Bid Documents for

Township of North Huron

Wingham Standpipe Replacement

Contract No. 300053193.0000

April 2026

Prepared by:

R.J. Burnside & Associates Limited
449 Josephine Street P.O. Box 10
Wingham ON N0G 2W0

The material in these Documents reflects appropriate judgement in light of the information available at the time of preparation. Any use which a third party makes of this document, or any reliance on or decisions made based on it, are the responsibilities of such third parties. R.J. Burnside & Associates Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on these documents.

Township of North Huron

Wingham Standpipe Replacement

Contract No.: 300053193.0000

Index to Bid Documents

Document	Contents
A	Instructions to Bidders
B	Bid
C	General Conditions of Contract
D	General Requirements
E	Drawings and Specifications
F	Special Provisions
G	Articles of Agreement

BURNSIDE

Document A

Instructions to Bidders

Table of Contents

1 THE WORK....1
2 WORK AND BIDDERS....1
3 BID DOCUMENTS AND CONTRACT....1
5 PRE-BID MEETING....5
6 DISCREPANCIES, OMISSIONS, AMBIGUITIES, COMMENTS, AND ADDENDA....5
7 SUBMISSION OF BIDS....6
8 BID FORM AND BID PRICE....9
9 BID SIGNING....10
10 SECURITY AND AGREEMENT TO BOND....10
11 INSURANCE....11
12 OWNERSHIP....11
13 BID OPENING....11
14 CLARIFICATION OF BIDS....12
15 SELECTION PROCESS AND RESERVED RIGHTS....12
16 BONDS....14
17 ACCEPTANCE OF CONDITIONS....14
18 OWNER'S MATERIALS AND DISCLOSURE OF INFORMATION....15
19 GOVERNING LAW....15
20 APPENDICES TO THE BID FORM....16

1 THE WORK

1.1 The work ("Work") is the replacement of an existing standpipe, located at 199 John Street, East, Wingham Ontario ("Place of the Work") for the Township of North Huron ("Owner"), as is more particularly described in the Bid Documents (as defined in Section 3.1 of these Instructions to Bidders) and Contract (as defined in Section 3.2 of these Instructions to Bidders).

1.2 The firm of R.J. Burnside & Associates Limited is the "Contract Administrator" who will be administering this request for Bids and administering the Contract that may be awarded as a result of this request for Bids.

1.3 All inquiries regarding this Work, or this request for Bids, are only to be directed in writing via the 'submit a question' option through the bid system. The deadline to submit questions shall be 5:00 pm local time on May 1, 2026.

2 WORK AND BIDDERS

2.1 The scope of Work is more particularly described in the Bid Documents.

2.2 The Owner is requesting Bids (as defined in Section 7.2 of these Instructions to Bidders) in connection with the Work from qualified contractors (in the case of an advertised tender), or from the pre-qualified or invited contractors listed below (if applicable). Each contractor who responds to this request for Bids is defined as a Bidder (collectively, the "Bidders").

3 BID DOCUMENTS AND CONTRACT

3.1 Bid Documents

.1 The Bid Documents consist of:

(i) Document A – Instructions to Bidders
(ii) Document B – Bid
(iii) Document C – General Conditions of Contract and Supplemental General Conditions
(iv) Document D – General Requirements
(v) Document E – Drawings and Specifications
(vi) Document F – Special Provisions
(vii) Document G – Articles of Agreement
(viii) all Addenda (as defined in Section 6.4 of these Instructions to Bidders) that were issued in writing by the Owner or Contract Administrator prior to the Bid Closing Time (as defined in Section 7.5 of these Instructions to Bidders)

.2 The Owner's Purchasing By-law and procurement policies and procedures (if applicable) are incorporated into the Bid Documents by

reference and shall take priority over the other provisions in these Instructions to Bidders with respect to procurement policies and procedures to be followed by the Owner during the Owner's consideration and selection process. Copies of the Owner's Purchasing By-law and procurement policies and procedures (if applicable) are available for review by the Bidders at the offices of the Owner.

.3 For greater certainty, no pre-qualification documents issued by the Owner or pre-qualification submissions delivered by the Bidders to the Owner shall form a part of the Bid Documents or the Contract, unless otherwise expressly provided for herein and the pre-qualification of an entity does not necessarily mean that the factors which were examined during the pre-qualification of that entity may not be re-examined or re-evaluated by the Owner during the consideration and selection process for this request for Bids. Any invitation to submit a Bid does not necessarily mean that the invited Bidder is pre-qualified for this request for Bids and shall not limit or constrain the Owner from evaluating the invited Bidder during the consideration and selection process for this request for Bids.

3.2 The Contract for this request for Bids ("Contract") consists of:

.1 Agreement between Owner and Contractor listed in Document G
.2 Documents describing clarifications, if any are requested and accepted by the Owner following the Bid Closing Time
.3 General Conditions of Contract, (OPSS.MUNI 100, November 2024), as modified by the Supplemental General Conditions
.4 Supplemental General Conditions listed in Document C
.5 The General Requirements (Document D) and the Drawings and Specifications (Document E)
.6 Addenda that were issued in writing by the Owner or Contract Administrator prior to the Bid Closing Time
.7 Instructions to Bidders (Document A) and Bid (Document B)
.8 Special Provisions listed in Document F

3.3 Bid documents:

.1 To obtain the Bid Documents they can be downloaded from the bid system (northhuron.bidsandtenders.ca). Documents can be previewed with a Preview Watermark prior to registering for the opportunity. Documents are not provided in any other manner.

.2 Only registered suppliers can submit.

.3 Bidders shall have a Bidding System Vendor account and be registered as a Plan Taker for this Bid opportunity, which will enable the Bidder to download the Bid Document, to receive Addenda email notifications and download all documents without the watermark "preview" on them.

.4 To ensure receipt of the latest information and updates via email regarding this bid, or if a Bidder has obtained this Bid Document from a third party, the onus is on the Bidder to create a Bidding System Vendor account and be registered as a Plan Taker for the bid opportunity.

3.4 In accordance with Section 3.3, Bid Documents must be obtained from the Bidding System. Bidders not meeting these criteria are subject to disqualification at the Owner's sole and absolute discretion.

3.5 Additional sets of the Bid Documents may be obtained by Bidders, at a cost, and subject to available printing time, by contacting the office which issued the original set of Bid Documents.

4 EXAMINATION OF THE PLACE OF THE WORK

4.1 The Bidder is fully responsible for obtaining all information required for the preparation of their Bid and, prior to submitting a Bid, the Bidder shall have visited and carefully examined the Place of the Work and the surrounding area in a reasonable and prudent manner and satisfied itself as to the scope and character of the Work and all conditions and information affecting the Work and how the Work is to be completed, including, without limitation, the nature and location of the Work, working areas, storage areas, local features including private property and utilities, access to and at the Place of the Work, weather conditions and any other factors which may influence the performance of the Work and/or the pricing of the Work.

4.2 In addition to the Bid Documents, the following reference documents (collectively, the "Reference Documents") shall also be obtained from the bidding system:

- Asbestos Management Plan, Wingham Standpipe Control Building, Wingham Ontario, R.J. Burnside & Associates Limited, December 2025.

- Designated Substances and Hazardous Materials Survey, Wingham Standpipe, Wingham Ontario, R.J. Burnside & Associates Limited, March 2023.

- Geotechnical Investigation, Proposed Standpipe Replacement, Township of North Huron, CMT Engineering Inc., August 2022.

- Report on Soil Investigation for Proposed Standpipe, Town of Wingham, B.M. Ross & Associates Limited, October 1973.

- Standpipe Structural Condition Assessment, Township of North Huron, R.J. Burnside & Associates Limited, September 2015.

- Wingham Inspection Report No. TT5-21, Township of North Huron, Landmark Tank & Tower Services, May 2005.

- Construction Drawings, Structural Details, Town of Wingham, The Canada Gunite Co. Ltd., May 1974.

- As Constructed Drawing M236-4, Plan and Profile John Street East Reconstruction, Town of Wingham, Maitland Engineering Services Ltd., January 1995.

- Plan of Survey of Part of Lot 4, Concession I, Town of Wingham, B.M. Ross OLS, October 1973.

The Reference Documents are provided for reference and information only and do not form part of the Bid Documents or Contract. The Owner and the Contract Administrator make no representation or warranty with respect to the accuracy or completeness of the Reference Documents and the Bidder is responsible for obtaining its own independent legal and technical advice with respect to the Reference Documents. Any comments in the Reference Documents on potential construction problems and possible methods are intended only for the guidance of the design engineer and are not to be relied upon by the Bidder. Therefore, the Bidders should make their own interpretations, and draw their own conclusions, on the information presented in the Reference Documents. Without limiting the generality of the foregoing, the Bidders will make their own assessments as to how the subsurface conditions may affect the Work, their proposed operations and pricing. The number of boreholes and/or test pits on which the Reference Documents are based may not be sufficient to determine all the factors that may affect construction methods, costs and performance of the Work. No claim for extras relating to work required to deal with conditions anticipated in the soils report will be entertained.

4.3 The Owner may arrange for test pit excavations and/or informational site visit(s) during the tender period in order to provide prospective Bidders with an opportunity to gather additional information regarding soil / groundwater

conditions and/or particular issues and concerns impacting upon the staging / completion of the Work. All Prospective Bidders are encouraged to avail themselves of this resource. The Contractor warrants that sufficient site information gathering has been undertaken and factored into the Bid, either through attendance at the site visit(s) arranged for by the Owner (if any), or through the Contractor's own investigations undertaken outside of the Owner-organised site visits.

Bidders may, at their own expense, excavate test pits or undertake other investigations to explore the existing conditions with prior written approval of the Owner and at the Owner's discretion.

5 PRE-BID MEETING

5.1 All Bidders are encouraged to attend a non-mandatory site visit at **10:00 am** local time on **Thursday, April 30, 2026,** at 199 John St E., Wingham ON.

6 DISCREPANCIES, OMISSIONS, AMBIGUITIES, COMMENTS, AND ADDENDA

6.1 The Bidder shall review information furnished to it by or on behalf of the Owner (including, without limitation, the Bid Documents) in a reasonable and prudent manner and satisfy itself that they (including, without limitation, the scope of the Work) are complete and clear.

6.2 Bidders finding discrepancies, omissions, errors, departures from good practice and ambiguities, or having other questions or comments in respect of the Bid Documents or any other information furnished to it by or on behalf of the Owner or having any doubt as the meaning of the Bid Documents or any other information furnished to it by or on behalf of the Owner (including, without limitation, any uncertainty as to the proper manner of completing the Bid) shall notify the Contract Administrator immediately in writing (but not later than the question deadline indicated on the bid system), via the 'submit a question' feature on the bid system.

6.3 The Owner reserves the right to distribute copies of any or all notices which it receives from the Bidders and the Owner's responses to such notices to all Bidders.

6.4 Prior to the Bid Closing Time, the Owner may change or add to any provision or part of the Bid Documents at any time or times (including, without limitation, appendices, supplemental information and other documents). Any changes or additions to the Bid Documents will be issued in writing by the Contract Administrator as a formal Addendum (collectively, the "Addenda" and individually, the "Addendum") through the bidding system. In the Addendum, the Owner may, having regard to the circumstances, extend the Bid Closing Time. The Owner and Contract Administrator will not be responsible for oral

explanations or instructions; any such oral explanations or instructions do not alter the Bid requirements or Bid Documents and should not be relied upon by the Bidders.

6.5 Bidders are responsible for ensuring that they have received all Addenda issued prior to the Bid Closing Time through contacting the bid issuing office for confirmation, or through other means.

6.6 Bidders shall acknowledge receipt of any addenda through the Bidding System by checking a box for each addendum and any applicable attachment. It is the responsibility of the Bidder to have received all Addenda that are issued. Bidders should check online prior to submitting their Bid and up until Bid closing time and date in the event additional addenda are issued.

6.7 If a Bidder submits their bid prior to the Bid closing time and date and an addendum is subsequently issued, the Bidding System shall WITHDRAW the Bid submission and the bid status will change to an INCOMPLETE STATUS and Withdraw the Bid. The Bidder can view this status change in the "MY BIDS" section of the Bidding System.

6.8 The Bidder is solely responsible to:

- Make any required adjustments to their Bid
- Acknowledge the addendum / addenda
- Ensure the re-submitted Bid is RECEIVED by the Bidding System no later than the stated bid closing time and date

7 SUBMISSION OF BIDS

7.1 In accordance with Section 7.5 of these Instructions to Bidders, Bidders shall submit their bid that should be clearly marked as **"Wingham Standpipe Replacement, Contract No. 300053193.0000"**, and with the name and address of the Bidder.

7.2 The bid for the Work (the "Bid") shall be comprised of the following:

.1 Bid Form
.2 The Security (as defined in Section 10.1.1 of these Instructions to Bidders)
.3 Agreement to Bond
.4 Appendix "A" – List of Bid Documents
.5 Appendix "B" – Subcontractors
.6 Appendix "C" – Schedule
.7 Appendix "D" – Residency
.8 Appendix "E" – Proposed Alternatives to the Work
.9 Appendix "F" – List of Experience
.10 Appendix "G" – Schedule of Unit Prices

the forms of all of which are set out in Document B – Bid. In addition, Appendices “A” to “G”, inclusive, are also described in Section 20 of these Instructions to Bidders.

7.3 Bidder initiated alternatives:

.1 Beyond the mandatory requirement to submit pricing for the Work as specified, the Bidders have the option of submitting proposed alternatives to the Work (“Proposed Alternatives to the Work”) which:

(i) present economical, environmental or technical benefits.

(ii) are consistent with the requirements set out in the Bid Documents (including, without limitation, the Drawings and Specifications).

(iii) still produce the desired end result.

.2 Bidders shall submit Proposed Alternatives to the Work as Appendix “E” – Proposed Alternatives to the Work. Without limiting the generality of the foregoing, the Proposed Alternatives to the Work shall include, without limitation, the following:

(i) a complete description with drawings, specifications and other information.

(ii) the reason for proposed substitution.

(iii) the differences between the specified work and the Proposed Alternatives to the Work and the necessary revisions to other work to accommodate the Proposed Alternatives to the Work.

(iv) the amount by which the Bid Price will be increased or decreased.

(v) such other necessary information to permit an accurate analysis of the Proposed Alternatives to the Work.

.3 The Bidders understand that:

(i) the Owner may accept any of the Proposed Alternatives to the Work and corresponding alternative prices in any order or combination, including all or none.

(ii) the price adjustments due to the Proposed Alternatives to the Work will not be taken into account during the Bid evaluation process.

(iii) Proposed Alternatives to the Work and the related price adjustments are open for acceptance by the Owner for the same period of time as the Bid.

(iv) the Work and the contract price in the Contract shall reflect the Proposed Alternatives to the Work and related price adjustment, if any, accepted by the Owner at the time of Acceptance (as defined in Section 13.2 of these Instructions to Bidders).

(v) acceptance of any Proposed Alternatives to the Work will not affect the date for Substantial Performance of the Work as set out in Document D.

(vi) acceptance of any Proposed Alternatives to the Work will not affect the list of Subcontractors set out in Appendix "B" – Subcontractors unless the Bidder specifically indicates a change to the list in the Proposed Alternatives to the Work and this change is accepted by the Owner.

7.4 All Bid submissions must be legible. Bidders shall be solely responsible for the delivery of their Bids in the manner and time prescribed in these Instructions to Bidders.

7.5 Electronic bid submissions only, shall be received by the Bidding System. Hardcopy submissions not permitted.

.1 Bids must be received before **2:00:00 pm** on **May 12, 2026** (the date and time shall be the "Bid Closing Time"). The closing time and date shall be determined by the Bidding System's web clock. The Owner may, in its sole and absolute discretion, extend the Bid Closing Time by issuing an Addendum.

