	3	4	NONVITAL NVO
4	IXC-20S+	RESERVED	GP	1GDP	TESTSW	XP4_ HEALTH

NOMENCLATURE DEFINITION TABLE	
SOFTWARE NAME	**DEFINITION**
AUX_IN	AUXILIARY INPUT
PO	POWER OFF INPUT
MDR1_DIS_J	TRACK 1 MDR DISABLE JUMPER INPUT
ISL1_DIS_J	ISLAND 1 DISABLE JUMPER INPUT
MDR2_DIS_J	TRACK 2 MDR DISABLE JUMPER INPUT
ISL2_DIS_J	ISLAND 2 DISABLE JUMPER INPUT
JMPK	BATTERY SUPPLIED TO ANY DISABLE INPUT
TK1_TX	TRACK 1 MDR TRANSMIT
TK1_RX	TRACK 1 MDR RECEIVE
TESTSW	TEST SWITCH INPUT
GP	GATE REPEATER INPUT
XP4_HEALTH	XP4 HEALTH INDICATION OUTPUT
1GDP	1 GATE DOWN REPEATER INPUT
2GDP	2 GATE DOWN REPEATER INPUT
PER_IN	PRE-EMPTION RELAY FEEDBACK INPUT
TESTSWUP	TEST SWITCH GATE UP CONTROL

LEGEND:

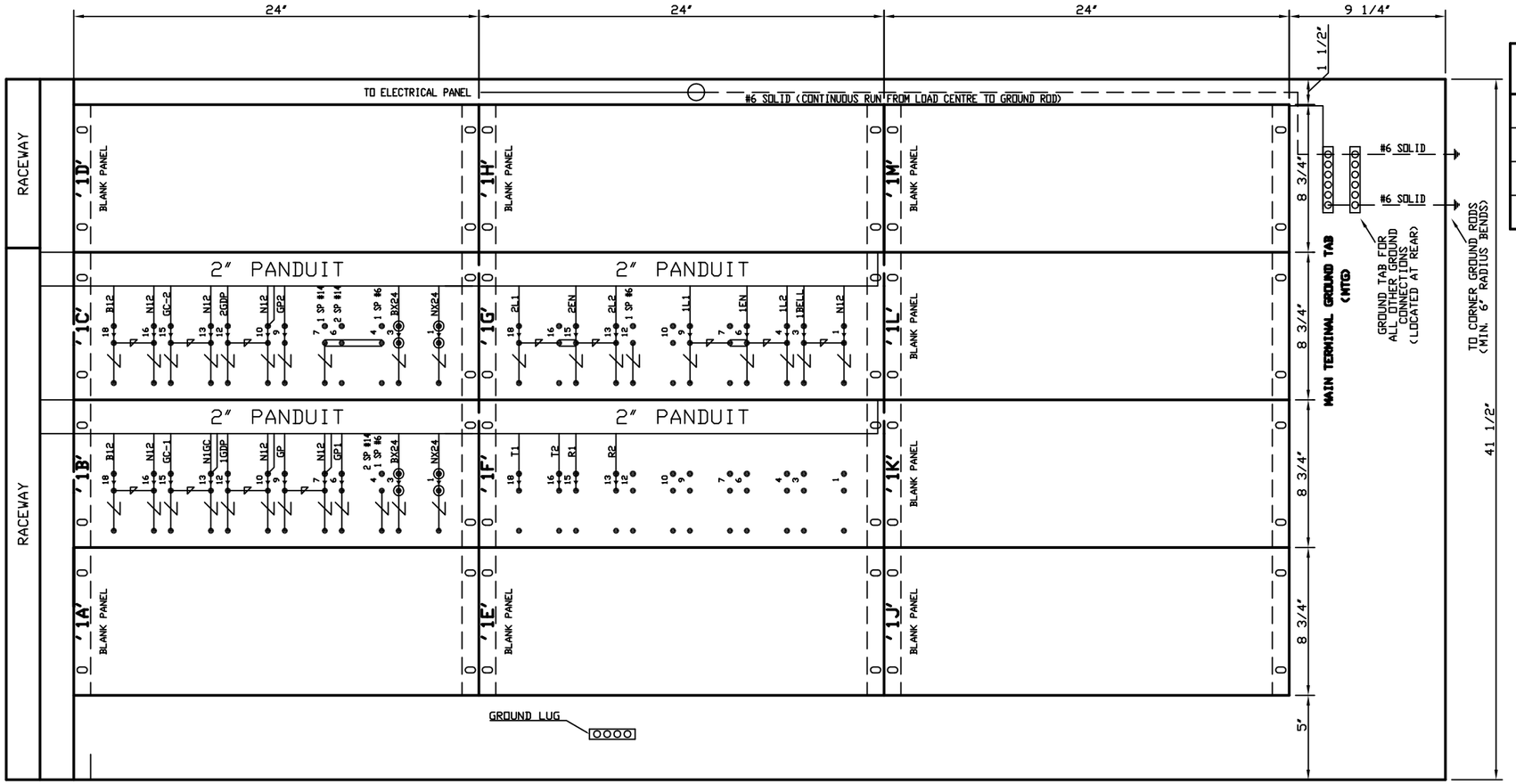
VIO-86S - VITAL INPUT/OUTPUT MODULE
XTI-1S - CROSSING TRACK INTERFACE MODULE, NORMAL/STANDBY
IXC-20S+ - INTEGRATED CROSSING CONTROL MODULE

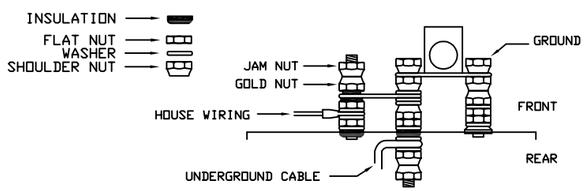
ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
XP4 I/O CHART

DWG No: TEMA128.66FA015_SW | SHT. 15/20 | REV. FA





CABLE CONSIST & TERMINATION CHART

TERMINAL PANEL	-BLE TERMINATED	CABLE DESTINATION
1B	1-10C #14 & 3-#6 WIRES (PART OF CABLE A)	SIGNAL #1
1C	1-10C #14 & 3-#6 WIRES (PART OF CABLE B)	SIGNAL #2
1F	2-2C #6 TWISTED	TRACK CIRCUITS
1G	4-#6 WIRES (PART OF CABLE A) 4-#6 WIRES (PART OF CABLE B)	1 F/L SIGNAL 2 F/L SIGNAL

LEGEND:

◎ - DENOTES CAP AND SHIELD

NOTES:

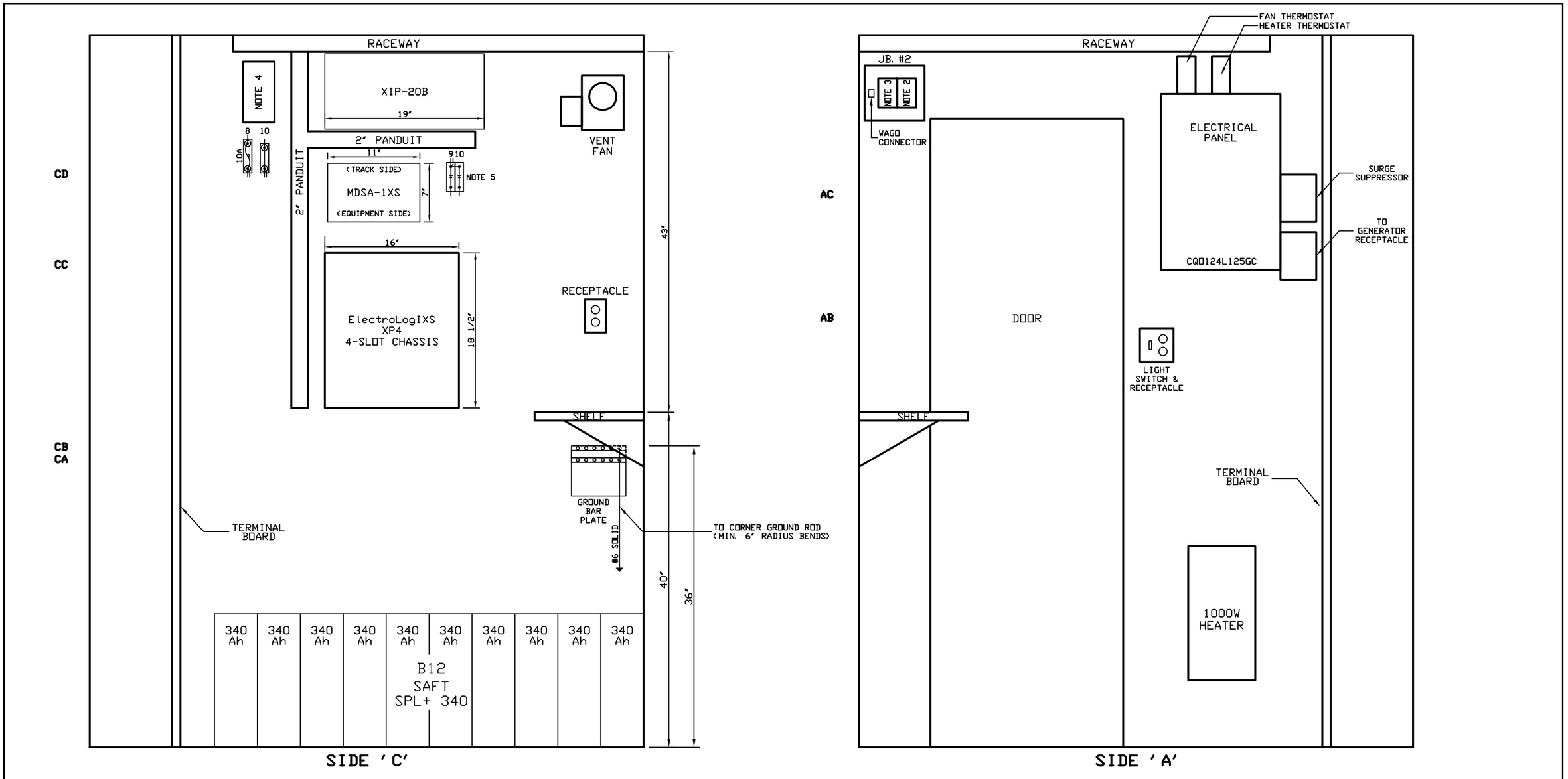
1. "CABLE A" IS A 7C #6 WHICH IS TERMINATED ON PANELS 1B & 1G. THREE (3) WIRES ARE TO BE TERMINATED ON PANEL 1B AND FOUR (4) ARE TO BE TERMINATED ON 1G.
2. "CABLE B" IS A 7C #6 WHICH IS TERMINATED ON PANELS 1C & 1G. THREE (3) WIRES ARE TO BE TERMINATED ON PANEL 1C AND FOUR (4) ARE TO BE TERMINATED ON 1G.

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
MAIN TERMINAL BOARD (SIDE B)

DWG No: TEMA128.66FA016_SW | SHT. 16/20 | REV. FA



NOTES:

1. SURGE PROTECTION SHOULD BE BONDED TO BUNGALOW.
2. CPOR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12
3. JMPR 12 VDC - POTTER BRUMFIELD P/N KUP-14D15-12
4. TRANSFORMER 120/24 VAC - HAMMOND P/N QC15ERCB
5. ⊣◀ DENOTES RECTIFIER - SIEMENS P/N 8008A299006

ENGINEER SEAL:

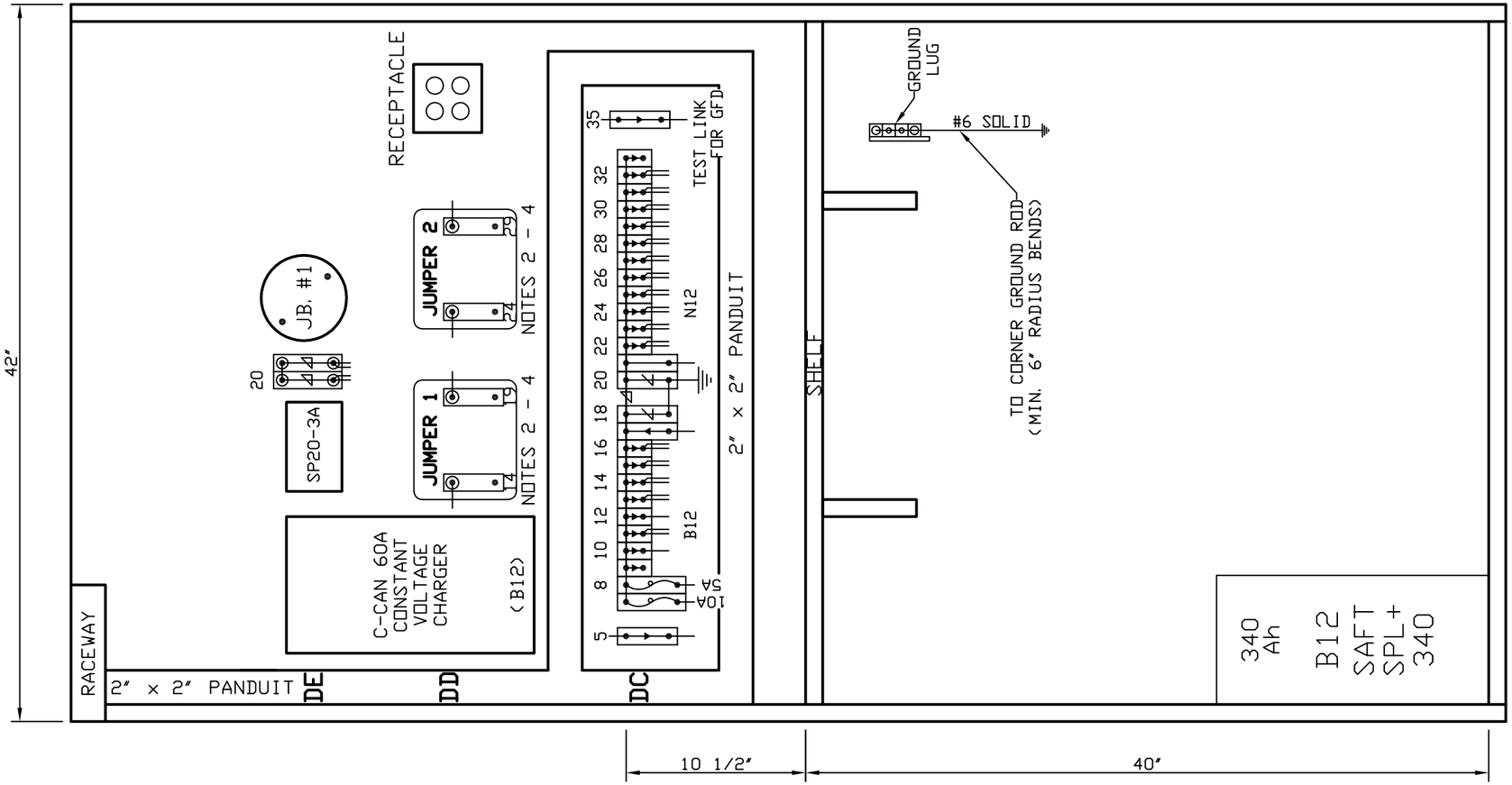
			-

Ontario Northland

J

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
SIDES 'A' & 'C'

DWG No:	SHT.	REV.
TEMA128.66FA017_SW	17/20	FA



NOTES:

1. SURGE PROTECTION SHOULD BE BONDED TO BUNGALOW.
2. **FOLLOW ONR SIGNAL STANDARDS WHEN TAKING TRACK OUT OF SERVICE.**
3. TRACK/ISLAND DEACTIVATION JUMPER PANEL. ALL PANELS TO HAVE A YELLOW SURFACE.
4. CAPS & SHIELD ON MDR/ISL DEACTIVATION TERMINALS ARE TO HELP PREVENT INTENDED DEACTIVATIONS. THEY ARE TO BE LEFT ON WHENEVER DEACTIVATION TERMINALS ARE NOT BEING USED.
5. EVERY ATTEMPT MUST BE MADE WHILE WIRING TO PLACE THE AC WIRING SEPARATE FROM THE DC WIRING BY USING SEPARATE TROUGHS AND PANDUITS.

ENGINEER SEAL:

			-

Ontario Northland

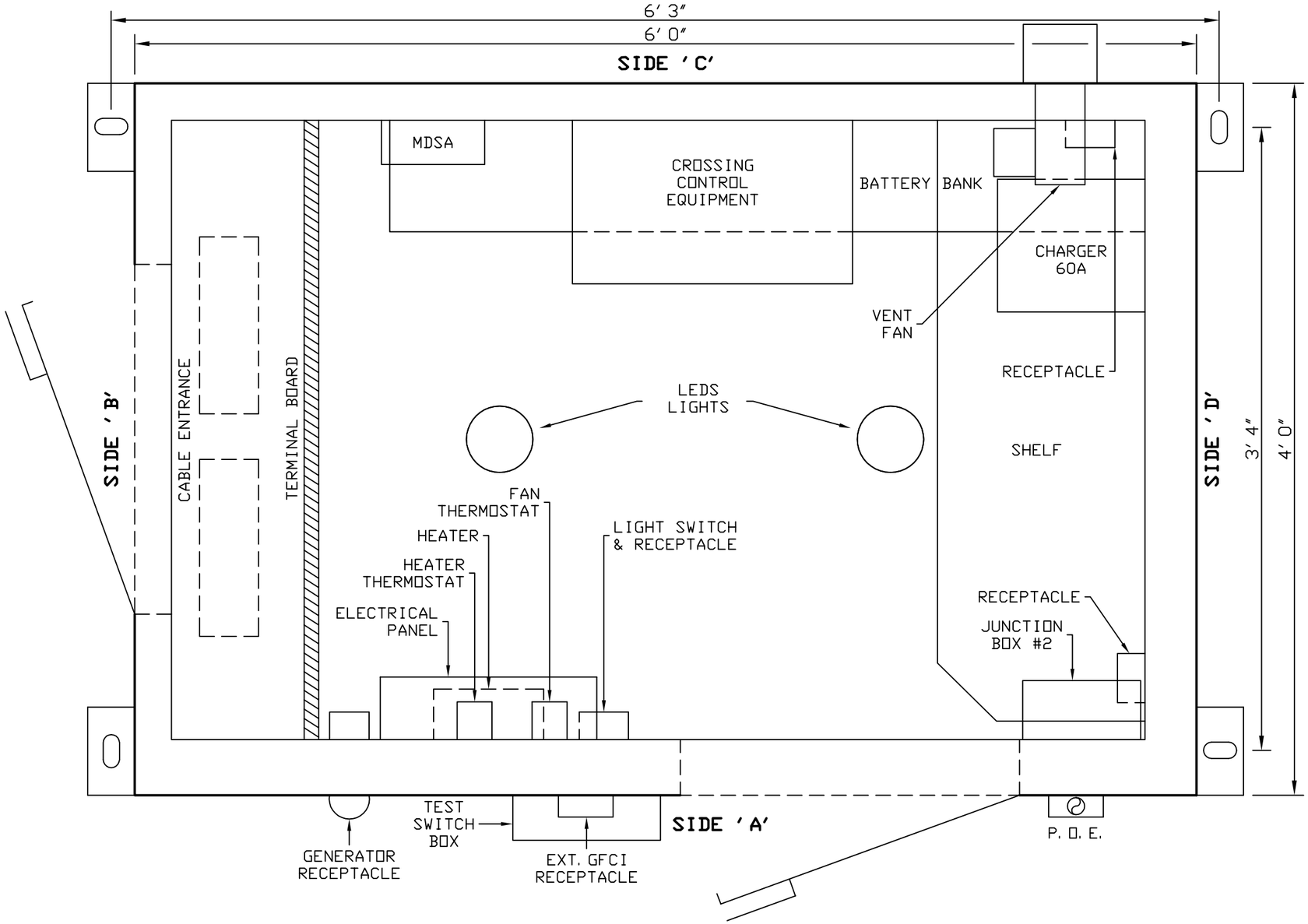
J

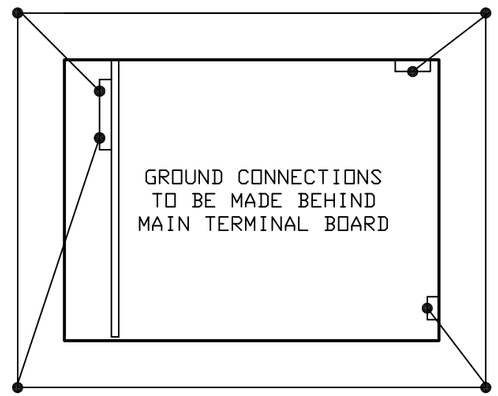
AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
SIDE 'D'