.2 Bidders are cautioned that the timing of their Bid Submission is based on when the Bid is received by the Bidding System, not when a Bid is submitted, as Bid transmission can be delayed due to file transfer size, transmission speed, etc.

.3 For the above reasons, it is recommended that sufficient time is allotted to complete your Bid Submission and to resolve any issues that may arise.

.4 Bidders should contact **Bids and Tenders** support at least twenty-four (24) hours prior to the closing time and date, if they encounter any problems.

.5 Late Bids are not permitted by the Bidding System.

.6 To ensure receipt of the latest information and updates via email regarding this bid, or if a Bidder has obtained these Bid Documents from a third party, the onus is on the Bidder to create a Bidding System Vendor account and register as a Plan Taker for the bid opportunity.

.7 Bidders may edit or withdraw their Bid Submission prior to the closing time and date. However, the Bidder is solely responsible to ensure the re-submitted Bid is received by the Bidding System no later than the stated closing time and date.

7.6 Each Bid will be marked by the Owner with the time and date it was received. A Bid received after the Bid Closing Time will be disqualified and returned unopened.

A Bid received after the Bid Closing Time will be disqualified and returned unopened.

7.7 The Bid is irrevocable by the Bidder submitting same and shall remain in effect and open for acceptance by the Owner for a period of ninety (90) days after the Bid Closing Time. Without limiting the generality of any other provision in the Bid Documents, the Acceptance of the Bid may take place at any time during such period of irrevocability. Except as expressly set out in these Instructions to Bidders, once submitted, a Bid may not be amended but if the Bid was submitted prior to the Bid Closing Time, such Bid may be withdrawn and a new complete Bid submitted prior to the Bid Closing Time. Where more than one (1) Bid is submitted by a Bidder prior to the Bid Closing Time, the last Bid to be received shall be deemed to have revoked and superseded any prior Bid by the applicable Bidder. Any new Bids must be submitted in accordance with the requirements of these Instructions to Bidders.

7.8 All costs and expenses incurred by the Bidders in connection with the Bids (including, without limitation, costs and expenses arising from involvement in any pre-qualification process conducted by the Owner, the preparation and submittal of the Bids, any clarifications requested by the Owner and visits to the Place of the Work) shall be borne by the Bidders and the Owner is not liable to pay for such costs and expenses or to otherwise reimburse or compensate the Bidders in connection with the Bids, provided that in the event the Owner breaches its obligations under this request for Bids, if any, or the Owner breaches its duty of care arising from this request for Bids, if any, the Owner may be responsible for the reasonable costs incurred by the Bidder in preparing its Bid, subject in any event to the limits in Section 17.2.

8 BID FORM AND BID PRICE

8.1 Bidders shall submit their Bids using the Bid Form and appendices ("Appendices") described in Section 7.2 of these Instructions to Bidders. All sections of the Bid Form, including all applicable Appendices which are required by these Instructions to Bidders to be submitted by the Bidders, should be completed. Without limiting the generality of the foregoing, all blanks must be filled in and all entries for unit prices, lump sums, extensions and totals should be filled in, as appropriate. Bids not completed in full may, in the sole and absolute discretion of the Owner, be disqualified. Apart from the completion of any blanks, a Bidder may not make amendments to the pre-

printed wording of the forms comprising the Bid. Any such amendments made, whether on the face of such forms or contained elsewhere in the Bid may, in the sole and absolute discretion of the Owner, result in disqualification of the Bid.

8.2 The Bid Price shall include all applicable federal and provincial sales taxes, excise taxes, and other taxes, including the HST (referred to separately in Appendix "G"), customs and duties. The Bid Price shall be set out in the Bid Form.

8.3 The receipt of any and all Addenda modifying the Bid Documents must be acknowledged by the Bidder when completing Section 1.1 of the Bid Form.

9 BID SIGNING

9.1 The Bids shall be signed in accordance with the requirements of this Article 9. Note that the use of seals, while encouraged when available, is not mandatory.

.1 Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature.

.2 Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.

.3 Limited Company: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal.

.4 Joint Venture: Each and every party of the joint venture shall sign under their respective seals in a manner appropriate to such party as described above.

10 SECURITY AND AGREEMENT TO BOND

10.1 All Bidders shall include with each Bid:

.1 An executed Bid Bond issued by a surety authorized to transact the business of suretyship in Ontario, in the latest form approved by the CCDC which is valid for a period of ninety (90) days after the Bid Closing Time, or a certified cheque payable to the Owner, or approved alternate form of security (which the Owner has approved at least five (5) days prior to the Bid Closing Time), representing not less than ten percent (10%) of the amount of the Bid Price (the "Security").

.2 An executed Agreement to Bond issued by a surety authorized to transact the business of suretyship in Ontario, in the form attached as

Attachment “A”, or similar standard industry form generally in keeping with Attachment “A”, which is valid for a period of ninety (90) days after the Bid Closing Time indicating that the Bidder is able to obtain from such surety a Performance Bond and a Labour and Material Payment Bond each for 100% of the Total Bid Price as required and in the form specified by the Contract. The cost of such Performance Bond and Labour and Material Payment Bond shall be included in the Bid Price.

10.2 Without prejudice to any other remedy or right which may be available to the Owner, the Security shall be forfeited if the Bidder refuses or fails to sign the Contract within five (5) days of being presented by the Contract Administrator with the Contract for execution.

10.3 Subject to the other provisions of this request for Bids, the Security will be returned (without interest) after the Acceptance (as defined in Section 13.2 of these Instructions to Bidders) has been made and the successful Bidder has signed the Contract after having been presented with it by the Contract Administrator, or previous to such time, at the discretion of the Owner.

11 INSURANCE

11.1 In addition to the other obligations elsewhere in the Contract, the successful Bidder shall be required to comply with the insurance requirements set out in Document D.

12 OWNERSHIP

12.1 All material and information delivered to the Owner by the Bidders in connection with or in relation to the Bids, including, without limitation, the Bids (collectively, the “Bid Materials”) shall be the sole and absolute property of the Owner.

13 BID OPENING

13.1 Bids will be opened by the Owner in private.

13.2 The acceptance (“Acceptance”) of the Bid from the successful Bidder shall be made by the Owner only in writing. The Contract Administrator may, on behalf of the Owner, issue a written notice to the successful Bidder notifying them that Acceptance has occurred and their Bid has been accepted by the Owner.

13.3 The selected Bidder will be required to execute and return three (3) copies of the Contract within five (5) days of being presented by the Contract Administrator with the Contract for execution, while recognizing that upon Acceptance, the Contract will be formed and binding on the Owner and the Bidder. The Contract between the selected Bidder and the Owner shall be composed of the documents referred to in Section 3.2 of these Instructions to

Bidders, as amended from time to time. Upon execution by Contractor and Owner copies will be distributed to all parties.

14 CLARIFICATION OF BIDS

14.1 The Owner reserves the right, at any time or times, following the Bid Closing Time, to request that any one or more Bidders clarify its Bid and such Bidders shall submit responses to such request within two (2) days following the date of the receipt of such request, or within such other time as the Owner may require. Without limiting the generality of the foregoing, the Owner may request clarification where any one or more Bidder's intent is unclear (including, without limitation, where there is an irregularity or omission in the information or documents provided by the Bidder in their Bid). The Owner may, in its sole and absolute discretion, choose to meet with one, some or all of the Bidders to clarify aspects of their Bids. The Owner may require Bidders to submit supplementary documents clarifying any matters contained in their Bids or the Owner may prepare a written interpretation of any aspect of a Bid (including, without limitation, meeting minutes) and seek the respective Bidder's acknowledgement of that interpretation.

14.2 The supplementary documents submitted by the Bidders which have been accepted by the Owner and the written interpretations prepared by the Owner which have been acknowledged by the relevant Bidders shall be considered to form part of the applicable Bids of those Bidders.

14.3 After the Bid Closing Time, only the supplementary documents submitted by the Bidders based on specific requests by the Owner for purposes of clarification which have been accepted by the Owner and written interpretations prepared by the Owner which have been acknowledged by the relevant Bidder shall be considered as additions to the Bid of the applicable Bidder, subject to the right of the Owner to correct or recalculate contained in Section 15.2 or the exercise of any other right or remedy available to the Owner.

14.4 The Owner is not obliged to seek clarification of any aspect of a Bid or to have discussions or other communication regarding clarifications with any Bidder.

15 SELECTION PROCESS AND RESERVED RIGHTS

15.1 The Owner's consideration and selection process will be based on which Bidder has provided a Bid which the Owner determines in its sole and absolute discretion to be the most beneficial to, and in the best interests of, the Owner. While price is an important factor in the consideration and selection process, the Owner may, in its sole and absolute discretion, consider many other factors during this process including, without limitation, the following, which are not listed in any particular order of importance or priority:

.1 The contents of the Bid Form and Appendices "A" through "G"

.2 The Owner's Purchasing By-law and/or procurement policies and procedures, if any

.3 Any other factor which the Owner determines in its sole and absolute discretion to be in the Owner's best interests

15.2 The following shall apply with respect to this request for Bids and the selection of a successful Bidder for the Contract:

.1 The Owner reserves the right to, as the interests of the Owner may require, reject or retain for consideration and acceptance any or all Bids or part or parts thereof and waive informalities or irregularities without liability on the part of the Owner or the Contract Administrator.

.2 The lowest Bid Price or any Bid will not be necessarily accepted.

.3 The Owner may defer or cancel the project or this request for Bids for any reason (including, without limitation, the costs exceed the Owner's budget or approvals or permissions required from external agencies or authorities are not obtained or may not be obtained in accordance with the Owner's scheduling requirements).

.4 In the event that a Bid contains an arithmetical error or inconsistency, the Owner reserves the right, in its sole and absolute discretion, to correct or recalculate the error, and to accept the Bid with the adjusted price. Without limiting the generality of the foregoing, any unit prices submitted by the Bidder will be deemed to represent the Bidder's intention and any amount calculated by multiplying estimated quantities by unit prices will be corrected accordingly.

.5 Bids that, without limitation, are improperly prepared, not in compliance with all of the requirements of the Bid Documents, incomplete, unsigned, improperly signed, conditional, qualified, illegible, unbalanced, obscure or contain reservations, additions not called for, arithmetical errors, omissions, erasures, alterations, or irregularities of any kind may, in the Owner's sole and absolute discretion, be considered informal or irregular and may be rejected or disqualified or be retained by the Owner for consideration and acceptance.

15.3 In addition to any other right or remedy the Owner may have in connection with the Bid Documents, if one or more of the Bid Prices is in excess of the Owner's budget, the Owner may, in its sole and absolute discretion:

.1 Enter into negotiations or discussions with one or more of the Bidders (even if such Bidder's Bid Price is not in excess of the Owner's budget) in connection with the Bid Documents (including, without limitation, the scope of Work, the amount of the Bid Price, the schedule to complete the Work and the Contract provisions) or clarify any outstanding issues and attempt to finalize the terms of the Contract. The negotiations and

discussions may take place contemporaneously or consecutively and the Owner will have no obligation to enter into negotiations or have discussions on similar or other terms or offer any modified terms to any Bidder. If the negotiations or discussions are successful, the Owner and the selected Bidder will enter into the finalized form of Contract; or

.2 If at any time the Owner forms the opinion that a mutually acceptable Contract is not likely to be reached within a reasonable time, give the Bidder(s) written notice to terminate the negotiations and discussions, in which event the Owner may then open discussions with another Bidder(s), terminate the Request for Bids or otherwise act pursuant to its rights and remedies in connection with the Bid Documents.

Notwithstanding any negotiations or discussions between the Owner and the Bidders pursuant to this provision, the Bids shall remain irrevocable in accordance with the Bid Documents.

15.4 The Owner may exercise any one or more of its rights and remedies in relation to this request for Bids (including, without limitation, the rejection of Bids) without explanation to the Bidders.

16 BONDS

16.1 The successful Contractor will be required to provide a Performance Bond and a Labour and Material Payment Bond, each in the amount indicated in Section 10.1.2 of this document, to the Owner with the executed Contract, pursuant to the terms and conditions thereof.

17 ACCEPTANCE OF CONDITIONS

17.1 By submitting a Bid to the Owner, Bidders acknowledge that they have read and agree to be bound by the Bid Documents.

17.2 The Bidder shall have no claim against, or entitlement to damages against, the Owner, the Contract Administrator or its advisors in connection with this request for Bids or otherwise in connection with this process (including, without limitation, claims or damages arising from (i) rejection of its Bid, (ii) cancellation of the Project, (iii) a breach, fundamental or otherwise, of the obligations under this request for Bids, if any, or (iv) breach of a duty of care arising from this request for Bids, if any) for an amount in excess of the reasonable costs incurred by the Bidder in preparing its Bid, and, in any event, the Bidder, by submitting a Bid, waives any claim for loss of profits if no Contract is entered into with the Bidder for any reason or under any circumstance whatsoever.

18 OWNER'S MATERIALS AND DISCLOSURE OF INFORMATION

18.1 All materials, drawings, specifications, information and documents obtained by, given to or made available to, the Bidder in connection with this request for Bids (including, without limitation, the Reference Documents and Bid Documents) (collectively, the "Owner's Materials") are not the property of the Bidders. The Owner's Materials shall not be used for any purpose other than replying to this request for Bids and the fulfillment of any subsequent Contract. The issue of the Owner's Materials does not confer a license or grant for any other purpose.

18.2 Upon request of the Owner, all of the Owner's Materials, in any form or media, shall be immediately returned to the Owner. The Owner and the Contract Administrator make no representation or warranty with respect to, and the Owner and the Contract Administrator accept no responsibility for, the accuracy or completeness of the Owner's Materials and the Bidder is responsible for obtaining its own independent legal and technical advice with respect to the Owner's Materials and making its own independent research and inquiries regarding all information contained in the Owner's Materials.

18.3 Bidders shall not discuss, disclose or communicate, directly or indirectly, any details pertaining to or in connection with their Bid to anyone not specifically involved in their Bid (including, without limitation, any other Bidder) without the prior written approval of the Owner. Without limiting the generality of the foregoing, each Bid shall be submitted without any connection, knowledge, comparison of figures or arrangement with any other Bidder and each Bidder will be responsible to ensure that its participation in this process is conducted fairly and without collusion or fraud.

18.4 Each Bidder and each shareholder, partner or joint venture member of the Bidder will not have any interest whatsoever in the Bid of any other Bidder, either directly or indirectly, nor will it enter into any arrangement, agreement or understanding before the Bid Closing Time that would have such a result nor will it have any other conflict of interest.

18.5 Bidders must not disclose any details pertaining to their Bid and the selection process, or the outcome thereof, in whole or in part to anyone not specifically involved in their Bid, without the prior written approval of the Owner. Without limiting the generality of the foregoing, Bidders shall not issue a news release or other public announcement or otherwise disclose any information pertaining to any details of their Bid, or the outcome thereof, or the selection process, in whole or in part, without the prior written approval of the Owner.

19 GOVERNING LAW

19.1 The Bid Documents shall be governed by the laws of Ontario and the federal laws of Canada applicable therein.

20 APPENDICES TO THE BID FORM

20.1 Appendix "A" to the Bid Form – List of Bid Documents

20.1.1 Appendix "A" to the Bid Form lists the Bid Documents.

20.2 Appendix "B" to Bid Form – Subcontractors

20.2.1 The Bidder shall complete Appendix "B" to the Bid Form indicating the subcontractors ("Subcontractors") it intends to employ to carry out each portion of the Work indicated therein. Subcontractors are subject to approval by the Owner. Once the Contract is signed by the Owner, no substitution of the Subcontractors approved by the Owner will be permitted unless approved by the Owner.

20.3 Appendix "C" to the Bid Form – Schedule

20.3.1 The Work shall be carried out in accordance with the schedule contained in Document D for the Bid Price.

20.3.2 The Bidders have the option of providing on Appendix "C" to the Bid Form which is an alternative schedule for the Work and the applicable amount by which the Bid Price will be adjusted. The Owner may, in its sole and absolute discretion, accept such alternative schedule for the Work and, in such event, the Bidder's obligation to carry out the Work in accordance with the schedule contained in Document D and the Bid Price shall be both amended accordingly.

20.4 Appendix "D" to the Bid Form – Residency

20.4.1 The Bidders shall indicate in Appendix "D" to the Bid Form their applicable residency.

20.5 Appendix "E" to the Bid Form – Proposed Alternatives to the Work (if any)

20.5.1 The Bidder's Proposed Alternatives to the Work, if any, shall be attached as Appendix "E" to the Bid Form.

20.6 Appendix "F" to the Bid Form – List of Experience

20.6.1 The Bidders shall indicate in Appendix "F" to the Bid Form their list of experience on projects of a similar nature completed within the last five years.

20.7 Appendix "G" to the Bid Form – Schedule of Unit Prices

20.7.1 The Bidders shall complete Appendix "G" - Schedule of Unit Prices as per the requirements listed in the Appendix "G" - "General Notes".

ATTACHMENT "A" FORM OF AGREEMENT TO BOND (EXAMPLE)

AGREEMENT TO BOND

TO: The Corporation of the Township of North Huron ("OWNER")

NAME OF BIDDER: _____

RE: Wingham Standpipe Replacement, Contract No. 300053193.0000

We, the undersigned, hereby agree to become bound as surety for the above-named Bidder, in a Performance Bond and a Labour and Material Payment Bond, each in the amount of 100% of the Bid Price and in a form conforming to the Bid Documents for the full and due performance of the Work shown and described therein, if the Bid attached hereto is accepted by the Owner.

IN WITNESS WHEREOF we have hereunto set out our corporate seal testified by the hands of our proper officers in that behalf.

Dated this _____ day of _____ 20___.

Name of Surety	
Surety's Address	

Witness: _____ Signed by: _____

Signature: _____ Signature: _____

Address: _____ Title: _____

Signed by: _____

Signature: _____

Title: _____

BURNSIDE

Document B

Bid

BID FORM

TO: The Corporation of the Township of North Huron
Township of North Huron Municipal Office
274, Josephine Street, PO Box 90
Wingham ON N0G 2W0

Attention: Director of Public Works

DATE: _____
Date

SUBMITTED BY: _____
"[Insert Bidder's Legal Name]"

ADDRESS: _____
"[Insert Bidder's Business Address]"

PROJECT NAME: Wingham Standpipe Replacement

CONTRACT NO.: 300053193.0000

1.1 The undersigned (the "Bidder"), hereby declares that it has received and carefully examined all of the Bid Documents as set out in Section 3.1 of the Instructions to Bidders and has visited the Place of the Work and familiarized itself with all of the conditions affecting the Work as described in the Bid Documents with respect to Work and with all of the provisions of the Bid Documents including, without limitation, the form of the Contract. Without limiting the foregoing, the undersigned also acknowledges having received and carefully examined all of the following Addenda and having included all aspects thereof in their bid:

Addendum No.	Date	Included in Bid (✓)

(Notes: If no Addenda are issued then this table shall be left blank. It is not necessary to submit copies of each Addendum with the Bid.)

1.2 In accordance with, and subject to, the Contract (including, without limitation, GC 8.01.02), the Bidder hereby offers to perform and complete the Work (including, without limitation, furnishing all products, materials, construction machinery, tools, equipment, plant, labour, and supervision necessary for the proper completion of the Work and the performance bond, labour and material payment bond, permits, insurance and transportation) to attain Substantial Performance of the Work in accordance with the schedule contained in Document D of the Bid Documents, for the price bid ("Bid Price") of: the total of the amounts calculated by multiplying the actual measured and approved quantities by the applicable unit prices combined with the completed lump sum price components of the Work and formally approved provisional and/or contingency items (if any), all as set out in Appendix "G", as adjusted pursuant to the Contract.

The Bid Price includes, without limitation, all applicable federal and provincial sales taxes, excise taxes and other taxes, including the HST, customs and duties.

In addition, the Bidder shall confirm that the Bid Price / Estimated Contract Price is set out in Appendix "G".

1.3 The Bidder agrees that time is of the essence and, if this Bid is accepted by the Owner and the Contract Administrator has issued an Order to Commence Work, the Bidder shall immediately commence the Work, including mobilization and submission of initial shop drawings.

1.4 The Bidder declares that it has visited and carefully examined the Place of the Work and the surrounding area in a reasonable and prudent manner and satisfied itself as to the scope and character of the Work and all conditions and information affecting the Work and how the Work is to be completed, including, without limitation, the nature and location of the Work, working areas, storage areas, local features including private property and utilities, access to and at the Place of the Work, weather conditions and any other factors which may influence the performance of the Work and/or the pricing of the Work.

1.5 The Bidder is responsible for each Subcontractor's solvency, the contents of each Subcontractor's bid and for each Subcontractor's obligations as contemplated pursuant to the Bid Documents.

1.6 The Bidder represents and warrants that each of the Subcontractors set out in Appendix "B" is reliable and competent to carry out the Work in accordance with the Bid Documents, that the Bidder has consulted with each of the listed Subcontractors and has ascertained to the Bidder's complete satisfaction that they are fully acquainted with the extent and nature of the work involved, and of the requirements of the construction schedule, and that all such Subcontractors shall execute the Work to conform to the requirements of the Bid Documents and the construction schedule. If awarded the Contract, the

Bidder shall only employ the Subcontractors set out in Appendix "B", as approved by the Owner, for the Work.

1.7 This Bid shall remain firm and irrevocable and open for acceptance by the Owner at any time for sixty (60) days after the Bid Closing Time, whether or not, any other Bid has been previously accepted by the Owner. This Bid shall expire upon written notice of rejection to the Bidder by the Owner or sixty (60) days after the Bid Closing Time, whichever first occurs.

1.8 We enclose herewith the Security, on the understanding that, without prejudice to any other right or remedy which may be available to the Owner, the Security may be used to compensate the Owner for any damages, costs or expenses that the Owner may incur as a result of the Bidder's failure to comply with, or breach of, the Bid or Bid process described in these Instructions to Bidders (including, without limitation, in the event that the Bidder attempts to withdraw its Bid prior to the expiry of sixty (60) days from the Bid Closing Time, or in the event that the Owner accepts the Bidder's Bid and the Bidder refuses or fails to sign the Contract or otherwise honour the Bid).

1.9 It is understood that all prices quoted in this Bid are in Canadian funds.

1.10 If notified in writing by the Owner (or Owner's agent) of acceptance of this Bid within sixty (60) days of the Bid Closing Time, we will execute the Contract within five (5) days of being presented by the Contract Administrator with the Contract for execution, while recognizing that upon the Acceptance the Contract will be formed and binding on the Owner and the Bidder, and furnish a Performance Bond and a Labour and Material Payment Bond as specified in Section 16 of the Instructions to Bidders.

Without prejudice to any other right or remedy which may be available to the Owner, in the event that we do not execute the Contract within five (5) days of being presented by the Contract Administrator with the Contract for execution, the Owner may, in its discretion, accept any other Bid, request new bids or carry out the Work in any other way the Owner deems best, and the Security may be used to compensate the Owner for any damages, costs or expenses that the Owner may incur as a result of taking such action.

1.11 The following documentation comprising the Bid is enclosed:

.1 This Bid Form

.2 The Security (as defined in Section 10.1.1 of the Instructions to Bidders)

.3 The Agreement to Bond

.4 Appendix "A" – List of Bid Documents

.5 Appendix "B" – Subcontractors

.6 Appendix “C” – Schedule

.7 Appendix “D” – Residency

.8 Appendix “E” – Proposed Alternatives to the Work

.9 Appendix “F” – List of Experience

.10 Appendix “G” – Schedule of Unit Prices

1.12 If this Bid is made by more than one person then each of the persons making this Bid agrees to be bound by it jointly and severally.

1.13 All capitalized terms used but not defined herein will have the definitions given to them in Document A – Instructions to Bidders.

1.14 The Bidder represents, warrants and covenants to the Owner that:

.1 All instructions and directions in the Bid Documents for the preparation and submission of this Bid have been complied with.

.2 This Bid is made without any connection, knowledge, comparison of figures or arrangement with any other person, corporation or other entity making another Bid for the Work and is, in all respects, fair and without collusion or fraud.

.3 No member of the municipal council of the Owner (as applicable) and no officer or employee of the Owner is, or will become interested directly or indirectly as a contracting party, partner, shareholder, surety or otherwise, in the performance of the Contract, or in the supply of materials or services, work or business to which it relates, or in any portion of the profits thereof, or in any of the monies to be derived therefrom.

.4 The Bidder agrees to be bound by the Bid Documents.

1.15 The Bidder declares and warrants that, in addition to all other Health & Safety requirements, it has considered and incorporated appropriate COVID-19 protocols and procedures into its Workplan, in keeping with current provincial best practices / guidelines for construction sites, and that submitted pricing properly reflects these measures. Upon Award, the successful bidder will be required to submit their COVID-19 plan to the Owner for record purposes.

SIGNED BY THE BIDDER AS OF THE DATE FIRST WRITTEN ABOVE.

FULL LEGAL COMPANY NAME

ADDRESS OF COMPANY

NAME/TITLE OF OFFICER

SIGNATURE OF OFFICER
AND COMPANY SEAL

TELEPHONE NUMBER

EMAIL ADDRESS

APPENDIX "A"

LIST OF BID DOCUMENTS

The Bid Documents consist of:

(i) Document A – Instructions to Bidders;
(ii) Document B – Bid;
(iii) Document C – General Conditions of Contract and Supplemental General Conditions;
(iv) Document D – General Requirements;
(v) Document E – Drawings and Specifications;
(vi) Document F – Special Provisions;
(vii) Document G – Articles of Agreement;
(viii) all Addenda (as defined in Section 6.4 of these Instructions to Bidders) that were issued in writing by the Owner or Contract Administrator prior to the Bid Closing Time.

APPENDIX "B"

SUBCONTRACTORS

The following is a listing of Subcontractors who we propose to use.

Division or Trade	Subcontractor	Approximate Value of Subcontract Work

APPENDIX "C"

SCHEDULE

.1 In accordance with, and subject to, the Contract, the Bidder shall carry out the Work in accordance with the Completion Date contained in Document D, Subsection D.1.1 for the unit prices and lump sum prices set out in Appendix "G".

.2 The Bidder submits the following alternative schedule for the Work and the applicable amount by which the unit prices and lump sum prices set out in Appendix "G" will be adjusted, for the Owner's consideration. If the Owner, in its sole and absolute discretion, accepts such alternative schedule for the Work, the Bidder's obligation to carry out the Work in accordance with the schedule contained in Document D and the unit prices and lump sum prices set out in Appendix "G" shall be both amended accordingly.

(a) Alternative Schedule for the Work

(b) Adjustment in the unit prices and lump sum prices set out in Appendix "G" (inclusive of all amounts including, without limitation, HST)

(Note: If the Bidder is not submitting an alternative schedule for the Work, then paragraphs (a) and (b) may be left blank.)

APPENDIX "D"

RESIDENCY

The Bidder **__is** *or* **__is not** a resident of Canada within the meaning of the Income Tax Act (Canada). Please check applicable description.

APPENDIX "E"

PROPOSED ALTERNATIVES TO THE WORK (IF ANY)

[See Section 7.3 of the Instructions to Bidders.]

APPENDIX "F"

LIST OF EXPERIENCE*

*(*use this form or provide information on a separate form)*

Location	Owner's Consultant	Contact Name and Information	Description of Contract	Completion Date	$ Value

APPENDIX "G"
SCHEDULE OF UNIT PRICES

General Notes

i) Where alternative materials are listed, Bidders shall indicate a Unit Price for each alternative but shall extend only the lowest Unit Price.

ii)

cu.m (m^3)	denotes	Cubic Metre (compacted or in situ)
m	denotes	Linear Metre
LS	denotes	Lump Sum
ea	denotes	Each
sq.m (m^2)	denotes	Square Metre
t	denotes	Tonne (2,204.6 lbs.)
ha	denotes	Hectare
hrs	denotes	Hours

iii) [All sections of the Schedule of Unit Prices must be completed **in full** and submitted as part of the Bid].

SCHEDULE OF UNIT PRICES

R. J. Burnside & Associates Limited

Project No. 300053193.0000

Contractor: ***

Address: ***

Contract Title: Wingham Standpipe Replacement

SCHEDULE A - Miscellaneous Items

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CONTRACT TOTAL
A1	Mobilization and Demobilization	1.00	LS		
A2	Bonding and Insurance	1.00	LS		
A3	Cash Allowances:				
a)	Utilities Allowance	1.00	LS	$15,000.00	$15,000.00
b)	Soils and Concrete Testing Allowance	1.00	LS	$15,000.00	$15,000.00
c)	Building Permit Allowance	1.00	LS	$3,000.00	$3,000.00
A4	Submittals:				
a)	Site Specific Health and Safety Plan	1.00	LS		
b)	Environmental Protection Plan	1.00	LS		
c)	Pre-Construction Survey	1.00	LS		
d)	Engineered Demolition Plan	1.00	LS		
e)	Shop Drawings	1.00	LS		
f)	As-Built Drawings	1.00	LS		
g)	Operating and Maintenance Data Manuals	1.00	LS		
A5	Traffic Control and Signage	1.00	LS		
A6	Environmental Mitigation incl. Erosion, Sediment and Dust Control, Mud Containment and Road Cleaning	1.00	LS		
A7	Construction Project Identification Sign	1.00	LS		
				SUBTOTAL:	

SCHEDULE OF UNIT PRICES

R. J. Burnside & Associates Limited

Contractor: ***

Address: ***

Contract Title: Wingham Standpipe Replacement

SCHEDULE B - Standpipe Replacement

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CONTRACT TOTAL
B1	Removals and Demolition	1.00	LS		
B2	Site Preparation incl. Clearing, Grubbing, Topsoil Stripping and Stockpiling	1.00	LS		
B3	Earthworks, Excavation, Backfill, Removal and Disposal of Excess Materials	1.00	LS		
B4	Yard Piping:				
a)	300 mm dia. PVC Inlet and Outlet Piping incl. Restrained Flexible Couplings	1.00	LS		
b)	300 mm dia. Gate Valves and Boxes	1.00	LS		
B5	Overflow Sewer Incl. Catch Basin. Precast Concrete Chamber and PVC Piping	1.00	LS		
B6	Glass Fused to Steel Standpipe:				
a)	Stainless Steel Process Piping	1.00	LS		
b)	Reinforced Concrete Foundation c/w Piles (to be Designed by the Tank Supplier)	1.00	LS		
c)	Standpipe incl. Roof Dome, Ladder, Platform, Safety Railings, and Lightning Protection				
d)	Obstruction Lighting System	1.00	LS		
e)	Submersible Tank Mixing System	1.00	LS		
f)	Roof Insulation	1.00	LS		
g)	Exterior Insulation and Steel Cladding	1.00	LS		
h)	Tank Logo Sign	1.00	LS		
i)	Overflow Piping and Duckbill Check Valve	1.00	LS		
j)	Electrical and Instrumentation	1.00	LS		
k)	System Integration	1.00	LS		
B7	1.8 m High Chain-Link Fencing and 6.0 m Wide Double Swing Gate	1.00	LS		
B8	Site Reinstatement incl. Topsoil and Terra-Seeding all Areas Disturbed by Construction	1.00	LS		
				SUBTOTAL:	

SCHEDULE OF UNIT PRICES

R. J. Burnside & Associates Limited

Project No. 300053193.0000

Contractor: ***

Address: ***

Contract Title: Wingham Standpipe Replacement

SCHEDULE C - Contingency Items

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CONTRACT TOTAL
C1	Remove and Dispose of Unsuitable Material Below Design Grade	25.00	cu.m		
C2	Supply, Place and Compact Where Required:				
a)	Granular "A"	10.00	t		
b)	Granular "B" Type II	10.00	t		
c)	Unshrinkable Fill	5.00	cu.m		
C3	50 mm Rigid Board HI Insulation	25.00	sq.m		
C4	Sodding	25.00	sq.m		
C5	Contingency Allowance	1.00	LS	$500,000.00	$500,000.00
				SUBTOTAL:	

SCHEDULE OF UNIT PRICES SUMMARY

Schedule	Amount
A – Miscellaneous Items	$
B – Standpipe Replacement	$
C – Contingency Items	$
SUB-TOTAL Bid Price/Estimated Contract Price	$
HST (@ 13%)	$
TOTAL Bid Price/Estimated Contract Price	$

All amounts in this Appendix “G” are in Canadian dollars.