DWG No: TEMA128.66FA018_SW

SHT. 18/20

REV. FA





BUNGALOW GROUNDING

NOTES:

1. SURGE PROTECTION SHOULD BE BONDED TO BUNGALOW.
2. DIAGONAL BOLT SPACING FOR 4' X 6' BUNGALOW - 84.96"

ENGINEER SEAL:

			-

Ontario Northland

D

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
TOP VIEW & GROUNDING

DWG No:	SHT.	REV.
TEMA128.66FA019_SW	19/20	FA

REV.	DATE	NAME	COMMENTS AND NOTES
PA	2021-12-21	HATCH	NEW XP4 INSTALLATION
PA-1	2022-07-31	HATCH	UPDATES DUE TO DESIGN SPEED INCREASE TO 60MPH AND ADDITION OF GATES
PA-2	2023-08-24	HATCH	UPDATES DUE TO TEST SWITCH GC OPERATION AND MDSA WIRING CHANGES
FA	2023-10-25	HATCH	AS INSTALLED

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
REVISION HISTORY

DWG No:	SHT.	REV.
TEMA128.66FA020_SW	20/20	FA

APPLICATION SOFTWARE INFORMATION		
NAME	CHECKSUM	CRC
onr_xing_1t_1p_gates_xp4_02.00v	**2923**	**9E75**
onr_xing_1t_1p_gates_xp4_02.00nv	**6948**	**890D**
onr_xing_1t_1p_gates_xp4_02.00 (NOTE 1)	**C9A2**	**4F3C**

ELECTROLOGIXS DIP SHUNT SETTINGS

CHASSIS ID DIP SHUNTS – CHASSIS DIP SHUNT LOCATED ON BACKPLANE UNDERNEATH UCI-3 MODULE

ID0 ⊠ ⊠ ⊠ ⊠ ○ ⊠ ⊠ ○ ID7
1 2 3 4 5 6 7 8

CHASSIS ID NUMBER = **09**

○ NOT PUNCHED (= BINARY 1) ⊠ PUNCHED OUT (= BINARY 0)

COMM SETTINGS – ETHERNET GENERAL SETTINGS	
ETHERNET PORT 1 (NOTE 2)	
IP ADDRESS	192.168.0.11
SUBNET MASK	255.255.255.0
DHCP SERVER	ENABLED
DHCP SERVER IP POOL START	192.168.0.12
DHCP SERVER IP POOL END	192.168.0.43
DHCP SERVER DEFAULT GATEWAY	192.168.0.11
ETHERNET PORT 2	
IP ADDRESS	192.168.1.12
SUBNET MASK	255.255.255.0
DHCP SERVER	DISABLED
DEFAULT GATEWAY	0.0.0.0

VITAL TIMER SETTINGS			
VITAL TIMER	**MINIMUM**	**MAXIMUM (DEFAULT)**	**VALUE (MIN:SEC)**
MIN_ACT_T	00:20	01:00	00:35 (NOTE 3)
PER_FAIL_T	00:15	01:15	00:15
PER_RESET_T	00:00	00:30	00:00
PREEMPT_T	00:00	01:15	00:00
S4_HLTH_T	00:05	00:10	00:05

VITAL CONFIGURATIONS SETTINGS			
VITAL SETTING	**STATUS NAME**	**DEFAULT**	**SETTING**
1	GATES_USED	FALSE	TRUE
2	BELL_ON_G_R	FALSE	TRUE
3	VCS_TESTSW1	FALSE	FALSE
4	VCS_TESTSW2	FALSE	FALSE
5	VCS_AUX_IN	FALSE	FALSE

I/O SLOTS – IXC-20S+ SETTINGS			
ADJUSTMENT	**DEFAULT**	**RANGE**	**SLOT 4**
CROSSING FLASH RATE	60 FPM	45-65	60 FPM
LAMP REGULATION	ON	ON or OFF	OFF
LAMP 1 OUTPUT VOLTAGE	10.0V	10.0-15.0	F/A (NOTE 6)
LAMP 2 OUTPUT VOLTAGE	10.0V	10.0-15.0	F/A (NOTE 6)
GATE 1 DELAY	8 sec.	3-20	19 sec.
GATE 2 DELAY	N/A	N/A	N/A

I/O SLOTS – GFD-1 SETTINGS					
ADJUSTMENT	**DEFAULT**	**RANGE**	**BATTERY 1**	**BATTERY 2**	**BATTERY 3**
BATTERY NAME	BATTERY #	N/A	B12	N/A	N/A
CALIBRATED VOLTAGE	N/A	N/A	F/A	N/A	N/A
GROUND FAULT THRESHOLD	2kΩ	2-20	F/A (NOTE 4)	N/A	N/A
GROUND FAULT TIME	5 sec.	5-30	5 sec.	N/A	N/A
LOW BATT. ALARM VOLTAGE	8.0V	8.0-16.5	11.0V	N/A	N/A
HIGH BATT. ALARM VOLTAGE	8.0V	8.0-16.5	16.5V	N/A	N/A

NOTES:

1. CHECKSUM & CRC OF THE "MULTI-APPLICATION" EPROM (INCLUDES BOTH THE VITAL & NON-VITAL APPLICATIONS IN ONE FILE). EPROM LABELED WITH THE MULTI-APPLICATION CHECKSUM & CRC.
2. ETHERNET PORT 1 TO BE USED FOR DIAGNOSTICS. LOGIN ID = admin PASSWORD = admin
3. MINIMUM ACTIVATION TIMER ENSURES WARNING DEVICES ARE OPERATED FOR A MINIMUM TIME ONCE ACTIVATED. MIN_ACT_TE SHOULD BE THE TOTAL TIME MINUS EQUIPMENT REACTION AND BUFFER TIME.
4. SET GROUND FAULT THRESHOLD SO THAT LEAKAGE CURRENT VALUE DISPLAYED DOES NOT EXCEED 2mA. LEAKAGE CURRENT = CALIBRATED VOLTAGE / GROUND FAULT THRESHOLD.
5. F/A = FIELD ADJUST (AS AND WHEN REQUIRED).
6. SET OUTPUT VOLTAGE 1.5V BELOW THE B12 BATTERY VOLTAGE MEASURED WHEN THE GATES ARE RISING (DURING MAX CURRENT DRAW).

ENGINEER SEAL:

REVISIONS

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
XP4 PROGRAM CONFIGURATION SHEET #1

DWG No:	SHT.	REV.
TEMA128.66FA001_PC	01/02	FA

XTI-1S APPROACH SETTINGS - BASIC APPROACH SETTINGS

ADJUSTMENT	DEFAULT	RANGE	TRACK 1
APPROACH TRACK FREQUENCY (FREQ)	N/A	86-979	86 Hz
MASTER/SLAVE OPERATION (TKMS)	MASTER	MASTER or SLAVE	MASTER
TRANSMITTER GAIN	0	0-255	AUTO SET BY XP4
TRANSMITTER CHECK ADJUSTMENT (TCA)	0Ω	-7 to 13	F/A
TRANSMITTER CHECK IMPEDANCE	0Ω	-7 to 13	AUTO SET BY XP4
APPROACH TRACK DIRECTION MODE (DIR)	BI	UNI or BI	BI
LUMPED IMPEDANCE ADJUSTMENT (LIA)	0	-9 to +9	F/A
NARROW BAND SHUNT COMPENSATION (NBSRX)	100 Rx	0-100	F/A
TRACK ISLAND ASSIGN	DISPLAY ONLY		ISL1_ASSIGN
APPROACH LENGTH (APLEN)	9999 ft.	250-9999	3970 ft.
AUTO Rx (ARX)	ENABLED	ENABLED or DISABLED	ENABLED

XTI-1S APPROACH SETTINGS - ADVANCED APPROACH SETTINGS

ADJUSTMENT		DEFAULT	RANGE	TRACK 1
MD TIMER	ENABLE (MDEN)	DISABLED	ENABLED or DISABLED	ENABLED
	DELAY (MDTT)	10 min.	10-60	10 min.
FALSE SHUNT	ENABLE (FSEN)	DISABLED	ENABLED or DISABLED	ENABLED
	Rx (FSRx)	70 Rx	0-80	70 Rx
	DELAY (FST)	10 min.	0-60	10 min.
APPROACH RELEASE	ENABLE (AREN)	DISABLED	ENABLED or DISABLED	ENABLED
	Rx (ARRx)	70 Rx	0-80	70 Rx
	DELAY (ART)	10 min.	0-60	10 min.
LOS TIME (LOS)		16 sec.	4-99	16 sec.
IJ-LOS TIME (IJ LOS)		5 sec.	4-99	5 sec.
APPROACH SETTING (NSVS)		NORMAL	NORMAL, SHORT or VERY SHORT	F/A

XTI-1S APPROACH SETTINGS - ISLAND SETTINGS

ADJUSTMENT	DEFAULT	RANGE	ISLAND 1
ISLAND ENABLED (ISEN)	ENABLED	ENABLED or DISABLED	ENABLED
ISLAND DISABLE TIMEOUT	2 hr.	1-24 hr.	2 hr. (NOTE 2)
ISLAND FREQUENCY (IFREQ)	N/A	4-8	4 KHz
LOS COUNT (ILOS)	0.5	0.5-4.0	0.5
FAULT DELAY (FDEL)	1	1-2	1
TRANSMITTER GAIN	0	0-255	AUTO SET BY XP4