The estimated quantities set out in this Appendix “G” are only approximate and the actual measured and approved quantities may vary from such estimated quantities.

The lump sum amounts and unit prices set out in this Appendix “G” shall apply to the Contract and are inclusive of all costs and expenses required to perform and complete the Work including, without limitation, all applicable federal and provincial sales taxes, excise taxes and other taxes, insurance, permits, customs, duties and transportation, except for the HST (referred to separately in this Appendix “G”).



Document C

General Conditions of Contract

Index to Document C – General Conditions of Contract

C.1 OPSS.MUNI 100 (Nov. 2024) GENERAL CONDITIONS OF CONTRACT 1
C.2 SUPPLEMENTAL GENERAL CONDITIONS 2

C.1 OPSS.MUNI 100 (NOV. 2024) GENERAL CONDITIONS OF CONTRACT

Subject to the requirements found elsewhere in this contract, the Work for this Contract shall be performed in accordance with the latest revision of the Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD). These Standard Specifications and Standard Drawings, where applicable, shall form part of this Contract.

It is the Contractor's responsibility to obtain up-to-date copies of OPS Specifications and Drawings.

OPSS MUNI GENERAL CONDITIONS OF CONTRACT

TABLE OF CONTENTS

SECTION GC 1.0 - INTERPRETATION

GC 1.01 Captions 7
GC 1.02 Abbreviations 7
GC 1.03 Gender and Singular References 7
GC 1.04 Definitions 8
GC 1.05 Ontario Traffic Manual 13
GC 1.06 Final Acceptance 13
GC 1.07 Interpretation of Certain Words 13

SECTION GC 2.0 - CONTRACT DOCUMENTS

GC 2.01 Reliance on Contract Documents 14
GC 2.02 Order of Precedence 14

SECTION GC 3.0 - ADMINISTRATION OF THE CONTRACT

GC 3.01 Contract Administrator's Authority 16
GC 3.02 Working Drawings 17
GC 3.03 Right of the Contract Administrator to Modify Methods and Equipment 18
GC 3.04 Emergency Situations 18
GC 3.05 Layout Information 18
GC 3.06 Extension of Contract Time 18
GC 3.07 Delays 19
GC 3.08 Assignment of Contract 20
GC 3.09 Subcontracting by the Contractor 20
GC 3.10 Changes 20
GC 3.10.01 Changes in the Work 20
GC 3.10.02 Extra Work 21
GC 3.10.03 Additional Work 21
GC 3.11 Notices 21
GC 3.12 Use and Occupancy of the Work Prior to Substantial Performance 22
GC 3.13 Claims, Negotiations, Mediation 22
GC 3.13.01 Continuance of the Work 22
GC 3.13.02 Record Keeping 22
GC 3.13.03 Claims Procedure 22
GC 3.13.04 Negotiations 23
GC 3.13.05 Mediation 23
GC 3.13.06 Payment 23
GC 3.13.07 Rights of Both Parties 24

GC 3.14 Arbitration 24
GC 3.14.01 Conditions for Arbitration 24
GC 3.14.02 Arbitration Procedure 24
GC 3.14.03 Appointment of Arbitrator 24
GC 3.14.04 Costs 25
GC 3.14.05 The Decision 25
GC 3.15 Archaeological Finds 25

SECTION GC 4.0 - OWNER'S RESPONSIBILITIES AND RIGHTS

GC 4.01 Working Area 26
GC 4.02 Approvals and Permits 26
GC 4.03 Management and Disposition of Materials 26
GC 4.04 Construction Affecting Railway Property 27
GC 4.05 Default by the Contractor 27
GC 4.06 Contractor’s Right to Correct a Default 27
GC 4.07 Owner’s Right to Correct a Default 28
GC 4.08 Termination of Contractor’s Right to Continue the Work 28
GC 4.09 Final Payment to Contractor 29
GC 4.10 Termination of the Contract 29
GC 4.11 Continuation of Contractor’s Obligations 29
GC 4.12 Use of Performance Bond 29
GC 4.13 Payment Adjustment 29

SECTION GC 5.0 - MATERIAL

GC 5.01 Supply of Material 30
GC 5.02 Quality of Material 30
GC 5.03 Rejected Material 30
GC 5.04 Substitutions 31
GC 5.05 Owner Supplied Material 31
GC 5.05.01 Ordering of Excess Material 31
GC 5.05.02 Care of Material 31

SECTION GC 6.0 - INSURANCE, PROTECTION AND DAMAGE

GC 6.01 Protection of Work, Persons, and Property 33
GC 6.02 Indemnification 33
GC 6.03 Contractor's Insurance 34
GC 6.03.01 General 34
GC 6.03.02 Commercial General Liability Insurance 34
GC 6.03.03 Automobile Liability Insurance 35
GC 6.03.04 Aircraft and Watercraft Liability Insurance 35
GC 6.03.04.01 Aircraft Liability Insurance 35
GC 6.03.04.02 Watercraft Liability Insurance 35
GC 6.03.05 Property and Boiler Insurance 35
GC 6.03.05.01 Property Insurance 35
GC 6.03.05.02 Boiler Insurance 35
GC 6.03.05.03 Use and Occupancy of the Work Prior to Completion 36
GC 6.03.05.04 Payment for Loss or Damage 36

GC 6.03.06 Contractor's Equipment Insurance 36
GC 6.03.07 Insurance Requirements and Duration 37
GC 6.04 Bonding 37
GC 6.05 Workplace Safety and Insurance Board 37

SECTION GC 7.0 - CONTRACTOR'S RESPONSIBILITIES AND CONTROL OF THE WORK

GC 7.01 General 38
GC 7.01.01 Site Visit 38
GC 7.01.02 Commencement of Work 38
GC 7.01.03 Control and Responsibility 38
GC 7.01.04 Compliance with the Occupational Health and safety Act 38
GC 7.01.05 Contractor's Representatives 39
GC 7.01.06 Assistance to the Contract Administrator 40
GC 7.01.07 Schedule 40
GC 7.01.08 Errors and Inconsistencies as Relating to the Contract 40
GC 7.01.09 Utilities 40
GC 7.02 Monuments and Layout 41
GC 7.03 Working Area 42
GC 7.04 Damage by Vehicles or Other Equipment 42
GC 7.05 Excess Loading of Motor Vehicles 42
GC 7.06 Maintaining Roadways and Detours 42
GC 7.07 Access to Properties Adjoining the Work and Interruption of Utility Services 43
GC 7.08 Approvals and Permits 44
GC 7.09 Suspension of Work 44
GC 7.10 Contractor's Right to Stop the Work or Terminate the Contract 44
GC 7.11 Notices by the Contractor 45
GC 7.12 Environmental Incident Management 45
GC 7.13 Obstructions 46
GC 7.14 Limitations of Operations 46
GC 7.15 Cleaning Up Before Acceptance 46
GC 7.16 Warranty 46
GC 7.17 Contractor's Workers 47
GC 7.18 Drainage 47

SECTION GC 8.0 - MEASUREMENT AND PAYMENT

GC 8.01 Measurement 48
GC 8.01.01 Quantities 48
GC 8.01.02 Variations in Tender Quantities 48
GC 8.02 Payment 49
GC 8.02.01 Non-Resident Contractor 49
GC 8.02.02 Price for Work 49
GC 8.02.03 Advance Payments for Material 49
GC 8.02.04 Certification and Payment 50
GC 8.02.04.01 Progress Payment 50
GC 8.02.04.02 Certification of Subcontract Completion 50
GC 8.02.04.03 Subcontract Statutory Holdback Release Certificate and Payment 51
GC 8.02.04.04 Certification of Substantial Performance 51

GC 8.02.04.05	Substantial Performance Payment and Substantial Performance Statutory Holdback Release Payment Certificates	52
GC 8.02.04.06	Certification of Completion	52
GC 8.02.04.07	Completion Payment and Completion Statutory Holdback Release Payment Certificates	52
GC 8.02.04.08	Interest	53
GC 8.02.04.09	Interest for Late Payment	53
GC 8.02.04.10	Interest for Negotiations and Claims	53
GC 8.02.04.11	Owner's Set-Off	54
GC 8.02.04.12	Delay in Payment	54
GC 8.02.05	Payment on a Time and Material Basis	54
GC 8.02.05.01	Definitions	54
GC 8.02.05.02	Daily Work Records	55
GC 8.02.05.03	Payment for Work	55
GC 8.02.05.04	Payment for Labour	55
GC 8.02.05.05	Payment for Material	56
GC 8.02.05.06	Payment for Equipment	56
GC 8.02.05.06.01	Working Time	56
GC 8.02.05.06.02	Standby Time	56
GC 8.02.05.07	Payment for Hand Tools	57
GC 8.02.05.08	Payment for Work by Subcontractors	57
GC 8.02.05.09	Submission of Invoices	57
GC 8.02.05.10	Payment Other Than on a Time and Material Basis	57
GC 8.02.05.11	Payment Inclusions	58
GC 8.02.06	Final Acceptance Certificate	58
GC 8.02.07	Records	58
GC 8.02.08	Taxes	58
GC 8.02.09	Liquidated Damages	59

SECTION GC 1.0 - INTERPRETATION

GC 1.01 Captions

.01 The captions appearing in these General Conditions have been inserted as a matter of convenience and for ease of reference only and in no way define, limit, or enlarge the scope or meaning of the General Conditions or any provision hereof.

.02 In the event of a conflict of a reference to the number and caption of a section, subsection, clause, or paragraph, reference shall be made to the caption.

GC 1.02 Abbreviations

.01 The abbreviations on the left below are commonly found in the Contract Documents and represent the organizations and phrases listed on the right:

AASHTO	-	American Association of State Highway Transportation Officials
ACI	-	American Concrete Institute
ANSI	-	American National Standards Institute
ASTM	-	ASTM International
AWG	-	American Wire Gauge
AWWA	-	American Water Works Association
CCIL	-	Canadian Council of Independent Laboratories
CGSB	-	Canadian General Standards Board
CSA	-	CSA Group - formerly Canadian Standards Association
CWB	-	Canadian Welding Bureau
GC	-	General Conditions
ISO	-	International Organization for Standardization
MECP	-	Ontario Ministry of the Environment, Conservation and Parks
MTO	-	Ontario Ministry of Transportation
MUTCD	-	Manual of Uniform Traffic Control Devices, published by MTO
OHSA	-	Ontario *Occupational Health and Safety Act*
OLS	-	Ontario Land Surveyor
OPS	-	Ontario Provincial Standard
OPSD	-	Ontario Provincial Standard Drawing
OPSS	-	Ontario Provincial Standard Specification
OTM	-	Ontario Traffic Manual
PEO	-	Professional Engineers Ontario
SAE	-	SAE International
SCC	-	Standards Council of Canada
SSPC	-	The Society for Protective Coatings
UL	-	Underwriters Laboratories
ULC	-	Underwriters Laboratories Canada
WHMIS	-	Workplace Hazardous Materials Information System
WSIB	-	Workplace Safety & Insurance Board

GC 1.03 Gender and Singular References

.01 References to the masculine or singular throughout the Contract Documents shall be considered to include the feminine and the plural and vice versa, as the context requires.

GC 1.04 Definitions

.01 For the purposes of the Contract Documents the following definitions shall apply:

Abnormal Weather means an extreme climatic condition characterized by wind speed, air temperature, precipitation, or snow fall depth, that is less than or greater than 1-1/2 standard deviations from the mean determined from the weather records of the 25-year period immediately preceding the tender opening date.

Actual Measurement means the field measurement of that quantity within the approved limits of the Work.

Addenda means any additions or change in the Tender documents issued by the Owner prior to Tender closing.

Additional Work means work not provided for in the Contract Documents and not considered by the Contract Administrator to be essential to the satisfactory completion of the Contract within its intended scope.

Agreement means the agreement between the Owner and the Contractor for the performance of the Work that is included in the Contract Documents.

Base means a layer of Material of specified type and thickness placed immediately below the pavement, driving surface, finished grade, curb and gutter, or sidewalk.

Business Day means any Day except Saturdays, Sundays, and statutory holidays.

Certificate of Subcontract Completion means the certificate issued by the Contract Administrator according to clause GC 8.02.04.02, Certification of Subcontract Completion.

Certificate of Substantial Performance means the certificate issued by the Contract Administrator at Substantial Performance.

Change Directive means any written instruction signed by the Owner, or by the Contract Administrator where so authorized, directing that a Change in the Work or Extra Work be performed.

Change in the Work means the deletion, extension, increase, decrease, or alteration of lines; grades; dimensions; quantities; methods; drawings; substantial changes in geotechnical, subsurface, surface, or other conditions; changes in the character of the Work to be done; or Materials of the Work or part thereof, within the intended scope of the Contract.

Change Order means a written amendment to the Contract signed by the Contractor and the Owner, or the Contract Administrator where so authorized, covering contingencies, a Change in the Work, Extra Work, Additional Work; and establishing the basis for payment and the time allowed for the adjustment of the Contract Time.

Completion means contract completion as set out in the *Construction Act*.

Completion Certificate means the certificate issued by the Contract Administrator at Completion.

Completion Payment means the payment described more particularly in clause GC 8.02.04.07.

Construction Act means as set out in the *Construction Act*, R.S.O. 1990, c. C.30, as amended.

Constructor means, for the purposes of, and within the meaning of the *Occupational Health and Safety Act*, R.S.O. 1990, c.O.1, as amended and amendments thereto, the Contractor who executes the Contract.

Contract means the undertaking by the Owner and the Contractor to perform their respective duties, responsibilities, and obligations as prescribed in the Contract Documents.

Contract Administrator means the person, partnership, or corporation designated by the Owner to be the Owner's representative for the purposes of the Contract.

Contract Documents mean the executed Agreement between the Owner and the Contractor, Tender, General Conditions of Contract, Supplemental General Conditions of Contract, Standard Specifications, Special Provisions, Contract Drawings, Addenda incorporated in a Contract Document before the execution of the Agreement, such other documents as may be listed in the Agreement, and subsequent amendments to the Contract Documents made pursuant to the provisions of the Agreement.

Contract Drawings or **Contract Plans** mean drawings or plans, any Geotechnical Report, any Subsurface Report, and any other reports and information provided by the Owner for the Work, and without limiting the generality thereof, may include soil profiles, foundation investigation reports, reinforcing steel schedules, aggregate sources list, Quantity Sheets, and cross-sections.

Contract Time means the time stipulated in the Contract Documents for Substantial Performance or Completion of the Work, including any extension of time made pursuant to the Contract Documents.

Contractor means the person, partnership, or corporation undertaking the Work as identified in the Agreement.

Control Monument means any horizontal or vertical (benchmark) monument that is used to lay out the Work.

Controlling Operation means any component of the Work that, if delayed, may delay the completion of the Work.

Cut-Off Date means the date up to which payment shall be made for Work performed.

Daily Work Records mean daily Records detailing the number and categories of workers and hours worked or on standby, types and quantities of Equipment and number of hours in use or on standby, and description and quantities of Material utilized.

Day means a calendar day.