MDR CONFIGURATION SETTINGS AND TRACK PARAMETERS

ADJUSTMENT		DEFAULT	RANGE	MDR1	MDR2
WARNING TIME (TT - ERT - APT)*		99 sec.	23-99	40 sec.	40 sec.
CW / MD MODE		MD	CW or MD	CW	CW
ADVANCED PREEMPT TIME		30 sec.	0-99	N/A	N/A
CWE WARNING TIME		80 sec.	0-80	N/A	N/A
AUX RECOVERY DELAY TIME		5 sec.	0-99	N/A	N/A
				SLOT 2 TRACK 1	SLOT 2 TRACK 1
TRACK ASSIGNED		ASSIGNED	ASSIGNED or NOT ASSIGNED	ASSIGNED	ASSIGNED
OFFSET DISTANCE		0 ft.	0-9999	0 ft.	0 ft.
MD RESTART		0 Rx	0-99	15 Rx	15 Rx
SUDDEN SHUNT ZONE		0 Rx	0-99	0 Rx	0 Rx
POSITIVE START	ENABLE (PSEN)	DISABLED	ENABLED or DISABLED	DISABLED	DISABLED
	DETECTION (PSRx)	0 Rx	0-80	N/A	N/A
	ACTIVE TIME (PST)	0 min.	0-60	N/A	N/A
POST JOINT DETECT	ENABLE (PJEN)	ENABLED	ENABLED or DISABLED	DISABLED	DISABLED
	DETECTION (PJRx)	15 Rx	15-80	N/A	N/A
	DELAY (PJDT)	15 sec.	4-99	N/A	N/A
CJ-LOS	MODE	STANDARD	STND, MAN, OR AUTO	STANDARD	STANDARD
	Rx LEVEL	15 Rx	15-80	N/A	N/A
	TIME	99 sec.	5-99	N/A	N/A

*TT = TOTAL WARNING TIME
*ERT = EQUIPMENT REACTION TIME
*APT = ADVANCED PRE-EMPTION TIME (UNLESS THE MDR IS ASSIGNED AS A PRE-EMPTION START)

NOTES:

1. F/A = FIELD ADJUST (AS AND WHEN REQUIRED).
2. ISLAND DISABLE TIMEOUT IS NOT UTILIZED. WHENEVER THE ISLAND IS JUMPERED OUT, IT WILL ONLY RECOVER ONCE THE JUMPER IS REMOVED.

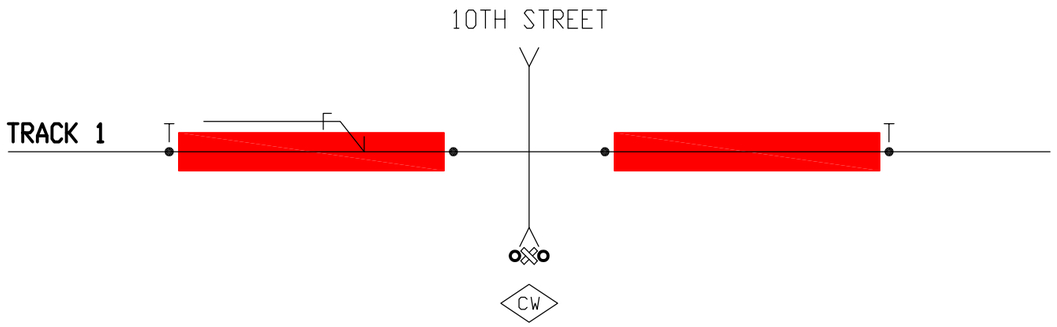
REVISIONS

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
XP4 PROGRAM CONFIGURATION SHEET #2

DWG No:	SHT.	REV.
TEMA128.66FA002_PC	02/02	FA



JUMPER 1

(TRACK CIRCUIT 1 MDR)

- JUMPER 1 WILL DISABLE THE CROSSING ACTIVATION CIRCUITS HIGHLIGHTED ON TRACK 1.

*** REFER TO SECTION SSIT-1002 WARNING SYSTEM - DEACTIVATION OF THE ONR SIGNAL STANDARDS FOR ANY CROSSING DEACTIVATIONS.

*** MAKE SURE ALL JUMPERS ARE REMOVED AND THE TRACK CIRCUITS HAVE BEEN TESTED BEFORE PLACING CROSSING BACK INTO SERVICE.

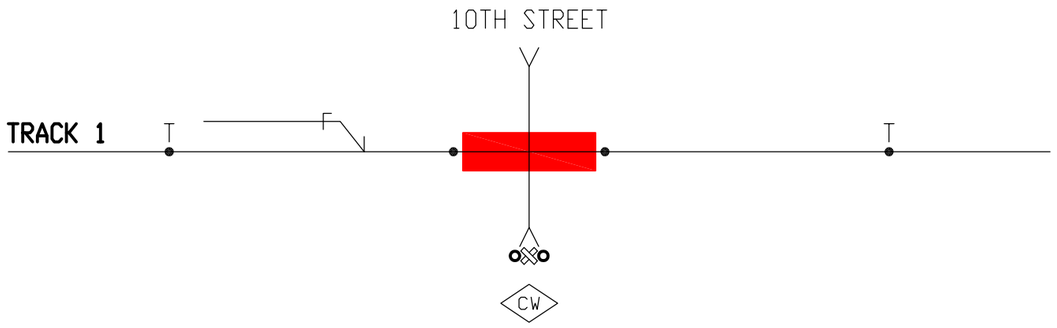
REVISIONS

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
JUMPER 1 TRACK DISABLE SCHEMATIC

DWG No: TEMA128.66FA001_JP | SHT. 01/02 | REV. FA



JUMPER 2

(TRACK 1 ISLAND)

- JUMPER 2 WILL DISABLE THE CROSSING ACTIVATION CIRCUITS HIGHLIGHTED ON TRACK 1.

NOTE:

WHEN DISABLING TRACK 1 ISLAND, TRACK CIRCUIT 1 MDR MUST ALSO BE DISABLED.

*** REFER TO SECTION SSIT-1002 WARNING SYSTEM - DEACTIVATION OF THE ONR SIGNAL STANDARDS FOR ANY CROSSING DEACTIVATIONS.

*** MAKE SURE ALL JUMPERS ARE REMOVED AND THE TRACK CIRCUITS HAVE BEEN TESTED BEFORE PLACING CROSSING BACK INTO SERVICE.

REVISIONS

ENGINEER SEAL:

Ontario Northland

AUTOMATIC CROSSING WARNING SYSTEM
10TH STREET
EARLTON, ONTARIO
MI. 128.66 TEMAGAMI SUBDIVISION
JUMPER 2 TRACK DISABLE SCHEMATIC

DWG No:	SHT.	REV.
TEMA128.66FA002_JP	02/02	FA

PART 3 – RFP SPECIFICATIONS
SCHEDULE 3-A-3
REFERENCE PHOTOGRAPHS

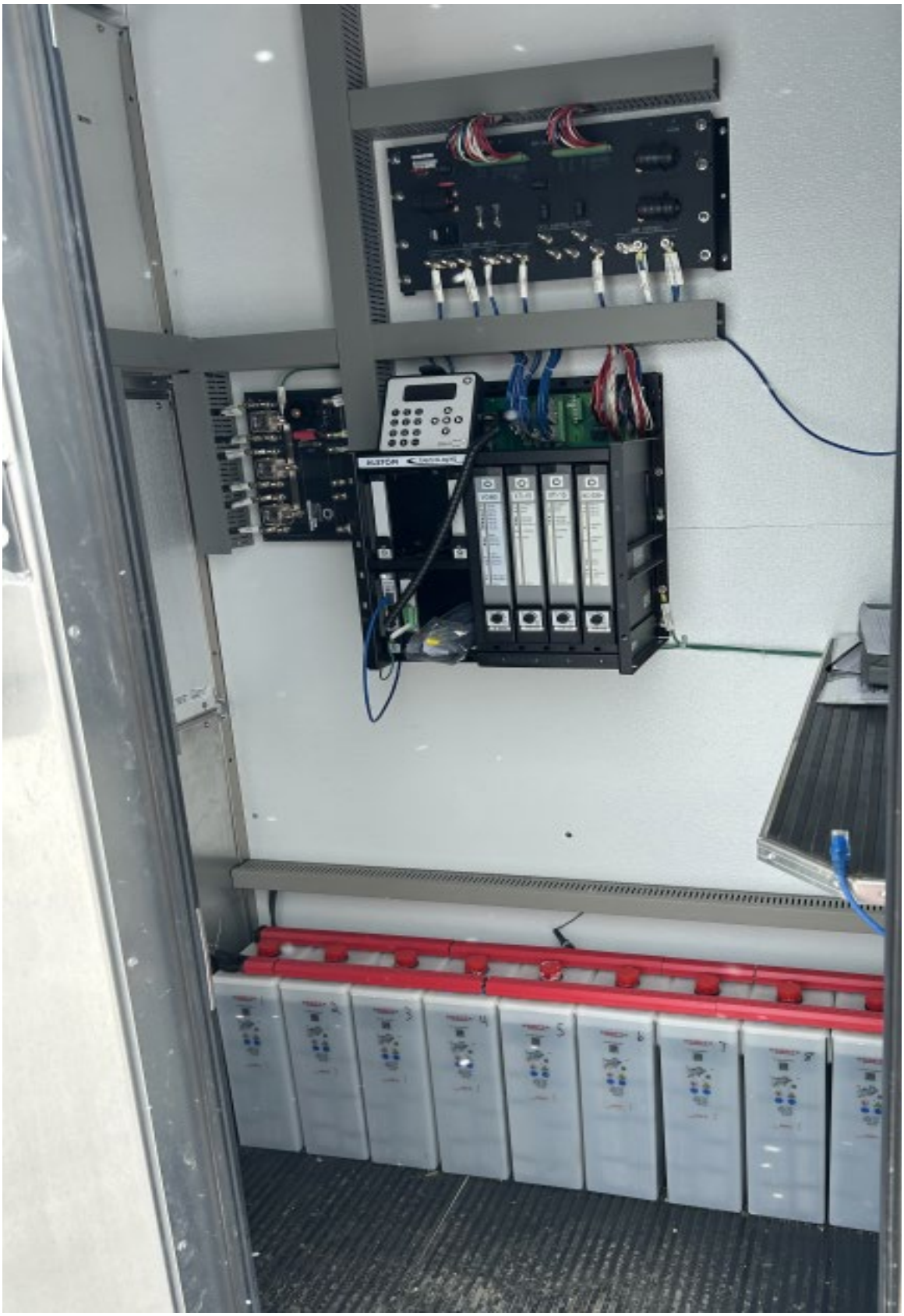
Example of Current Installation to be used as a prototype.

Future Requirements

- Bungalow (6’x6’)
- Two Battery Banks


C-CAN
JUMPER 1
JUMPER 2


ALSTOM
ElectroLogIXS
XTI-1S
XTI-1S



Hydro Installation 100A service -

- Meter base to be mounted so mid-point of socket is 1.75m above FINISHED grade.
- Meter base to be surface mounted. No recess or enclosure permitted.
- (OH) Ensure attachment point meets or exceeds OESC guidelines to provide a safe height for the service wire above ground.
- (UG-PRIVATE) Supply & install private wire and terminate in meter base. Provide sufficient coil at utility end for Hydro One to run up pole. Provide conduit/straps/bolts + weather head.
- Supply & install meter base (see list of currently approved meter bases on Hydro One website).

PART 3 – RFP SPECIFICATIONS
SCHEDULE 3-A-4
BILL OF MATERIALS

Refer to the Bill of Materials (BOM), which is attached to this Schedule 3-A-4 for both gated and non-gated crossings.

Of note, the BOM were prepared with a high level of accuracy; however, it is for estimating purposes only. I It is the Contractors' responsibility to complete the engineering and design, to determine specific materials and quantities required.

BILL OF MATERIAL (BOM) - EQUIPMENT COSTING FOR ESTIMATING PURPOSES ONLY

PROJECT DESCRIPTION: ONR CROSSINGS UPDATE (XP4 4-slot) **SUBDIVISION: KAPUSKASING**
CONTRACT DESCRIPTION: UPGRADE WARNING DEVICES **MILEAGE: 54.48**
PROJECT NUMBER **D'Amours Road.**

Ontario Northland

PART NUMBER		UNIT	MANUFACTURER	DESCRIPTION
B01345	1	EA	ENDURON	ONR SPEC 6'x6' BUNGALOW W/ PRE-WIRED ELECTRICAL PANEL or equivalent with adjustable foundations legs
LC2-001WB-WG4	1	EA	VELCORP GEMS	INTELLIGENT POWER OFF INDICATION LIGHT
16-7223-10	1	EA	ALSTOM	One track redundant with VPM-3, one VIO-86S and 20 amp crossing control. Includes one 4-slot chassis, two XTI-1S in NS config, one XTI NS personality module, one VIO-86S, one VIO-86S personality module, one CDU-1, One NSM-1,one UCI-3, one CPS-3, one VPM-3, one IXC-20S+, one IXC-20S+ personality module and one field reference manual, & GFD-1 or GCP 5000 and auxiliary equiipment
250204-100	1	EA	ALSTOM	MDSA-1XS Motion Detector Surge Arrester Model 1 (for one track)
227561-100	1	EA	ALSTOM	XIP-20B Crossing Interface Panel 20 amp
180611-100	1	EA	ALSTOM	Wall mount kit for XIP-20B
075046-001	1	EA	ALSTOM	CABLE, XIP-20 #1, 8FT (FOR IXC-20+)
075047-001	1	EA	ALSTOM	CABLE, XIP-20 #2, 8FT (FOR IXC-20+)
ASE8X8X4	1	EA	HOFFMAN	STEEL, GRAY JUNCTION BOX, 8IN X 8IN X 4IN
CUSTOM	1	EA	LOCAL SUPPLY	Octagonal Junction Box
CUSTOM	1	EA	LOCAL SUPPLY	Round Junction Box Cover
NYK:092307-306X	1	EA	SIEMENS	CROSSING TEST SWITCH BOX, TEST KEY/GATE UP, DPDT KNIFE SWITCH (RCL BURCO P/N: 439-1867)
RLW12/600E	1	EA	C-CAN	C-CAN 12 60A CHARGER
ECP-JUMPER-01	1	EA	SIGNEL SERVICE INC.	JUMPER PANEL #1
ECP-JUMPER-02	1	EA	SIGNEL SERVICE INC.	JUMPER PANEL #2
SPL+340	10	EA	SAFT	SAFT SPL REFILLABLE NI-CAD BATTERY - 340Ah
FLS-ONR-2-BFL	1	EA	WESTERN CULLEN	2 WAY FLASHER W/ ELECTRONIC BELL, LED LIGHTS, WITH FOUNDATION or equivalent
FLS-ONR-2-FL	1	EA	WESTERN CULLEN	2 WAY FLASHER W/ PINNACLE, LED LIGHTS, WITH FOUNDATION or equivalent
960-83-4	2	EA	WESTERN CULLEN	1-WAY CROSS-ARM, 960-960-83-4 WESTERN CULLEN 83-
	1		WESTERN CULLEN	DOLLY ARM
985-857	4	EA	WESTERN CULLEN	LED LIGHT, 985-857 (LIGHTS FOR 1-WAY CROSS-ARM)
3366-711-4	2	EA	WESTERN CULLEN	MOUNTING BRACKET, EMERGENCY NOTIFICATION SIGN (For 4" Mast)

BILL OF MATERIAL (BOM) - EQUIPMENT COSTING FOR ESTIMATING PURPOSES ONLY

PROJECT DESCRIPTION: ONR CROSSINGS UPDATE (XP4 4-slot) **SUBDIVISION: KAPUSKASING**
CONTRACT DESCRIPTION: UPGRADE WARNING DEVICES **MILEAGE: 54.48**
PROJECT NUMBER **D'Amours Road.**

Ontario Northland

PART NUMBER		UNIT	MANUFACTURER	DESCRIPTION
ONR-PEDASTAL-ASSY	**2**	EA	POLY-URE	BOOTLEG PEDESTAL or equivalent
91296	**1**	ROLL	BRADY	TAPE, RED BURIED ELECTRIC CABLE WARNING (1000 FT ROLL)
T416B	**4**	EA	ERICO	GROUND ROD INSPECTION HOUSING
615800	**4**	EA	ERICO	ROD,GROUND,COPPER COVERED STEEL,5/8" DIAMETER X 10'-0" LONG
SBNT1161G	6	EA	ERICO	CONNECTOR, ONE SHOT THERMITE MOULD,FOR TOP OF 5/8 IN. DIA. GROUND ROD,TO CONNECT UP TO THREE #6AWG SOLID COPPER WIRES
660083	**60**	M	MILRAIL INC.	Cable, 7c
652926	**190**	M	MILRAIL INC.	2 COND,#6 AWG, TWISTED
152-11-3038	**750**	FT	OKONITE	WIRE, #10, CASE, BLUE (500' SPOOLS)
152-11-3002	**400**	FT	OKONITE	WIRE, #16 AWG, CASE, BLUE (1000' SPOOLS)
CUSTOM	10	M	LOCAL SUPPLY	ELECTRICAL BX CABLE, AC-90, RED/BLACK (#14 - 2C w/ GND)
CUSTOM	10	M	LOCAL SUPPLY	ELECTRICAL BX CABLE, AC-90, BLACK/WHITE (#14 - 2C)
CUSTOM	**25**	M	LOCAL SUPPLY	Cable, #6 AWG, Polyrad XT Gray, F/ Indoors
CUSTOM	10	M	LOCAL SUPPLY	WIRE, #14 AWG, CASE, RED
CUSTOM	10	M	LOCAL SUPPLY	WIRE, #14 AWG, CASE, BLACK
CUSTOM	TBD	M	LOCAL SUPPLY	CABLE, TECK90, FOR AC FEED TO BUNGALOW
				LEVELING PLATE
SBS8TCINS664	**100**	FT	ERICO	Wire, Bondstrand, Ins. (NOTE: 100 ft. Rolls)
NYK:400044883127X1	**2**	EA	SIEMENS	GENERAL PURPOSE PANEL - 12 POSITION
NYK:400044883152X1	**2**	EA	SIEMENS	GENERAL PURPOSE PANEL - BLANK
NYK:023274-501X	**3**	EA	SIEMENS	(x6) 1" Terminal Block (Model 274) w/ NO HARDWARE
NYK:023839-3	**22**	EA	SIEMENS	1" TERMINAL STRAP
NYK:023839-1	**3**	EA	SIEMENS	2.375" TERMINAL STRAP
NYK:Z820000300000	**10**	EA	SIEMENS	2.375" Terminal Block (Model 612) w/ NO HARDWARE
NYK:024620-2X	**28**	EA	SIEMENS	INSULATED DISCONNECT STRAP (TEST LINK) - 1" [w/ insulated link, gold nut]
NYK:024620-5X	**3**	EA	SIEMENS	INSULATED DISCONNECT STRAP (TEST LINK) - 2.375" [w/ insulated link, gold nut]
NYK:023831	**400**	EA	SIEMENS	NUT, TERMINAL, SHOULDER, AREMA
NYK:023832	**300**	EA	SIEMENS	NUT, CLAMP, TERMINAL, AREMA