Drawings or **Plans** mean any Contract Drawings or Contract Plans, or any Working Drawings or Working Plans, or any reproductions of drawings or plans pertaining to the Work.

End Result Specification means specifications that require the Contractor to be responsible for supplying a product or part of the Work. The Owner accepts or rejects the final product or applies a price adjustment that is commensurate with the degree of compliance with the specification.

Engineer means a professional engineer licenced by the Professional Engineers of Ontario to practice in the Province of Ontario.

Equipment means all machinery and equipment used for preparing, fabricating, conveying or erecting the Work and normally referred to as construction machinery and equipment.

Estimate means a calculation of the quantity or cost of the Work or part of it depending on the context.

Extra Work means work not provided for in the Contract as awarded but considered by the Contract Administrator to be essential to the satisfactory completion of the Contract within its intended scope, including unanticipated Work required to comply with legislation and regulations that affect the Work.

Final Acceptance means the date on which the Contract Administrator determines that the Work has passed all inspection and testing requirements and the Contract Administrator is satisfied that the Contractor has rectified all imperfect Work and has discharged all of the Contractor's obligations under the Contract Documents.

Final Acceptance Certificate means the certificate issued by the Contract Administrator at Final Acceptance of the Work.

Final Detailed Statement means a complete evaluation prepared by the Contract Administrator showing the quantities, unit prices, and final dollar amounts of all items of Work completed under the Contract, including variations in tender items and Extra Work, all as set out in the same general form as the monthly Estimates.

Geotechnical Report means a report or other information identifying soil, rock, and ground water conditions in the area of any proposed Work.

Grade means the required elevation of that part of the Work.

Hand Tools means tools that are commonly called tools or implements of the trade and include small power tools.

Highway means a common and public highway any part of which is intended for or used by the general public for the passage of vehicles and includes the area between the lateral property lines thereof.

Inclement Weather means weather conditions or conditions resulting directly from weather conditions that prevent the Contractor from proceeding with a Controlling Operation**.**

Lot means a specific quantity of Material or a specific amount of construction normally from a single source and produced by the same process.

Lump Sum Item means a tender item indicating a portion of the Work for which payment will be made at a single tendered price. Payment is not based on a measured quantity, although a quantity may be given in the Contract Documents.

Major Item means any tender item that has a value, calculated based on its actual or estimated tender quantity, whichever is the larger, multiplied by its tender unit price, which is equal to or greater than the lesser of,

a) $100,000, or

b) 5% of the total tender value calculated based on the total of all the estimated tender quantities and the tender unit prices.

Material means Material, machinery, equipment and fixtures forming part of the Work.

Monument means either a Property Monument or a Control Monument.

Owner means the party to the Contract for whom the Work is being performed, as identified in the Agreement, and includes, with the same meaning and import, "Authority."

Pavement means a wearing course or courses placed on the Roadway and consisting of asphaltic concrete, hydraulic cement concrete, Portland cement concrete, or plant or road mixed mulch.

Performance Bond means the type of security furnished to the Owner to guarantee completion of the Work according to the Contract and to the extent provided in the bond.

Plan Quantity means that quantity as computed from within the boundary lines of the Work as shown in the Contract Documents.

Project means the construction of the Work as contemplated by this Contract.

Proper Invoice has the meaning as set out in the *Construction Act*.

Property Monument means any property bar, concrete pillar, rock post, cut cross or other object that marks the boundary between real property ownership.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that Work meets the specified requirements.

Quality Control (QC) means a system or series of activities carried out by the Contractor, Subcontractor, supplier, and manufacturer to ensure that Work meets the specified requirements.

Quantity Sheet means a list of the quantities of Work to be done.

Quarried Rock means Material removed from an open excavation made in a solid mass of rock that, prior to removal, was integral with the parent mass.

Quarry means a place where aggregate has been or is being removed from an open excavation made in a solid mass of igneous, sedimentary, or metamorphic rock or any combination of these that, prior to removal, was integral with the parent areas.

Rate of Interest means the prejudgment interest rate determined under subsection 127(2) of the *Courts of Justice Act* or, if the contract or subcontract specifies a different interest rate for the purpose, the greater of the prejudgment interest rate and the interest rate specified in the contract or subcontract.

Records mean any books, payrolls, accounts, or other information that relate to the Work or any Change in the Work, Extra Work, Additional Work or claims arising therefrom.

Roadway means that part of the Highway designed or intended for use by vehicular traffic and includes the Shoulders.

Shoulder means that portion of the Roadway between the edge of the travelled portion of the wearing surface and the top inside edge of the ditch or fill slope.

Special Provisions mean directions containing requirements specific to the Work.

Standard Drawing or Standard Specification means a standard practice required and stipulated by the Owner for performance of the Work.

Statutory Holdback means the holdbacks required under the *Construction Act*.

Subbase means a layer of Material of specified type and thickness between the Subgrade and the Base.

Subcontractor means a person, partnership or corporation undertaking the execution of a part of the Work by virtue of an agreement with the Contractor.

Subgrade means the earth or rock surface, whether in cut or fill, as prepared to support the pavement structure, consisting of Base, Subbase, and Pavement.

Substantial Performance has the meaning as set out in the *Construction Act*, R.S.O. 1990, c. C.30, as amended.

Subsurface Report means a report or other information identifying the location of Utilities, concealed and adjacent structures, and physical obstructions that fall within the influence of the Work.

Superintendent means the Contractor's authorized representative in charge of the Work and who shall be a “competent person” within the meaning of the definition contained in the *Occupational Health and Safety Act*, R.S.O. 1990, c. 0.1, as amended.

Surety means the person, partnership or corporation, other than the Contractor, licensed in Ontario to transact business under the *Insurance Act*, R.S.O. 1990, c.I.8, as amended, executing a bond provided by the Contractor.

Tender means an offer in writing from the Contractor, submitted in the format prescribed by the Owner, to complete the Work.

Time and Material means costs calculated according to clause GC 8.02.05, Payment on a Time and Material Basis.

Utility means an aboveground or underground facility maintained by a municipality, public utility authority or regulated authority and includes services such as sanitary sewer, storm sewer, water, electric, gas, oil, steam, data transmission, telephone, and cable television.

Warranty Period means the applicable time period according to clause GC 7.16.02, Warranty.

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

Working Area means all the lands and easements owned or acquired by the Owner for the construction of the Work.

Working Day means any Day,

a) except Saturdays, Sundays and statutory holidays;

b) except a Day as determined by the Contract Administrator, on which the Contractor is prevented by inclement weather or conditions resulting immediately therefrom, from proceeding with a Controlling Operation. For the purposes of this definition, this shall be a Day during which the Contractor cannot proceed with at least 60% of the normal labour and Equipment force effectively engaged on the Controlling Operation for at least 5 hours;

c) except a Day on which the Contractor is prevented from proceeding with a Controlling Operation, as determined by the Contract Administrator by reason of,

   i. Any breach of the Contract by the Owner or if such prevention is due to the Owner, another contractor hired by the Owner, or an employee of any one of them, or by anyone else acting on behalf of the Owner.

   ii. Non-delivery of Owner supplied Materials.

   iii. Any cause beyond the reasonable control of the Contractor that can be substantiated by the Contractor to the satisfaction of the Contract Administrator.

Working Drawings or **Working Plans** means any Drawings or Plans prepared by the Contractor for the execution of the Work and may, without limiting the generality thereof, include formwork, falsework, and shoring plans; Roadway protection plans; shop drawings; shop plans; or erection diagrams.

GC 1.05 Ontario Traffic Manual

.01 All references in the Contract Documents to the MUTCD, including all Parts and Divisions thereof, or MTO Traffic Control Manual for Roadway Work Operations, or Traffic Control Manual for Roadway Operations Field Edition are hereby deleted and replaced by all currently available books which make up the Ontario Traffic Manual.

GC 1.06 Final Acceptance

.01 For the purposes of determining whether Final Acceptance has occurred, the Contract Administrator shall not take into account, in determining the discharge of the Contractor's obligations, any warranty obligation of the Contractor to the extent that the warranty extends beyond 12 months after Substantial Performance.

GC 1.07 Interpretation of Certain Words

.01 The words "acceptable," "approval," "authorized," "considered necessary," "directed," "required," "satisfactory," or words of like import, shall mean approval of, directed, required, considered necessary, or authorized by and acceptable or satisfactory to the Contract Administrator, unless the context clearly indicates otherwise.

SECTION GC 2.0 - CONTRACT DOCUMENTS

GC 2.01 Reliance on Contract Documents

.01 The Owner warrants that the information furnished in the Contract Documents can be relied upon with the following limitations or exceptions:

a) Based on available information at the time of the contract, the location of all mainline underground Utilities that may affect the Work shall be shown to a tolerance of:

i. 1.0 m horizontal, and

ii. 0.3 m vertical

.02 The Owner does not warrant or make any representation with respect to:

a) interpretations of data or opinions expressed in any Subsurface Report available for the perusal of the Contractor, that are not included as part of the Contract Documents, and

b) other information specifically excluded from this warranty.

GC 2.02 Order of Precedence

.01 In the event of any inconsistency or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:

a) Agreement

b) Addenda

c) Special Provisions

d) Contract Drawings

e) Standard Specifications

f) Standard Drawings

g) Tender

h) Supplemental General Conditions

i) OPSS.MUNI 100 General Conditions of Contract

j) Working Drawings

Later dates shall govern within each of the above categories of documents.

.02 In the event of any conflict among or inconsistency in the information shown on Drawings, the following rules shall apply:

a) Dimensions shown in figures on a Drawing shall govern where they differ from dimensions scaled from the same Drawing;

b) Drawings of larger scale shall govern over those of smaller scale;

c) Detailed Drawings shall govern over general Drawings; and

d) Drawings of a later date shall govern over those of an earlier date in the same series.

.03 In the event of any inconsistency or conflict in the contents of Standard Specifications the following descending order of precedence shall govern:

a) Owner's Standard Specifications

b) Ontario Provincial Standard Specifications

c) Other standards referenced in OPSSs and OPSDs (e.g., CSA, CGSB, ASTM, and ANSI).

.04 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all.

SECTION GC 3.0 - ADMINISTRATION OF THE CONTRACT

GC 3.01 Contract Administrator's Authority

.01 The Contract Administrator shall be the Owner's representative during construction and until the issuance of the Completion Certificate or the issuance of the Final Acceptance Certificate, whichever is later. All instructions to the Contractor, including instructions from the Owner, shall be issued by the Contract Administrator. The Contract Administrator shall have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

.02 All claims, disputes and other matters in question relating to the performance and the quality of the Work or the interpretation of the Contract Documents shall be referred to the Contract Administrator in writing by the Contractor. The Contract Administrator shall give a decision in writing within a reasonable time.

.03 The Contract Administrator may inspect the Work for its conformity with the Contract Documents, and to record the necessary data to establish payment quantities under the schedule of tender quantities and unit prices or to assess the value of the Work completed in the case of a lump sum price Contract.

.04 The Contract Administrator shall provide an estimate of the amounts owing to the Contractor under the Contract as provided for in section GC 8.0, Measurement and Payment.

.05 The Contract Administrator, to not cause delay in the schedule, shall, with reasonable promptness, review and take appropriate action upon the Contractor's submissions such as shop drawings, product data, and samples according to the Contract Documents. Unless specified otherwise, the Contract Administrator shall respond to submissions requiring approval according to the Contract as soon as possible but not longer than 5 Business Days, or timelines mutually agreed in writing, excluding any requests for extensions of Contract Time.

.06 The Contract Administrator shall investigate all allegations of a Change in the Work made by the Contractor and issue appropriate instructions.

.07 The Contract Administrator shall prepare Change Directives and Change Orders for the Owner’s approval.

.08 Upon written application by the Contractor, the Contract Administrator and the Contractor shall jointly conduct an inspection of the Work to establish the date of Substantial Performance of the Work or the date of Completion of the Work or both.

.09 The Contract Administrator shall be, in the first instance, the interpreter of the Contract Documents and the judge of the performance thereunder by both parties to the Contract. Interpretations and decisions of the Contract Administrator shall be consistent with the intent of the Contract Documents and, in making these decisions, the Contract Administrator shall not show partiality to either party.

.10 The Contract Administrator shall have the authority to reject any part of the Work or Material that does not conform to the Contract Documents.

.11 In the event that the Contract Administrator determines that any part of the Work performed by the Contractor is defective, whether the result of poor workmanship the use of defective Material or damage through carelessness or other act or omission of the Contractor and whether or not incorporated in the Work or otherwise fails to conform to the Contract Documents, then the Contractor shall if directed by the Contract Administrator promptly, as directed by the Contract Administrator, remove the Work and replace, make good, or re-execute the Work at no additional cost to the Owner.

.12 Any part of the Work destroyed or damaged by such removals, replacements, or re-executions shall be made good, promptly, at no additional cost to the Owner.

.13 If, in the opinion of the Contract Administrator it is not expedient to correct defective Work or Work not performed according to the Contract Documents, the Owner may deduct from monies otherwise due to the Contractor the difference in value between the Work as performed and that called for by the Contract Documents amount that will be determined in the first instance by the Contract Administrator.

.14 Notwithstanding any inspections made by the Contract Administrator or the issuance of any certificates or the making of any payment by the Owner, the failure of the Contract Administrator to reject any defective Work or Material shall not constitute acceptance of defective Work or Material.

.15 The Contract Administrator shall have the authority to temporarily suspend the Work for such reasonable time as may be necessary:

a) to facilitate the checking of any portion of the Contractor's construction layout;

b) to facilitate the inspection of any portion of the Work; or

c) for the Contractor to remedy its non-compliance with any provisions of the Contract Documents.

The Contractor shall not be entitled to any compensation for suspension of the Work in these circumstances.

.16 The Owner has the right to terminate the Contract for wilful or persistent violation by the Contractor or its workers of any applicable laws or bylaws, including but not limited to, the *Occupational Health and Safety Act* legislation and regulations, *Workplace Safety and Insurance Board Act*, and Regulation 347 of the *Environmental Protection Act*.

.17 If the Contract Administrator determines that any worker employed on the Work is incompetent, as defined by the *Occupational Health and Safety Act*, or is disorderly, then the Contract Administrator shall provide written notice to the Contractor and the Contractor shall immediately remove the worker from the Working Area. Such worker shall not return to the Working Area without the prior written consent of the Contract Administrator.

GC 3.02 Working Drawings

.01 The Contractor shall arrange for the preparation of clearly identified and dated Working Drawings as called for by the Contract Documents.

.02 The Contractor, to not cause delay in the Work, shall submit Working Drawings to the Contract Administrator with reasonable promptness and in orderly sequence. If either the Contractor or the Contract Administrator so requests, they shall jointly prepare a schedule fixing the dates for submission and return of Working Drawings. Working Drawings shall be submitted in printed form. At the time of submission, the Contractor shall notify the Contract Administrator in writing of any deviations from the Contract Documents that exist in the Working Drawings.

.03 The Contract Administrator shall review and return Working Drawings according to an agreed upon schedule, or otherwise, with reasonable promptness so as not to cause delay in any part of the Work.

.04 The Contract Administrator's review shall be to check for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the Working Drawings or of responsibility for meeting all requirements of the Contract Documents, unless a deviation on the Working Drawings has been approved in writing by the Contract Administrator.

.05 The Contractor shall make any changes in Working Drawings that the Contract Administrator may require to make the Working Drawings consistent with the Contract Documents and resubmit, unless otherwise directed by the Contract Administrator. When resubmitting, the Contractor shall notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.

.06 Work related to the Working Drawings shall not proceed until the Working Drawings have been signed and dated by the Contract Administrator.

.07 The Contractor shall keep one set of the reviewed Working Drawings, marked as above, at the site at all times.

GC 3.03 Right of the Contract Administrator to Modify Methods and Equipment

.01 The Contractor shall, when requested in writing, make alterations in the method, Equipment, or work force at any time the Contract Administrator considers the Contractor's actions to be unsafe, or damaging to either the Work or existing facilities or the environment.