BILL OF MATERIAL (BOM) - EQUIPMENT COSTING FOR ESTIMATING PURPOSES ONLY

PROJECT DESCRIPTION: ONR CROSSINGS UPDATE (XP4 4-slot) **SUBDIVISION: KAPUSKASING**

CONTRACT DESCRIPTION: UPGRADE WARNING DEVICES **MILEAGE: 54.48**

PROJECT NUMBER **D'Amours Road.**

Ontario Northland

PART NUMBER		UNIT	MANUFACTURER	DESCRIPTION
NYK:023834	**350**	EA	SIEMENS	WASHER, BEVELED, BINDING POST, AREMA
NYK:400044700001X	**6**	EA	SIEMENS	LINE TO LINE EQUALIZER - HEAVY DUTY
NYK:400044485028X	**11**	EA	SIEMENS	ARRESTER - LIGHT DUTY
NYK:027614-1X	**2**	EA	SIEMENS	FUSE BLOCK FOR CARTRIDGE FUSE - BAKELITE BASE
NYK:023408-7X	**10**	EA	SIEMENS	Shield and cap, Bakelite (2) 3/4" wire slots
FRN-R-5	**1**	EA	BUSSMANN	5A Slow Blow Fuse
FRN-R-10	**1**	EA	BUSSMANN	10A Slow Blow Fuse
KUP-14D15-12	**2**	EA	POTTER & BRUMFIELD	12V KUP SERIES: ENCLOSED GENERAL PURPOSE RELAYS
27E121	**2**	EA	POTTER & BRUMFIELD	Screw terminal socket, rated 15 A, for 1-3 pole relays
20C228	**4**	EA	POTTER & BRUMFIELD	Hold down spring with screw for 27E121 // KU SERIES RELAY BASE SPRING for 27E121
RB14-14X	1	EA	THOMAS & BETTS	TERMINAL, RING EYE, BLUE INSULATION, FOR 14-16 AWG WIRE, 1/4 IN. STUD,PULLOUT STENGTH 70 LB. 100 PER PACKAGE
RC10-14X	1	EA	THOMAS & BETTS	TERMINAL, RING EYE, YELLOW INSULATION, FOR 10-12 AWG WIRE, 1/4 IN. STUD,PULLOUT STENGTH LB.50 150 PER PACKAGE
C2LG6	**1**	EA	PANDUIT	DUCT COVER, PLASTIC, 2INx6FT, Note : - 6 per package
G2X3LG6	**1**	EA	PANDUIT	DUCT, PLASTIC, 2INx3INx6FT, Note : - 6 per package
C1.5LG6	**1**	EA	PANDUIT	DUCT, COVER, PLASTIC, 1.5INx6FT, Note : - 6 per package
F1.5X2LG6-A	**1**	EA	PANDUIT	DUCT, PLASTIC, 1.5IN, Note : - 6 per package
PL330/25	**2**	EA	**ONTC WILL SUPPLY**	HIGH SECURITY PADLOCK
CUSTOM	2	EA	**ONTC WILL SUPPLY**	BOOTLEG MARKERS
CUSTOM	**2**	EA	**ONTC WILL SUPPLY**	EMERGENCY NOTIFICATION SIGN FOR CROSSING MAST ONLY
CUSTOM	**2**	EA	LOCAL SUPPLY	24" X 35" ALUMINUM PANEL FOR FARADAY PROTECTION
CUSTOM	TBD	FT	LOCAL SUPPLY	RUBBER AIR HOSE FOR TRACK WIRE PROTECTION

BILL OF MATERIAL (BOM) - EQUIPMENT COSTING FOR ESTIMATING PURPOSES ONLY

PROJECT DESCRIPTION: ONR CROSSINGS UPDATE (XP4 4-slot) **SUBDIVISION: KAPUSKASING**

CONTRACT DESCRIPTION: UPGRADE WARNING DEVICES **MILEAGE: 54.48**

PROJECT NUMBER **D'Amours Road.**

Ontario Northland

PART NUMBER		UNIT	MANUFACTURER	DESCRIPTION

Notes:

- Contractors are reponsible for purchasing any additional materials required for installations that are not listed in the BOM.

- Contractors shall purchase material needed for track & signal connections, terminations, splicing, bonding, and grounding, in accordance with Contract Documents, Contract Drawings and/or instructed by ONTC.

BILL OF MATERIAL (BOM) - EQUIPMENT COSTING FOR ESTIMATING PURPOSES ONLY

PROJECT DESCRIPTION: ONTC Crossing UPGRADE (XP4 4-slot) **SUBDIVISION:** TEMAGAMI
CONTRACT DESCRIPTION: RAILWAY SPEED UPGRADE (60 MPH) **MILEAGE:**
PROJECT NUMBER **LOCATION NAME:** 10th Street (Earlton)

Ontario Northland

PART NUMBER		UNIT	MANUFACTURER	DESCRIPTION
B01345	1	EA	ENDURON	ONR SPEC 6'x6' BUNGALOW W/ PRE-WIRED ELECTRICAL PANEL or equivalent with adjustable foundations legs
LC2-001WB-WG4	1	EA	VELCORP GEMS	INTELLIGENT POWER OFF INDICATION LIGHT
QO115CP	1	EA	SQUARE D	Circuit Breaker, Plug-On, 15A Single Pole
16-7223-10	1	EA	ALSTOM	One track redundant with VPM-3, one VIO-86S and 20 amp crossing control. Includes one 4-slot chassis, two XTI-1S in NS config, one XTI NS personality module, one VIO-86S, one VIO-86S personality module, one CDU-1, One NSM-1,one UCI-3, one CPS-3, one VPM-3, one IXC-20S+, one IXC-20S+ personality module and one field reference manual, & GFD-1 or GCP 5000 and auxiliary equiipment
250204-100	1	EA	ALSTOM	MDSA-1XS Motion Detector Surge Arrester Model 1 (for one track)
227561-100	1	EA	ALSTOM	XIP-20B Crossing Interface Panel 20 amp
180611-100	1	EA	ALSTOM	Wall mount kit for XIP-20B
075046-001	1	EA	ALSTOM	CABLE, XIP-20 #1, 8FT (FOR IXC-20+)
075047-001	1	EA	ALSTOM	CABLE, XIP-20 #2, 8FT (FOR IXC-20+)
	1	EA		
ASE8X8X4	1	EA	HOFFMAN	STEEL, GRAY JUNCTION BOX, 8IN X 8IN X 4IN
CUSTOM	1	EA	LOCAL SUPPLY	Octagonal Junction Box
CUSTOM	1	EA	LOCAL SUPPLY	Round Junction Box Cover
NYK:40004480707AX	1	EA	SIEMENS	240 VAC Line Surge Protectors Model SP20-3A
NYK:092307-306X	1	EA	SIEMENS	CROSSING TEST SWITCH BOX, TEST KEY/GATE UP, DPDT KNIFE SWITCH (RCL BURCO P/N: 439-1867)
RLW12/600E	1	EA	C-CAN	C-CAN 12 60A CHARGER
ECP-JUMPER-01	1	EA	SIGNEL SERVICE INC.	JUMPER PANEL #1
ECP-JUMPER-02	1	EA	SIGNEL SERVICE INC.	JUMPER PANEL #2
QC15ERCB	1	EA	HAMMOND	BUCK-BOOST TRANSFORMER 120/24 VAC
SPL+340		EA	SAFT	SAFT SPL REFILLABLE NI-CAD BATTERY - 340Ah
M-10-ONR-36-2BFL	1	EA	WESTERN CULLEN	2 WAY FLASHER W/ ELECTRONIC BELL, LED LIGHTS, FOUNDATION; 5" MAST, 36' GATES W/ LIGHTS (CAN BE SUPPLIED WITH LONGEST [18'6"] WITH GATE HEATERS or Siemens S80 Gate Mechanism
M-10-ONR-36-2FL	1	EA	WESTERN CULLEN	2 WAY FLASHER W/ PINNACLE, LED LIGHTS, FOUNDATION; 5" MAST, 36' GATES W/ LIGHTS (CAN BE SUPPLIED WITH LONGEST [18'6"] WITH GATE HEATERS or Siemens S80 Gate Mechanism
6U5568-X	2	EA	LW	HI-WIND GUARD, AL TUSK STYLE, F/5"MAST
	2	EA	N/A	LEVELING PLATES
ONR-PEDASTAL-ASSY	2	EA	POLY-URE	BOOTLEG PEDESTAL or equivalent
91296	1	ROLL	BRADY	TAPE, RED BURIED ELECTRIC CABLE WARNING (1000 FT ROLL)
T416B	4	EA	ERICO	GROUND ROD INSPECTION HOUSING
615800	4	EA	ERICO	ROD,GROUND,COPPER COVERED STEEL,5/8" DIAMETER X 10'-0" LONG
SBNT1161G	6	EA	ERICO	CONNECTOR, ONE SHOT THERMITE MOULD,FOR TOP OF 5/8 IN. DIA. GROUND ROD,TO CONNECT UP TO THREE #6AWG SOLID COPPER WIRES
652926	190	M	MILRAIL INC.	2 COND, #6 AWG, TWISTED

S67-CP100	**60**	M	MILRAIL INC.	Cable, 7 COND, #6AWG Stranded
567743	**120**	M	NEXANS CANADA INC.	14c Cable, (FOR GATES OPERATION)
152-11-3038	**750**	FT	OKONITE	WIRE, #10, CASE, BLUE (500' SPOOLS)
152-11-3002	**400**	FT	OKONITE	WIRE, #16 AWG, CASE, BLUE (1000' SPOOLS)
CUSTOM	10	M	LOCAL SUPPLY	ELECTRICAL BX CABLE, AC-90, RED/BLACK (#14 - 2C w/ GND)
CUSTOM	10	M	LOCAL SUPPLY	ELECTRICAL BX CABLE, AC-90, BLACK/WHITE (#14 - 2C)
CUSTOM	25	M	LOCAL SUPPLY	Cable, #6 AWG, Polyrad XT Gray, F/ Indoors
CUSTOM	10	M	LOCAL SUPPLY	WIRE, #14 AWG, CASE, RED
CUSTOM	10	M	LOCAL SUPPLY	WIRE, #14 AWG, CASE, BLACK
CUSTOM	TBD	M	LOCAL SUPPLY	CABLE, TECK90, FOR AC FEED TO BUNGALOW
SBS8TCINS664	**100**	FT	ERICO	Wire, Bondstrand, Ins. (NOTE: 100 ft. Rolls)
NYK:400044883127X1	**4**	EA	SIEMENS	GENERAL PURPOSE PANEL - 12 POSITION
NYK:400044883152X1	**4**	EA	SIEMENS	GENERAL PURPOSE PANEL - BLANK
NYK:023274-501X	**4**	EA	SIEMENS	(x6) 1" Terminal Block (Model 274) w/ NO HARDWARE
NYK:023839-3	**27**	EA	SIEMENS	1" TERMINAL STRAP
NYK:023839-1	**5**	EA	SIEMENS	2.375" TERMINAL STRAP
NYK:Z820000300000	**11**	EA	SIEMENS	2.375" Terminal Block (Model 612) w/ NO HARDWARE
NYK:024620-2X	**52**	EA	SIEMENS	INSULATED DISCONNECT STRAP (TEST LINK) - 1" [w/ insulated link, gold nut]
NYK:024620-5X	**3**	EA	SIEMENS	INSULATED DISCONNECT STRAP (TEST LINK) - 2.375" [w/ insulated link, gold nut]
NYK:023831	**-**	EA	SIEMENS	NUT, TERMINAL, SHOULDER, AREMA
NYK:023832	**-**	EA	SIEMENS	NUT, CLAMP, TERMINAL, AREMA
NYK:023834	**-**	EA	SIEMENS	WASHER, BEVELED, BINDING POST, AREMA
NYK:400044700001X	**13**	EA	SIEMENS	LINE TO LINE EQUALIZER - HEAVY DUTY
NYK:400044485028X	**36**	EA	SIEMENS	ARRESTER - LIGHT DUTY
NYK:027614-1X	**3**	EA	SIEMENS	FUSE BLOCK FOR CARTRIDGE FUSE - BAKELITE BASE
NYK:023408-7X	**26**	EA	SIEMENS	Shield and cap, Bakelite (2) 3/4" wire slots
FRN-R-5	**1**	EA	BUSSMANN	5A Slow Blow Fuse
FRN-R-10	**2**	EA	BUSSMANN	10A Slow Blow Fuse
KUP-14D15-12	**2**	EA	POTTER & BRUMFIELD	12V KUP SERIES: ENCLOSED GENERAL PURPOSE RELAYS
27E121	**2**	EA	POTTER & BRUMFIELD	Screw terminal socket, rated 15 A, for 1-3 pole relays
20C228	**4**	EA	POTTER & BRUMFIELD	Hold down spring with screw for 27E121 // KU SERIES RELAY BASE SPRING for 27E121
CIDUCT5	5	EA	THOMAS & BETTS	COMPOUND, DUCT-SEAL, 5LB BAGS ONLY
RB14-14X	1	EA	THOMAS & BETTS	TERMINAL, RING EYE, BLUE INSULATION, FOR 14-16 AWG WIRE, 1/4 IN. STUD,PULLOUT STENGTH 70 LB. 100 PER PACKAGE
RC10-14X	1	EA	THOMAS & BETTS	TERMINAL, RING EYE, YELLOW INSULATION, FOR 10-12 AWG WIRE, 1/4 IN. STUD,PULLOUT STENGTH LB.50 150 PER PACKAGE
C2LG6	**5**	EA	PANDUIT	DUCT COVER, PLASTIC, 2INx6FT
G2X3LG6	**5**	EA	PANDUIT	DUCT, PLASTIC, 2INx3INx6FT
PL330/25	**2**	EA	**ONTC WILL SUPPLY**	HIGH SECURITY PADLOCK
CUSTOM	**2**	EA	**ONTC WILL SUPPLY**	EMERGENCY NOTIFICATION SIGN FOR CROSSING MAST ONLY
CUSTOM	2	EA	**ONTC WILL SUPPLY**	BOOTLEG MARKERS
CUSTOM	**2**	EA	LOCAL SUPPLY	24" X 35" ALUMINUM PANEL FOR FARADAY PROTECTION
CUSTOM	TBD	FT	LOCAL SUPPLY	RUBBER AIR HOSE FOR TRACK WIRE PROTECTION

Notes:

- Contractors are reponsible for purchasing any additional materials required for installations that are not listed in the BOM.

- Contractors shall purchase material needed for track & signal connections, terminations, splicing, bonding, and grounding, in accordance with Contract Documents, Contract Drawings and/or instructed by ONTC.

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 001
Description: _____

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 reviewed the supplied photographs and familiarized ourselves thoroughly with local conditions, hereby agree to supply the services associated with the 2024, 2025, and 2026 Design, Supply, Installation, Testing and Commissioning of all Materials and Equipment required for the Grade Crossing Warning System Upgrades as outlined in our Proposal for a total price of:

	Year 2024	**Optional Year 2025**	**Optional Year 2026**
Crossing Upgrade with Gates	$_____	$_____	$_____
Crossing Upgrade without Gates	$_____	$_____	$_____

which price 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 on the following Proposal Form 1-A.

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%; **warranty holdback will be 2.5%.**

(f) We will provide the required evidence of insurance, as specified in the Supplementary Conditions;

(g) For the General Liability Insurance, Ontario Northland Transportation Commission are to be included as 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.

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 1-A
PROPOSAL SUBMISSION FORM

Please refer to the attached Schedule A – Schedule of Quantities and Prices. This form must be completed as part of the proposal.

ONTC is looking for a total of two lump sum prices for crossing upgrades based on both the design and bill of material templates provided along with each line item requested for 2024, and optional years 2025 and 2026. Once the contract is awarded, a plan and price per each specific location guided by the templates will be established and approved by ONTC prior to the crossing upgrade. See list of locations for future reference.

Item 1

Typical ONTC Crossing Upgrade with gates based on the design and BOM template.

Assumptions:

- Work Location – 555 Oak Street E, North Bay, ON, P1B 8E3
- 120 m of 14c Cable
- 120 m of 2C TW#6
- 40 m of Teck Cable
- 5 loads of 22-ton fill
- 60 mph as a design speed

Item 2

Typical ONTC Crossing Upgrade without gates based on the design and BOM template.

Assumptions:

- Work Location – 555 Oak Street E, North Bay, ON, P1B 8E3
- 120 m of 7c Cable
- 120 m of 2C TW#6
- 40 m of Teck Cable
- 5 loads of 22-ton fill
- 60 mph design speed

Item 3

Additional items if/when required:

Construction

- Mobilization from North Bay to the work site, and from site to site afterward (One-time fee for the crew and equipment to travel to a new location, non-reoccurring) – per Kilometer
- Factory Testing per bungalow (FAT)
- Fill material for Bungalow/signal pads per 22-ton load + leveling on Temagami Sub
- Foundation and Bungalow Installation + wire connections (with gates)

- Foundation and mast installation + wire connections (with gates)
- Dolly arm installation including 2-way lights + wiring if required.
- Foundation and 40-foot cantilever installation if required.
- Directional boring/drilling per meter
- Trenching per meter
- Vac Truck per hour
- Testing & Commissioning per site

Material

- 7c Cable per meter (for crossing without gates)
- 14c Cable per meter (for crossing with gates)
- 2 c TW#6 per meter
- Teck cable per meter

Optional Work: (no estimates required as this time)

- Supply and install seven (7) radio control switches. (ML-18 - Advanced Rail Systems)
- Supply and install one (1) wheel impact load detector. Wheel Impact Load Detector (WILD) (nagoryfoster.com)

SCHEDULE A - Schedule of Quantities and Prices

ONTC 2024 upgrade for a Typical ONTC crossing upgrade

Unit Prices listed in this Schedule are based on the use of Specified Materials. Unit Price shall include all overhead, profit, handling, and all other related charges and shall hereinafter be referred to as Contract Unit Prices. All of the prices listed below are to be included in the Contract Price.

Item 1	Description	Section and/or Drawing No.	Unit	Estimated Quantity	Unit Price 2024	Unit Price 2025	Unit Price 2026
Crossing Upgrade Work							
	Typical ONTC crossing upgrade with gates.						
1	Mobilization & Demobilization to and from North Bay (one time price per work season)	Section 01 52 00	L.S.	1	$	$	$
2	Construction Facilities	Section 01 52 00	L.S.	1	$	$	$
3	Environmental Protection	Section 01 56 10	L.S.	1	$	$	$
4	Design based on template provided	Schedule 3-A-2 reference drawing	L.S.		$	$	$
5	Supply of all signal equipment required to upgrade a Crossing Warning Signal Assembly (LED light units, bell(s), crossing warning sign, masts & and foundations and gates), Crossing Control Equipment, Signal Housing, battery cells, and all other materials.	Section 01 11 00, Section 01 42 19, Section 34 42 01. Section 34 42 02, Section 34 42 03, Section 34 42 06, Section 34 42 13, Section 34 42 23, Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM, Assumptions in Part 4 - Form 1A	L.S.	1	$	$	$
6	Installation, programming, testing and commissioning of all signal equipment associated with the design of the Crossing Upgrades.	Section 01 11 00, Section 01 14 00, Section 01 35 00, Section 01 42 19, Section 31 24 11, Section 34 05 05, Section 34 42 01. Section 34 42 02, Section 34 42 03, Section 34 42 04, Section 34 42 05, Section 34 42 06, Section 34 42 13, Section 34 42 23, Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM, Assumptions in Part 4 - Form 1A	L.S.	1	$	$	$
7	Supply and Install electrical equipment for the Crossing Upgrades.	Section 26 05 00, Schedule 3-A-2 reference drawing, 3-A-3 reference photographs (Hydro), Assumptions in Part 4 - Form 1A	L.S.	1	$	$	$
				Typical ONTC crossing upgrade with gates.	**$**	**$**	**$**
	Harmonized Sales Tax (HST)						
	TOTAL PROPOSAL PRICE						