.02 The Contractor shall, when requested in writing, alter the sequence of its operations on the Contract so as to avoid interference with work being performed by others.

.03 Notwithstanding the foregoing, the Contractor shall ensure that all necessary safety precautions and protection are maintained throughout the Work.

GC 3.04 Emergency Situations

.01 The Contract Administrator has the right to determine the existence of an emergency situation and, when such an emergency situation is deemed to exist, the Contract Administrator may instruct the Contractor to take action to remedy the situation. If the Contractor does not take timely action or, if the Contractor is not available, the Contract Administrator may direct others to remedy the situation.

.02 If the emergency situation was the fault of the Contractor, the remedial Work shall be done at the Contractor's expense. If the emergency situation was not the fault of the Contractor, the Owner shall pay for the remedial Work.

GC 3.05 Layout Information

.01 The Contract Administrator shall provide sufficient information, including without limitation, baseline and benchmark information, to facilitate the general location, alignment, elevation and layout of the Work.

.02 The Contract Administrator shall provide pre and post construction inventories of all Monuments, etc. that are located within the Working Area.

.03 The Owner shall be responsible only for the correctness of the layout information provided by the Contract Administrator.

GC 3.06 Extension of Contract Time

.01 An application for an extension of Contract Time shall be made in writing by the Contractor to the Contract Administrator as soon as the need for such extension becomes evident and at least 15 Days prior to the expiration of the Contract Time. The application for an extension of Contract Time shall enumerate the reasons and state the length of extension required.

.02 Circumstances suitable for consideration of an extension of Contract Time include the following:

a) Delays: See subsection GC 3.07, Delays.

b) Changes in the Work: See clause GC 3.10.01, Change in the Work.

c) Extra Work: See clause GC 3.10.02, Extra Work.

d) Additional Work: See clause GC 3.10.03, Additional Work.

.03 The Contract Administrator shall, in reviewing an application for an extension to the Contract Time, consider whether the delays, Changes in the Work, Extra Work, or Additional Work involve a Controlling Operation.

.04 The Contract Time shall be extended for such additional time as may be recommended by the Contract Administrator and deemed fair and reasonable by the Owner.

.05 The terms and conditions of the Contract shall continue for such extension of Contract Time.

GC 3.07 Delays

.01 If the Contractor is delayed in the performance of the Work by:

a) War, blockades, and civil commotions; or

b) Errors in the Contract Documents; or

c) An act or omission of the Owner or Contract Administrator, or anyone employed or engaged by them directly or indirectly, contrary to the provisions of the Contract Documents; or

d) A stop work order issued by a court or public authority, provided that such order was not issued as the result of an act or omission of the Contractor or anyone employed or engaged by the Contractor directly or indirectly; or

e) The Contract Administrator giving notice under section GC 7.0, Suspension of Work; or

f) Abnormal Weather provided that in the case of an application for an extension of Contract Time, due to the Abnormal Weather, the Contractor shall, with the Contractor's application, submit evidence from Environment Canada, together with detailed calculations in support of such application; or

g) Archaeological finds, according to subsection GC 3.15, Archaeological Finds,

h) The presence of species at risk as defined in the *Species at Risk Act* (S.C. 2002, c. 29) and/or the *Endangered Species Act*, S.O. 2007, c. 29 not otherwise identified in the Contract Documents, then, the Contractor shall be granted an extension of Contract Time according to subsection GC 3.06, Extension of Contract Time or Interim Completion Dates, and shall be reimbursed by the Owner for reasonable costs incurred by the Contractor as the result of such delay.

.02 If the Work is delayed by labour disputes, strikes or lock-outs, including lock-outs decreed or recommended to its members by a recognized contractor's association, of which the Contractor is a member or to which the Contractor is otherwise bound, which are beyond the Contractor's control, then the Contract Time shall be extended according to subsection GC 3.06, Extension of Contract Time.

.03 In no case shall the extension of Contract Time be less than the time lost as the result of the event causing the delay, unless a shorter extension is agreed to by the Contractor. The Contractor shall not be entitled to payment for costs incurred as the result of such delays unless such delays are the result of actions by the Owner.

.04 The Contractor shall not be entitled to payment for the cost of delays incurred as a result of a dispute between the Contractor and Owner. The Contractor shall execute the Work and may pursue resolution of the dispute according to subsection GC 3.13, Claims, Negotiations, Mediations.

GC 3.08 Assignment of Contract

.01 The Contractor shall not assign the Contract, either in whole or in part, without the prior written consent of the Owner.

GC 3.09 Subcontracting by the Contractor

.01 Subject to clause GC 3.09.03, Subcontracting by the Contractor, the Contractor may subcontract any part of the Work, according to the Contract Documents and any limitations specified therein.

.02 The Contractor shall notify the Contract Administrator in writing in 10 Days prior to the start of construction of the intention to subcontract. Such notification shall identify the part of the Work, and the Subcontractor with whom it is intended.

.03 The Contract Administrator shall, within 5 Days of receipt of such notification, accept or reject the intended Subcontractor. The rejection shall be in writing and shall include the reasons for the rejection.

.04 The Contractor shall not, without the written consent of the Owner, change a Subcontractor who has been engaged according to with this subsection.

.05 The Contractor shall preserve and protect the rights of the Owner under the Contract Documents with respect to that part of the Work to be performed under subcontract and shall:

a) Enter into agreements with the intended Subcontractors to require them to perform their Work according to the Contract Documents; and

b) Be as fully responsible to the Owner for acts and omissions of the Contractor's Subcontractors and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the Contractor.

.06 The Owner's consent to subcontracting by the Contractor shall not be construed to relieve the Contractor from any obligation under the Contract and shall not impose any liability upon the Owner. Nothing contained in the Contract Documents shall create a contractual relationship between a Subcontractor and the Owner.

GC 3.10 Changes

GC 3.10.01 Changes in the Work

.01 The Owner, or the Contract Administrator where so authorized, may, by order in writing, make a Change in the Work without invalidating the Contract. The Contractor shall not be required to proceed with a Change in the Work until in receipt of a Change Order or Change Directive. Upon the receipt of such Change Order or Change Directive the Contractor shall proceed with the Change in the Work.

.02 The Contractor may apply for an extension of Contract Time according to the terms of clause GC 3.06, Extension of Contract Time.

.03 If the Change in the Work relates solely to quantities, payment for that part of the Work shall be made according to the conditions specified in clause GC 8.01.02, Variations in Tender Quantities. If the Change in the Work does not solely relate to quantities, then either the Owner or the Contractor may initiate negotiations upwards or downwards for the adjustment of the Contract price in respect of the Change in the Work pursuant to subsection GC 3.13, Claims, Negotiations, Mediation or payment may be made according to the conditions contained in clause GC 8.02.05, Payment on a Time and Material Basis.

GC 3.10.02 Extra Work

.01 The Owner, or Contract Administrator where so authorized, may instruct the Contractor to perform Extra Work without invalidating the Contract. The Contractor shall not be required to proceed with the Extra Work until in receipt of a Change Order or Change Directive. Upon receipt of such Change Order or Change Directive the Contractor shall proceed with the Extra Work.

.02 The Contractor may apply for an extension of Contract Time according to the terms of clause GC 3.06, Extension of Contract Time.

.03 Either the Owner or Contractor may initiate negotiations upwards or downwards for the payment for the Extra Work pursuant to subsection GC 3.13, Claims, Negotiations, Mediation, or payment may be made according to the conditions contained in clause GC 8.02.05, Payment on a Time and Material Basis.

GC 3.10.03 Additional Work

.01 The Owner, or Contract Administrator where so authorized, may request the Contractor to perform Additional Work without invalidating the Contract. If the Contractor agrees to perform Additional Work, the Contractor shall proceed with such Additional Work upon receipt of a Change Order.

.02 The Contractor may apply for an extension of Contract Time according to the terms of subsection GC 3.06, Extension of Contract Time.

.03 Payment for the Additional Work may be negotiated pursuant to subsection GC 3.13, Claims, Negotiations, Mediation, or payment may be made according to the conditions contained in clause GC 8.02.05, Payment on a Time and Material Basis.

GC 3.11 Notices

.01 Any notice permitted or required to be given to the Contract Administrator or the Superintendent in respect of the Work shall be deemed to have been given to and received by the addressee on the date of delivery if delivered by hand, email, or by facsimile transmission and on the fifth Day after the date of mailing, if sent by mail.

.02 The Contractor and the Owner shall provide each other with the mail and email addresses; cell phone, and telephone numbers for the Contract Administrator and the Superintendent at the commencement of the Work, and update as necessary.

.03 In the event of an emergency situation or other urgent matter the Contract Administrator or the Superintendent may give a verbal notice, provided that such notice is confirmed in writing within 2 Days.

.04 Any notice permitted or required to be given to the Owner or the Contractor shall be given according to the notice provision of the Contract.

GC 3.12 Use and Occupancy of the Work Prior to Substantial Performance

.01 Where it is not contemplated elsewhere in the Contract Documents, the Owner may use or occupy the Work or any part thereof prior to Substantial Performance, provided that at least 30 Days written notice has been given to the Contractor.

.02 The use or occupancy of the Work or any part thereof by the Owner prior to Substantial Performance shall not constitute an acceptance of the Work or parts so occupied. In addition, the use or occupancy of the Work shall not relieve the Contractor or the Contractor's Surety from any liability that has arisen, or may arise, from the performance of the Work according to the Contract Documents. The Owner shall be responsible for any damage that occurs because of the Owner's use or occupancy. Such use or

occupancy of any part of the Work by the Owner does not waive the Owner's right to charge the Contractor liquidated damages according to the terms of the Contract.

GC 3.13 Claims, Negotiations, Mediation

GC 3.13.01 Continuance of the Work

.01 Unless the Contract has been terminated or completed, the Contractor shall in every case, after serving or receiving any notification of a claim or dispute, verbal or written, continue to proceed with the Work with due diligence and expedition. It is understood by the parties that such action shall not jeopardize any claim it may have.

GC 3.13.02 Record Keeping

.01 Immediately upon commencing Work that may result in a claim, the Contractor shall keep Daily Work Records during the course of the Work, sufficient to substantiate the Contractor's claim, and the Contract Administrator shall keep Daily Work Records to be used in assessing the Contractor's claim, all according to clause GC 8.02.07, Records.

.02 The Contractor and the Contract Administrator shall attempt to reconcile their respective Daily Work Records on a daily basis, to simplify review of the claim, when submitted. If the Contractor and the Contract Administrator fail to reconcile their respective Daily Work Records, then the Contractor shall submit its Daily Work Records as part of its claim, whereby the resolution of the dispute about the Daily Work Records shall not be resolved until there is a resolution of the claim.

.03 The keeping of Daily Work Records by the Contract Administrator or the reconciling of such Daily Work Records with those of the Contractor shall not be construed to be acceptance of the claim.

GC 3.13.03 Claims Procedure

.01 The Contractor shall give verbal notice of any situation that may lead to a claim for additional payment immediately upon becoming aware of the situation.

.02 The Contractor shall provide written notice within 7 Days of the commencement of any part of the Work that may be affected by the situation.

.03 The Contractor shall submit detailed claims as soon as reasonably possible and in any event no later than 30 Days or such time as mutually agreed after completion of the Work affected by the situation. The detailed claim shall:

a) Identify the item or items in respect of which the claim arises;

b) State the grounds, contractual or otherwise, upon which the claim is made; and

c) Include the Records maintained by the Contractor supporting such claim.

.04 Within 30 Days of the receipt of the Contractor's detailed claim, the Contract Administrator may request the Contractor to submit any further and other particulars as the Contract Administrator considers necessary to assess the claim. The Contractor shall submit the requested information within 30 Days of receipt of such request.

.05 Within 90 Days of receipt of the detailed claim, the Contract Administrator shall advise the Contractor, in writing, of the Contract Administrator's opinion regarding the validity of the claim.

GC 3.13.04 Negotiations

.01 The parties shall make all reasonable efforts to resolve their dispute by amicable negotiations and agree to provide, without prejudice, open and timely disclosure of relevant facts, information, and documents to facilitate these negotiations.

.02 Should the Contractor disagree with the opinion given in clause GC 3.13.03.05, with respect to any part of the claim, the Contract Administrator shall enter into negotiations with the Contractor to resolve the matters in dispute. Where a negotiated settlement cannot be reached and it is agreed that payment cannot be made on a Time and Material basis according to clause GC 8.02.05, Payment on a Time and Material Basis, the parties shall proceed according to clause GC 3.13.05, Mediation, or subsection GC 3.14, Arbitration.

.03 Prior to the expiry of 30 Business Days from the date of receipt of the Contractors claim, the Contract Administrator shall provide a written response to the Contractor stating the Contract Administrator's final price for the Change Order and an explanation of the rationale and basis of the Contract Administrator's position which shall be deemed to be the initial site response.

GC 3.13.05 Mediation

.01 If a claim is not resolved satisfactorily through the negotiation stage noted in clause GC 3.13.04, Negotiations, within a period of 30 Days following the opinion given in clause GC 3.13.03.05, and the Contractor wishes to pursue the issue further, the parties may, upon mutual agreement, utilize the services of an independent third-party mediator.

.02 The mediator shall be mutually agreed upon by the Owner and Contractor.

.03 The mediator shall be knowledgeable regarding the area of the disputed issue. The mediator shall meet with the parties together or separately, as necessary, to review all aspects of the issue. In a final attempt to assist the parties in resolving the issue themselves prior to proceeding to arbitration the mediator shall provide, without prejudice, a non-binding recommendation for settlement.

.04 The review by the mediator shall be completed within 90 Days following the opinion given in clause GC 3.13.03.05.

.05 Each party is responsible for its own costs related to the use of the mediation process. The cost of the third-party mediator shall be equally shared by the Owner and Contractor.

GC 3.13.06 Payment

.01 Payment of the claim shall be made no later than 28 Days after the date of resolution of the claim or dispute. Such payment shall be made according to the terms of section GC 8.0, Measurement and Payment.

GC 3.13.07 Rights of Both Parties

.01 It is agreed that no action taken under subsection GC 3.13, Claims, Negotiations, Mediation, by either party shall be construed as a renunciation or waiver of any of the rights or recourse available to the parties, provided that the requirements set out in this subsection are fulfilled.

.02 It is further agreed that the parties may at any time resort to the adjudication procedure contained in the *Construction Act*.

GC 3.14 Arbitration

GC 3.14.01 Conditions of Arbitration

.01 If a claim is not resolved satisfactorily through the negotiation stage noted in clause GC 3.13.04, Negotiations, or the mediation stage noted in clause GC 3.13.05, Mediation, either party may invoke the provisions of subsection GC 3.14, Arbitration, by giving written notice to the other party.

.02 Notification that arbitration shall be implemented to resolve the issue shall be communicated in writing as soon as possible and no later than 60 Days following the opinion given in clause GC 3.13.03.05. Where the use of a third-party mediator was implemented, notification shall be within 120 Days of the opinion given in clause GC 3.13.03.05.

.03 The parties shall be bound by the decision of the arbitrator.

.04 The rules and procedures of the *Arbitration Act*, 1991, S.O. 1991, c.17, as amended, shall apply to any arbitration conducted hereunder except to the extent that they are modified by the express provisions of subsection GC 3.14, Arbitration.

GC 3.14.02 Arbitration Procedure

.01 The following provisions are to be included in the agreement to arbitrate and are subject only to such right of appeal as exist where the arbitrator has exceeded their jurisdiction or have otherwise disqualified themselves:

a) All existing actions in respect of the matters under arbitration shall be stayed pending arbitration;

b) All outstanding claims and matters to be settled are to be set out in a schedule to the agreement. Only such claims and matters as are in the schedule shall be arbitrated; and

c) Before proceeding with the arbitration, the Contractor shall confirm that all matters in dispute are set out in the schedule.