Item 2	Description	Section and/or Drawing No.	Unit	Quantity	Unit Price 2024	Unit Price 2025	Unit Price 2026
Crossing Upgrade Work							
	Typical ONTC crossing upgrade without gates.						
1	Mobilization & Demobilization to and from North Bay (one time price per work season)	Section 01 52 00	L.S.	1	$_____	$_____	$_____
2	Construction Facilities	Section 01 52 00	L.S.	1	$_____	$_____	$_____
3	Environmental Protection	Section 01 56 10	L.S.	1	$_____	$_____	$_____
4	Design based on template provided	Schedule 3-A-2 reference drawing			$_____	$_____	$_____
5	Supply of all signal equipment required to upgrade a Crossing Warning Signal Assembly (LED light units, bell(s), crossing warning sign, masts & and foundations), Crossing Control Equipment, Signal Housing, battery cells, and all other materials.	Section 01 11 00, Section 01 42 19, Section 34 42 01. Section 34 42 02, Section 34 42 03, Section 34 42 06, Section 34 42 13, Section 34 42 23, Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM, Assumptions in Part 4 - Form 1A	L.S.	1	$_____	$_____	$_____
6	Installation, programming, testing and commissioning of all signal equipment associated with the design of the Crossing Upgrades.	Section 01 11 00, Section 01 14 00, Section 01 35 00, Section 01 42 19, Section 31 24 11, Section 34 05 05, Section 34 42 01. Section 34 42 02, Section 34 42 03, Section 34 42 04, Section 34 42 05, Section 34 42 06, Section 34 42 13, Section 34 42 23, Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM, Assumptions in Part 4 - Form 1A	L.S.	1	$_____	$_____	$_____
7	Supply and Install electrical equipment for the Crossing Upgrades.	Section 26 05 00, Schedule 3-A-2 reference drawing, 3-A-3 reference photographs (Hydro), Assumptions in Part 4 - Form 1A	L.S.	1	$_____	$_____	$_____
		Typical ONTC crossing upgrade with gates.			**$_____**	**$_____**	**$_____**
	Harmonized Sales Tax (HST)						
	TOTAL PROPOSAL PRICE						

Item 3	Description	Section and/or Drawing No.	Unit	Estimated Quantity	Unit Price 2024	Unit Price 2025	Unit Price 2026
Crossing Upgrade Work							
	Additional Line items if required						
1	Mobilization from North Bay to the work site, and from site to site afterward (One-time fee for the crew and equipment to travel to a new location, non-reoccurring) - per Kilometer	Section 01 52 00	KM	1	$_____	$_____	$_____
2	Factory Testing (FAT) per bungalow with gates	N/A	L.S.	1	$_____	$_____	$_____
3	Testing & Commissioning per site with gates	Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM	L.S.	1	$_____	$_____	$_____
4	Fill Material for Bungalow/signal pads per 22-ton load + leveling on Temagami Sub	N/A	L.S.	1	$_____	$_____	$_____
5	Foundation and bungalow installation + wire connection (with gates)	N/A	L.S.	1	$_____	$_____	$_____
6	Foundation and mast installation + wire connection (with gates)	N/A	L.S.	1	$_____	$_____	$_____
7	Dolly arm installation including 2 way lights + wire connection	N/A	L.S.	1	$_____	$_____	$_____
8	Foundation and 40' cantilever installation if required	N/A	L.S.	1	$_____	$_____	$_____
9	Directional boring/drilling - Temagami Sub	N/A	M	1	$_____	$_____	$_____
10	Mechanical trenching per meter	N/A	M	1	$_____	$_____	$_____
11	Vac Truck per hours - Temagami Sub	N/A	Hr.	1	$_____	$_____	$_____
12	7c cable per meter	Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM	L.S.	1	$_____	$_____	$_____
13	14c cable per meter	Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM	L.S.	1	$_____	$_____	$_____
14	2c cable TW6 per meter	Schedule 3-A-2 reference drawing, 3-A-3 reference photographs, 3-A-4 BOM	L.S.	1	$_____	$_____	$_____
15	Tech #2AW G/3C Teck90 per meter	Section 26 05 00, Schedule 3-A-2 reference drawing, 3-A-3 reference photographs (Hydro)	L.S.	1	$_____	$_____	$_____
16	Training and Familiarization of crossing predictor and gate mechanism (up to 10 maintainers)	N/A	L.S.	1	$_____	$_____	$_____
				Total of Line Items	$_____	$_____	$_____
	Harmonized Sales Tax (HST)						
	TOTAL PROPOSAL PRICE						

Item 4	Description	Section and/or Drawing No.	Unit	Estimated Quantity	Unit Price 2024	Unit Price 2025	Unit Price 2026
Optional Work (no estimates required at this time)							
1	Supply and Install 7 radio control switches (DTMF)	ML-18 - Advanced Rail Systems	L.S.	7	$ N/A	$ N/A	$ N/A
2	Supply and Install 1 Wheel Impact Load Detector	Wheel Impact Load Detector (WILD) (nagoryfoster.com), https://www.progressrail.com/en/Segments/Infrastructure/Signaling/Products.html	L.S.	1	$ N/A	$ N/A	$ N/A
				Total	**$ N/A**	**$ N/A**	**$ N/A**

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 or manufacturer that has headquarters or a main office in Ontario, and that regularly conduct its activities (i.e., produces manufactured goods, intangible goods, or services) on a permanent basis in Ontario, is clearly identified by name and is accessible during normal business hours.

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.

Please indicate the Federally Regulated Railway installation standards that the Respondent typically uses during installation: _____.

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 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	Fax	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	Fax	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	Fax	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
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.
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.

DATE FORMALIZED April 2016 REVISED February 2023	**Health and Safety Policy**

POLICY STATEMENT

In keeping with our value of *Safety. Full Stop*. Ontario Northland Transportation Commission (ONTC) / Nipissing Central Railway (NCR) is committed to providing a safe and healthy work environment. Safety is core to everything we do. We don't settle for less, for our people or our customers, even when operating pressures make it difficult to do so.

As part of developing a safety culture, we will collectively strive to prevent accidents and incidents through a risk-based approach with the goal to continuously improve. Employees are required to report safety concerns immediately and can do so without fear of reprisal, while management ensures all employees receive quick follow-up.

We will adopt the latest in systems to improve the reporting, investigation, and 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, such as during 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.

Chad Evans
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 on behalf of our proposed sub-contractors, 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	

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 7
SCHEDULE OF MATERIALS

SCHEDULE OF MATERIALS - VARIATIONS (AND SOURCES)

VARIATIONS:

MATERIALS SOURCES:
(ADD WHERE REQUIRED)

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 8
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.

QUANTITY	DESCRIPTION	CAPACITY	CONDITION	AGE	LOCATION	OWNER	HOURLY RENTAL RATE

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 9
SCHEDULE AND PROPOSED APPROACH

SCHEDULE

Respondents shall include a schedule with their Proposal. The schedule shall be in Gantt chart format, showing all activities of the Work and the critical path. The Respondent shall propose a schedule based on the capacity to deliver a minimum of 8 crossing upgrades in 2024 with an upward limit of 20, a minimum of 20 crossing upgrades in 2025 with an upward limit of 30, and another possible 10 to 30 crossing upgrades in 2026. The construction period to work on ONTC property should be expected between May 1st or in favorable weather condition in the spring season until November 1st of each year given the weather conditions to prevent frost issues. The construction schedule shall reflect the milestone dates listed below.

Request for Proposal Close	February 20, 2024
Contract Award	Within 2 weeks of Closing Date
Preliminary Design Including advance BOM Submissions for Review	Maximum 10 Business Days after Award Date
Identify Specific Locations (ONTC & Contractor)	Maximum 10 Business Days after Award Date
Detailed Design Submissions for Review	Maximum 20 Business Days after Award Date
Expected Timeline for Review	5 to 10 Business Days after Submission
Design Corrections if needed	5 Business Days after being notified
Work and Test Plan Submissions for Review	Minimum 20 business days prior to mobilization
Mobilization to Site	Spring of each year
Completion of the field Work	Before November 1st of each year

Note: The above timelines are crucial for initiating the project promptly and will serve as a guiding framework throughout the entire process. The preliminary Design and the advance bill of materials (BOM) shall be identified and approved as a priority to accelerate the procurement process.

Do you agree to complete the fieldwork between May 1st and November 1st of each year?

Respondent confirms that they will complete the fieldwork between May and November 1st of each year.

(Check one) YES_____; NO_____

ONTC has established the date for Completion of the Field Work with consideration for northern Ontario weather conditions. As such, there is no flexibility to extend the end date for completion of the work, and a failure to confirm that the work will be completed by the identified date will result in a rejection 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 in Part 3 – RFP Specifications, Schedule 3-A, Scope of Work. Evidence of a thorough review of the RFP Documents should be apparent in the Respondent's Schedule and Proposed Approach.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 10
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 11
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 12
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 13
CONTRACTOR'S QUALIFICATION STATEMENT

1. The Respondent shall include a company profile.

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.)

3. Please advise if you will be utilizing local resources for the grade crossing warning system upgrades. What is the value of the budget to be allocated to local subcontractors and how and when will the vendor use the local workforce, local vendors, local manufacturers, etc.

4. Describe your experience with the climatic and environmental requirements in Northern Ontario.

5. Are you able to deliver the grade crossing warning system upgrades per the critical delivery schedule specified in the RFP? Provide details of the associated support ONTC should expect as part of the overall service. Include how your organization can ensure on-time delivery of the services and how your organization will be responsive and on-site as per the schedule outlined in the RFP.

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.

In the event 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 13, a company profile for each subcontractor.

ONTC will consider all information submitted in the Respondent's Proposal when evaluating the Respondent's experience.

PART 4 – FORM OF PROPOSAL
PROPOSAL FORM 14
CLAIMS

Submit an up-to-date list of outstanding, pending or anticipated claims, proceedings, liens or other legal claims, actions or proceedings.

PART 5

REQUEST FOR PROPOSALS

CCDC 2 – 2020 SUPPLEMENTARY CONDITIONS

Note: The Supplementary Conditions and Special Supplementary Conditions will be issued by way of Addendum in accordance with these RFP Documents.