GC 3.14.03 Appointment of Arbitrator

.01 The arbitrator shall be mutually agreed upon by the Owner and Contractor to adjudicate the dispute.

.02 Where the Owner and Contractor cannot agree on a sole arbitrator within 30 Days of the notification of arbitration noted in clause GC 3.14.01.02, the Owner and the Contractor shall each choose an appointee within 37 Days of the notice of arbitration.

.03 The appointees shall mutually agree upon an arbitrator to adjudicate the dispute within 15 Days after the last appointee was chosen or they shall refer the matter to the ADR Institute of Ontario (ADRIO), which may select an arbitrator to adjudicate the dispute within 7 Days of being requested to do so.

.04 The arbitrator shall not be interested financially in the Contract nor in either party's business and shall not be employed by either party.

.05 The arbitrator may appoint independent experts and any other persons to assist them.

.06 The arbitrator is not bound by the rules of evidence that govern the trial of cases in court but may hear and consider any evidence that the arbitrator considers relevant.

.07 The hearing shall commence within 90 Days of the appointment of the arbitrator.

GC 3.14.04 Costs

.01 The arbitrator's fee shall be equally shared by the Owner and the Contractor.

.02 The fees of any independent experts and any other persons appointed to assist the arbitrator shall be shared equally by the Owner and the Contractor.

.03 The arbitration hearing shall be held in a place mutually agreed upon by both parties or in the event the parties do not agree, a site shall be chosen by the arbitrator. The cost of obtaining appropriate facilities shall be shared equally by the Owner and the Contractor.

.04 The arbitrator may, in their discretion, award reasonable costs, related to the arbitration.

GC 3.14.05 The Decision

.01 The reasoned decision shall be made in writing within 90 Days of the conclusion of the hearing. An extension of time to make a decision may be granted with consent of both parties. Payment shall be made according to clause GC 3.13.06, Payment.

GC 3.15 Archaeological Finds

.01 If the Contractor's operations expose any items that may indicate an archaeological find, such as but not limited to building remains, hardware, accumulations of bones, pottery, or arrowheads, the Contractor shall immediately notify the Contract Administrator and suspend operations within the area identified by the Contract Administrator. Notification may be verbal provided that such notice is confirmed in writing within 2 Days. Work shall remain suspended within that area until otherwise directed by the Contract Administrator in writing, according to subsection GC 7.09, Suspension of Work.

.02 Any delay in the completion of the Contract that is caused by such a suspension of Work shall be considered to be beyond the Contractor's control according to clause GC 3.07.01.

.03 Any Work directed or authorized in connection with an archaeological find shall be considered as Extra Work according to clause GC 3.10.02, Extra Work.

.04 The Contractor shall take all reasonable action to minimize additional costs that may accrue as a result of any work stoppage.

SECTION GC 4.0 - OWNER'S RESPONSIBILITIES AND RIGHTS

GC 4.01 Working Area

.01 The Owner shall acquire all property rights that are deemed necessary by the Owner for the construction of the Work, including temporary working easements, and shall indicate the full extent of the Working Area on the Contract Drawings.

GC 4.02 Approvals and Permits

.01 The Owner shall pay for all plumbing and building permits.

.02 The Owner shall obtain and pay for all permits, licences, and certificates solely required for the design of the Work.

GC 4.03 Management and Disposition of Materials

.01 The Owner shall identify in the Contract Documents the Materials to be moved within or removed from the Working Area and any characteristics of those Materials that necessitates special Materials management and disposition.

.02 According to regulations under the *Occupational Health and Safety Act*, R.S.O. 1990, c.O.1, as amended, the Owner advises that:

a) The designated substances silica, lead, and arsenic are generally present throughout the Working Area occurring naturally or as a result of vehicle emissions;

b) The designated substance asbestos may be present in cement products, asphalt, and conduits for Utilities;

c) The following hazardous materials are ordinarily present in construction activities: limestone, gypsum, marble, mica, and Portland cement; and

d) Exposure to these substances may occur as a result of activities by the Contractor such as sweeping, grinding, crushing, drilling, blasting, cutting, and abrasive blasting.

.03 The Owner shall identify in the Contract Documents any designated substances or hazardous materials other than those identified above and their location in the Working Area.

.04 If the Owner or Contractor discovers or is advised of the presence of designated substances or hazardous Materials that are in addition to those listed in clause GC 4.03.02, or not clearly identified in the Contract Documents according to clause GC 4.03.03, then verbal notice shall be provided to the other party immediately with written confirmation within 2 Days. The Contractor shall stop Work in the area immediately and shall determine the necessary steps required to complete the Work according to applicable legislation and regulations.

.05 The Owner shall be responsible for any reasonable additional costs of removing, managing and disposing of any Material not identified in the Contract Documents, or where conditions exist that could not have been reasonably foreseen at the time of tendering. All work under this paragraph shall be deemed to be Extra Work.

.06 Prior to commencement of the Work, the Owner shall provide to the Contractor a list of those products controlled under the Workplace Hazardous Materials Information System (WHMIS), that the Owner may supply or use on the Contract, together with copies of the Safety Data Sheets for these products. All containers used in the application of products controlled under WHMIS shall be labelled. The Owner shall notify the Contractor in writing of changes to the list and provide relevant Safety Data Sheets.

.07 Unless expressly permitted in the Contract Documents, the Contractor shall not bring onto the Work Area any designated substance or hazardous Material per OHSA without the prior written authorization of the Contract Administrator.

.08 The Contractor shall use all reasonable care to avoid spilling or disturbing any designated substances or hazardous Material per OHSA.

GC 4.04 Construction Affecting Railway Property

.01 The Owner shall pay the costs of all flagging and other traffic control measures required and provided by the railway company unless such costs are solely a function of the Contractor's chosen method of completing the Work.

.02 Every precaution shall be taken by the Contractor to protect all railway property at track crossings; or otherwise, on which construction operations are to take place according to the terms of this Contract.

.03 The Contractor shall be required to conduct the construction operations in such a manner as to avoid a possibility of damaging any railway property in the vicinity of the Works. Every reasonable precaution shall be taken by the Contractor to ensure the safety of the workers, Subcontractors, and Equipment, as well as railway property throughout the duration of the Contract.

GC 4.05 Default by the Contractor

.01 If the Contractor fails to commence the Work within 14 Days of a formal order to commence Work signed by the Contract Administrator or, upon commencement of the Work, should neglect to prosecute the Work properly or otherwise fails to comply with the requirements of the Contract and, if the Contract Administrator has given a written statement to the Owner and Contractor that sufficient cause exists to justify such action, the Owner may, without prejudice to any other right or remedy the Owner may have, notify the Contractor in writing that the Contractor is in default of the Contractor’s contractual obligations and instruct the Contractor to correct the default in the 5 Working Days immediately following the receipt of such notice.

.02 If the Contractor is adjudged bankrupt, or makes a general assignment for the benefit of creditors because of the Contractor’s insolvency or if a receiver is appointed because of the Contractor’s insolvency, the Owner may, without prejudice to any other right or remedy the Owner may have, by giving the Contractor or receiver or trustee in bankruptcy notice in writing, terminate the Contract.

GC 4.06 Contractor's Right to Correct a Default

.01 The Contractor shall have the right within the 5 Working Days following the receipt of a notice of default to correct the default and provide the Owner with satisfactory proof that appropriate corrective measures have been taken.

.02 If the Owner determines that the correction of the default cannot be completed within the 5 Working Days following receipt of the notice, the Contractor shall not be in default if the Contractor:

a) Commences the correction of the default within the 5 Working Days following receipt of the notice;

b) Provides the Owner with a schedule acceptable to the Owner for the progress of such correction; and

c) Completes the correction according to such schedule.

GC 4.07 Owner's Right to Correct Default

.01 If the Contractor fails to correct the default within the time specified in subsection GC 4.06, Contractor's Right to Correct a Default, or subsequently agreed upon, the Owner, without prejudice to any other right or remedy the Owner may have, may correct such default and deduct the cost thereof, as certified by the Contract Administrator, from any payment then or thereafter due to the Contractor.

GC 4.08 Termination of Contractor's Right to Continue the Work

.01 Where the Contractor fails to correct a default within the time specified in subsection GC 4.06, Contractor's Right to Correct a Default, or subsequently agreed upon, the Owner, without prejudice to any other right or remedy the Owner may have, may terminate the Contractor's right to continue the Work in whole or in part by giving written notice to the Contractor.

.02 If the Owner terminates the Contractor's right to continue with the Work in whole or in part, the Owner shall be entitled to:

a) Take possession of the Working Area or that portion of the Working Area devoted to that part of the Work terminated;

b) Utilize any Material within the Working Area;

c) Withhold further payments to the Contractor with respect to the Work or the portion of the Work withdrawn from the Contractor until the Work or portion thereof withdrawn is completed;

d) Charge the Contractor the additional cost over the Contract price of completing the Work or portion thereof withdrawn from the Contractor, as certified by the Contract Administrator and any additional compensation paid to the Contract Administrator for such additional service arising from the correction of the default;

e) Charge the Contractor a reasonable allowance, as determined by the Contract Administrator, to cover correction to the Work performed by the Contractor that may be required under subsection GC 7.16, Warranty;

f) Charge the Contractor for any damages the Owner sustained as a result of the default; and

g) Charge the Contractor the amount by which the cost of corrections to the Work under subsection GC 7.16, Warranty, exceeds the allowance provided for such corrections.

GC 4.09 Final Payment to Contractor

.01 If the Owner's cost to correct and complete the Work in whole or in part is less than the amount withheld from the Contractor under subsection GC 4.08, Termination of Contractor's Right to Continue the Work, the Owner shall pay the balance to the Contractor as soon as the final accounting for the Contract is complete.

GC 4.10 Termination of the Contract

.01 Where the Contractor is in default of the Contract the Owner shall, without prejudice to any other right or remedy the Owner may have, terminate the Contract by giving written notice of termination to the Contractor, the Surety, and any trustee or receiver acting on behalf of the Contractor's estate or creditors.

.02 If the Owner elects to terminate the Contract, the Owner shall provide the Contractor and the trustee or receiver with a complete accounting to the date of termination.

GC 4.11 Continuation of Contractor's Obligations

.01 The Contractor's obligation under the Contract as to quality, correction, and warranty of the Work performed prior to the time of termination of the Contract or termination of the Contractor's right to continue with the Work in whole or in part shall continue to be in force after such termination.

GC 4.12 Use of Performance Bond

.01 If the Contractor is in default of the Contract and the Contractor has provided a Performance Bond, the provisions of section GC 4.0, Owner’s Responsibilities and Rights, shall be exercised according to the conditions of the Performance Bond.

GC 4.13 Payment Adjustment

.01 If any situation should occur in the performance of the Work that would result in a Change in the Work, the Owner shall be entitled to an adjustment and those adjustments shall be managed according to clause GC 3.10.01, Changes in the Work.

SECTION GC 5.0 - MATERIAL

GC 5.01 Supply of Material

.01 All Material necessary for the proper completion of the Work, except that listed as being supplied by the Owner, shall be supplied by the Contractor. The Contract price for the appropriate tender items shall be deemed to include full compensation for the supply and delivery of such Material.

GC 5.02 Quality of Material

.01 All Material supplied by the Contractor shall be new, unless otherwise specified in the Contract Documents.

.02 Material supplied by the Contractor shall conform to the requirements of the Contract.

.03 As specified in the Contract Documents or as requested by the Contract Administrator, the Contractor shall make available, for inspection or testing, a sample of any Material to be supplied by the Contractor.

.04 The Contractor shall obtain for the Contract Administrator the right to enter onto the premises of the Material manufacturer or supplier to carry out such inspection, sampling, and testing as specified in the Contract Documents or as requested by the Contract Administrator.

.05 The Contractor shall notify the Contract Administrator of the sources of supply sufficiently in advance of the Material shipping dates to enable the Contract Administrator to perform the required inspection, sampling, and testing.

.06 The Owner shall not be responsible for any delays to the Contractor's operations where the Contractor fails to give sufficient advance notice to the Contract Administrator to enable the Contract Administrator to carry out the required inspection, sampling, and testing before the scheduled shipping date.

.07 The Contractor shall not change the source of supply of any Material without the written authorization of the Contract Administrator.

.08 Material that is not specified shall be of a quality best suited to the purpose required, and the use of such Material shall be subject to the approval of the Contract Administrator.

.09 All Material inspection, sampling, and testing shall be carried out on random basis according to the standard inspection or testing methods required for the Material. Any approval given by the Contract Administrator for the Materials to be used in the Work based upon the random method shall not relieve the Contractor from the responsibility of incorporating Material that conforms to the Contract Documents into the Work or properly performing the Contract and of any liability arising from the failure to properly perform as specified in the Contract Documents.

GC 5.03 Rejected Material

.01 Rejected Material shall be removed from the Working Area expeditiously after the notification to that effect from the Contract Administrator. Where the Contractor fails to comply with such notice, the Contract Administrator may cause the rejected Material to be removed from the Working Area and disposed of, in what the Contract Administrator considers to be the most appropriate manner, and the Contractor shall pay the costs of disposal and the appropriate overhead charges.

GC 5.04 Substitutions

.01 Where the Contract Documents require the Contractor to supply a Material designated by a trade or other name, the Tender shall be based only upon supply of the Material so designated, that shall be regarded as the standard of quality required by the Contract Documents. After the acceptance of the Tender, the

Contractor may apply to the Contract Administrator to substitute another Material identified by a different trade or other name for the Material designated as aforesaid. The application shall be in writing and shall state the price for the proposed substitute Material designated as aforesaid, and such other information as the Contract Administrator may require.

.02 Rulings on a proposed substitution shall not be made prior to the acceptance of the Tender. Substitutions shall not be made without the prior approval of the Contract Administrator. The approval or rejection of a proposed substitution shall be at the discretion of the Contract Administrator.

.03 If the proposed substitution is approved by the Contract Administrator, the Contractor shall be entitled to the first $1,000 of the aggregate saving in cost by reason of such substitution and to 50% of any additional saving in cost in excess of such $1,000. Each such approval shall be conveyed to the Contractor in writing or by issuance of a Certificate of Equality on the Owner's standard form of "Certification of Equality" and, if any adjustment to the Contract price is made by reason of such substitution, a Change Order shall be issued as well.

GC 5.05 Owner Supplied Material

GC 5.05.01 Ordering of Excess Material

.01 Where Material is supplied by the Owner and where this Material is ordered by the Contractor in excess of the amount specified to complete the Work, such excess Material shall become the property of the Contractor on completion of the Work and shall be charged to the Contractor at cost plus applicable overheads.

GC 5.05.02 Care of Material

.01 The Contractor shall, in advance of receipt of shipments of Material supplied by the Owner, provide adequate and proper storage facilities acceptable to the Contract Administrator, and on the receipt of such Material shall promptly place it in storage except where it is to be incorporated forthwith into the Work.

.02 The Contractor shall be responsible for acceptance of Material supplied by the Owner, at the specified delivery point and for its safe handling and storage. If such Material is damaged while under the control of the Contractor, it shall be replaced or repaired by the Contractor at no expense to the Owner, and to the satisfaction of the Contract Administrator. If such Material is rejected by the Contract Administrator for reasons that are not the fault of the Contractor, it shall remain in the care and at the risk of the Contractor until its disposition has been determined by the Contract Administrator.

.03 Where Material supplied by the Owner arrives at the delivery point in a damaged condition or where there are discrepancies between the quantities received and the quantities shown on the bills of lading, the Contractor shall immediately report such damage or discrepancies to the Contract Administrator who shall arrange for an immediate inspection of the shipment and provide the Contractor with a written release from responsibility for such damage or deficiencies. Where damage or deficiencies are not so reported, it shall be assumed that the shipment arrived in good condition and order, and any damage or deficiencies reported thereafter shall be made good by the Contractor at no extra cost to the Owner.

.04 The full amount of Material supplied by the Owner in each shipment shall be accounted for by the Contractor and such Material shall be at the risk of the Contractor after taking delivery. Such Material shall not, except with the written permission of the Contract Administrator, be used by the Contractor for purposes other than the performance of the Work under the Contract.

.05 Empty reels, crates, containers, and other type of packaging from Material supplied by the Owner shall become the property of the Contractor when they are no longer required for their original purpose and shall be disposed of by the Contractor at the Contractor’s expense unless otherwise specified in the Contract Documents.

.06 Immediately upon receipt of each shipment, the Contractor shall provide the Contract Administrator copies of bills of lading, or such other documentation the Contract Administrator may require to substantiate and reconcile the quantities of Material received.

.07 Where Material supplied by the Owner is ordered and stockpiled prior to the award of the Contract, the Contractor shall, at no extra cost to the Owner, immediately upon commencement of operations, check the Material, report any damage or deficiencies to the Contract Administrator and take charge of the Material at the stockpile site. Where damage or deficiencies are not so recorded by the Contractor, it shall be assumed that the stockpile was in good condition and order when the Contractor took charge of it, and any damage or deficiencies reported thereafter shall be made good by the Contractor at no extra cost to the Owner.

SECTION GC 6.0 - INSURANCE, PROTECTION AND DAMAGE

GC 6.01 Protection of Work, Persons and Property

.01 The Contractor, the Contractor's agents, and all workers employed by or under the control of the Contractor, including Subcontractors, shall protect the Work, persons, and property from damage or injury. The Contractor shall be responsible for all losses and damage that may arise as the result of the Contractor's operations under the Contract, unless indicated to the contrary below.

.02 The Contractor is responsible for the full cost of any necessary temporary protective Work and the restoration of all damage where the Contractor damages the Work or property in the performance of the Contract. If the Contractor is not responsible for the damage that occurs to the Work or property, the Contractor shall restore such damage, and such Work and payment shall be administered according to these General Conditions.

.03 The Contractor shall immediately inform the Contract Administrator of all damage and injuries that occur during the term of the Contract. The Contractor shall then investigate and report back to the Contract Administrator within 15 Days of occurrence of incident, or as soon as possible. The Contract Administrator may conduct its own investigation and the Contractor shall provide all assistance to the Contract Administrator as may be necessary for that purpose.

.04 The Contractor shall not be responsible for loss and damage that occurs as a result of:

a) War;

b) Blockades and civil commotions;

c) Errors in the Contract Documents; or

d) Acts or omissions of the Owner, the Contract Administrator, their agents and employees, or others not under the control of the Contractor, but within the Working Area with the Owner's permission.

.05 The Contractor and the Contractor’s Surety shall not be released from any term or provision of any responsibility, obligation, or liability under the Contract or waive or impair any of the rights of the Owner, except by a release duly executed by the Owner.

GC 6.02 Indemnification

.01 The Contractor shall indemnify and hold harmless the Owner and the Contract Administrator, their elected officials, agents, officers, and employees from and against all claims, demands, losses, expenses, costs, damages, actions, suits, or proceedings by third parties, hereinafter called "claims", directly or indirectly arising or alleged to arise out of the performance of or the failure to perform the Work, provided such claims are:

a) Attributable to bodily injury, sickness, disease, or death or to damage to or destruction of tangible property;

b) Caused by negligent acts or omissions of the Contractor or anyone for whose acts the Contractor may be liable; and

c) Made in writing within a period of 6 years from the date of Substantial Performance of the Work as set out in the Certificate of Substantial Performance of the Work or, where so specified in the Contract Documents, from the date of certification of Final Acceptance.

.02 The Contractor shall indemnify and hold harmless the Owner from all and every claim for damages, royalties or fees for the infringement of any patented invention or copyright occasioned by the Contractor in connection with the Work performed or Material furnished by the Contractor under the Contract.

.03 The Owner expressly waives the right to indemnity for claims other than those stated in clauses GC 6.02.01 and GC 6.02.02.

.04 The Owner shall indemnify and hold harmless the Contractor, their elected officials, agents, officers, and employees from and against all claims, demands, losses, expenses, costs, damages, actions, suits, or proceedings arising out of the Contractor's performance of the Contract that are attributable to a lack of or defect in title or an alleged lack of or defect in title to the Working Area.

.05 The Contractor expressly waives the right to indemnity for claims other than those stated in clause GC 6.02.04.

GC 6.03 Contractor's Insurance

GC 6.03.01 General

.01 Without restricting the generality of subsection GC 6.02, Indemnification, the Contractor shall provide, maintain, and pay for the insurance coverages listed under clauses GC 6.03.02 and GC 6.03.03. Insurance coverage in clauses GC 6.03.04, GC 6.03.05, and GC 6.03.06 shall only apply when so specified in the Contract Documents.

.02 The Contractor shall provide the Contract Administrator with an original Certificate of Insurance for each type of insurance coverage that is required by the Contract Documents. The Contractor shall ensure that the Contract Administrator is, at all times in receipt of a valid Certificate of Insurance for each type of insurance coverage, in such amounts as specified in the Contract Documents. The Contractor will not be permitted to commence Work until the Contract Administrator is in receipt of such proof of insurance. The Contract Administrator may withhold payments of monies due to the Contractor until the Contractor has provided the Contract Administrator with original valid Certificates of Insurance as required by the provisions of the Contract Documents.

GC 6.03.02 Commercial General Liability Insurance

.01 Commercial General Liability Insurance shall be in the name of the Contractor, with the Owner and the Contract Administrator named as additional insureds, with limits of not less than $5,000,000 inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof. The insurance shall be provided in a form acceptable to the Owner.

.02 Approval of this insurance shall be conditional upon the Contractor obtaining the services of an insurer licensed to underwrite insurance in the Province of Ontario and obtaining the insurer's certificate of equivalency to the required insurance.

.03 The Contractor shall submit annually to the Owner, proof of continuation of the completed operations coverage and, if the Contractor fails to do so, the limitation period for claiming indemnity described in clause GC 6.02.01 c), shall not be binding on the Owner.

.04 Should the Contractor decide not to employ Subcontractors for operations requiring the use of explosives for blasting, pile driving or caisson work, removal or weakening of support of property building or land, the Commercial General Liability Insurance shall include the appropriate endorsements.

.05 The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, termination, or material change.

.06 "Claims Made" insurance policies shall not be permitted.

GC 6.03.03 Automobile Liability Insurance

.01 Automobile liability insurance in respect of licensed vehicles shall have limits of not less than $5,000,000 inclusive per occurrence for bodily injury, death and damage to property, in the following forms endorsed to provide the Owner with not less than 30 Days written notice in advance of any cancellation, termination, or material change:

a) Standard non-owned automobile policy including standard contractual liability endorsement, and

b) Standard owner's form automobile policy providing third party liability and accident benefits insurance and covering licensed vehicles owned or operated by the Contractor.

GC 6.03.04 Aircraft and Watercraft Liability Insurance

GC 6.03.04.01 Aircraft Liability Insurance

.01 Aircraft liability insurance with respect to owned or non-owned aircraft used directly or indirectly in the performance of the Work, including use of additional premises, shall be subject to limits of not less than $5,000,000 inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof, and limits of not less than $5,000,000 for aircraft passenger hazard. Such insurance shall be in a form acceptable to the Owner. The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, change, or amendment restricting coverage.

GC 6.03.04.02 Watercraft Liability Insurance

.01 Watercraft liability insurance with respect to owned or non-owned watercraft used directly or indirectly in the performance of the Work, including use of additional premises, shall be subject to limits of not less than $5,000,000 inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof. Such insurance shall be in a form acceptable to the Owner. The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, change, or amendment restricting coverage.

GC 6.03.05 Property and Boiler Insurance

GC 6.03.05.01 Property Insurance

.01 All risks property insurance shall be in the name of the Contractor, with the Owner and the Contract Administrator named as additional insureds, insuring not less than the sum of the amount of the Contract price and the full value, as may be stated in the Contract Documents, of Material that is specified to be provided by the Owner for incorporation into the Work.

GC 6.03.05.02 Boiler Insurance

.01 Boiler insurance insuring the interests of the Contractor, the Owner and the Contract Administrator for not less than the replacement value of boilers and pressure vessels forming part of the Work, shall be in a form acceptable to the Owner.

GC 6.03.05.03 Use and Occupancy of the Work Prior to Completion

.01 Should the Owner wish to use or occupy part or all of the Work prior to Substantial Performance, the Owner shall give 30 Days written notice to the Contractor of the intended purpose and extent of such use or occupancy. Prior to such use or occupancy, the Contractor shall notify the Owner in writing of the additional premium cost, if any, to maintain property and boiler insurance, which shall be at the Owner's expense. If because of such use or occupancy the Contractor is unable to provide coverage, the Owner upon written notice from the Contractor and prior to such use or occupancy shall provide, maintain, and

pay for property and boiler insurance insuring the full value of the Work, including coverage for such use or occupancy, and shall provide the Contractor with proof of such insurance. The Contractor shall refund to the Owner the unearned premiums applicable to the Contractor's policies upon termination of coverage.

.02 The policies shall provide that in the event of a loss or damage, payment shall be made to the Owner and the Contractor as their respective interests may appear. The Contractor shall act on behalf of both the Owner and the Contractor for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the Contractor shall proceed to restore the Work. Loss or damage shall not affect the rights and obligations of either party under the Contract, except that the Contractor shall be entitled to such reasonable extension of Contract Time relative to the extent of the loss or damage as the Contract Administrator may decide in consultation with the Contractor.

GC 6.03.05.04 Payment for Loss or Damage

.01 The Contractor shall be entitled to receive from the Owner, in addition to the amount due under the Contract, the amount at which the Owner's interest in restoration of the Work has been appraised, such amount to be paid as the restoration of the Work proceeds, and according to the requirements of section GC 8.0, Measurement and Payment. In addition, the Contractor shall be entitled to receive from the payments made by the insurers the amount of the Contractor's interest in the restoration of the Work.

.02 The Contractor shall be responsible for deductible amounts under the policies, except where such amounts may be excluded from the Contractor's responsibility by the terms of this Contract.

.03 In the event of a loss or damage to the Work arising from the action or omission of the Owner or others, the Owner shall pay the Contractor the cost of restoring the Work as the restoration of the Work proceeds and according to the requirements of section GC 8.0, Measurement and Payment.

GC 6.03.06 Contractor's Equipment Insurance

.01 All risks Contractor's Equipment insurance covering construction equipment used by the Contractor for the performance of the Work, including boiler insurance on temporary boilers and pressure vessels, shall be in a form acceptable to the Owner and shall not allow subrogation claims by the insurer against the Owner. The policies shall be endorsed to provide the Owner with not less than 30 Days written notice in advance of cancellation, change, or amendment restricting coverage. Subject to satisfactory proof of financial capability by the Contractor for self-insurance of the Contractor's Equipment, the Owner agrees to waive the equipment insurance requirement, and for the purpose of this Contract, the Contractor shall be deemed to be insured. This policy shall be amended to provide permission for the Contractor to grant prior releases with respect to damage to the Contractor's Equipment.

GC 6.03.07 Insurance Requirements and Duration

.01 Each insurance policy as noted in the Contract Documents shall be in effect from the date of commencement of the Work until 10 Days after the date of Final Acceptance of the Work, as set out in the Final Acceptance Certificate.

.02 The Contractor shall provide the Owner, on a form acceptable to the Owner, proof of insurance prior to commencement of the Work and signed by an officer of the Contractor and either the underwriter or the broker.

.03 The Contractor shall, on request, promptly provide the Owner with a certified true copy of each insurance policy exclusive of information pertaining to premium or premium bases used by the insurer to determine the cost of the insurance. The certified true copy shall include the signature by an officer of the Contractor and in addition, a signature by an officer of the insurer or the under writer or the broker.

.04 Where a policy is renewed, the Contractor shall provide the Owner, on a form acceptable to the Owner, renewed proof of insurance immediately following completion of renewal.

.05 Unless specified otherwise, the Contractor shall be responsible for the payment of deductible amounts under the policies.

.06 If the Contractor fails to provide or maintain insurance as required in subsection GC 6.03, Contractor's Insurance, or elsewhere in the Contract Documents, then the Owner shall have the right to provide and maintain such insurance and give evidence thereof to the Contractor. The Owner's cost thereof shall be payable by the Contractor to the Owner on demand.

.07 If the Contractor fails to pay the cost of the insurance placed by the Owner within 28 Days of the date on which the Owner made a formal demand for reimbursement of such costs, the Owner may deduct the costs thereof from monies which are due or may become due to the Contractor.

GC 6.04 Bonding

.01 The Contractor shall provide the Owner with the surety bonds in the amount required by the Contract Documents.

.02 Such bonds shall be issued by a duly licensed surety company authorized to transact a business of suretyship in the Province of Ontario and shall be to the satisfaction of the Owner. The bonds shall be maintained in good standing until the Final Acceptance.

GC 6.05 Workplace Safety and Insurance Board

.01 The Contractor shall provide the Contract Administrator with a copy of a Certificate of Clearance indicating the Contractor’s good standing with the Workplace Safety and Insurance Board, as follows:

a) Immediately prior to the Contract Administrator authorizing the Contractor to commence Work.

b) Prior to issue of the Certificate of Substantial Performance.

c) Prior to expiration of the Warranty Period.

d) At any other time when requested by the Contract Administrator.

SECTION GC 7.0 - CONTRACTOR'S RESPONSIBILITIES AND CONTROL OF THE WORK

GC 7.01 General

GC 7.01.01 Site Visit

.01 The Contractor warrants that the site of the Work has been visited during the preparation of the Tender and the character of the Work and all local conditions that may affect the performance of the Work are known.

GC 7.01.02 Commencement of Work

.01 The Contractor shall not commence the Work nor deliver anything to the Working Area until the Contractor has received a written order to commence the work from the Contract Administrator.

GC 7.01.03 Control and Responsibility

.01 The Contractor shall have complete control of the Work and shall effectively direct and supervise the Work so as to ensure conformity with the Contract Documents. The Contractor shall be responsible for construction means, methods, techniques, sequences, and procedures and for coordinating the various parts of the Work.

.02 The Contractor shall provide adequate labour, Equipment, and Material to ensure the completion of the Contract according to the Contract Documents. The Work shall be performed as vigorously and as continuously as weather conditions or other interferences may permit.

.03 The Contractor shall have the sole responsibility for the design, erection, operation, maintenance, and removal of temporary structures and other temporary facilities and the design and execution of construction methods required in their use.

.04 Notwithstanding clause GC 7.01.03, where the Contract Documents include designs for temporary structures and other temporary facilities or specify a method of construction in whole or part, such facilities and methods shall be considered to be part of the design of the Work, and the Contractor shall not be held responsible for that part of the design or the specified method of construction. The Contractor shall, however, be responsible for the execution of such design or specified method of construction in the same manner that the Contractor is responsible for the execution of the Work.

.05 The Contractor shall comply with and conform to all statutes, laws, by-laws, regulations, requirements, ordinances, notices, rulings, orders, directives and policies of the municipal, provincial and federal governments and any other lawful authority and all court orders, judgments and declarations of a court of competent jurisdiction (collectively referred to as the “Laws”), applicable to the Work to be provided by, and the undertakings and obligations of, the Contractor under this Contract.

GC 7.01.04 Compliance with the Occupational Health and Safety Act

.01 The Contractor shall execute the terms of the Contract in strict compliance with the requirements of the *Occupational Health and Safety Act*, R.S.O. 1990, c.O.1, as amended, (the "Act") and Ontario Regulation 213/91, as amended, (that regulates Construction Projects) and any other regulations as amended under *the Act* (the "Regulations") that may affect the performance of the Work, as the "Constructor" or "employer," as defined by *the Act*, as the case may be. The Contractor shall ensure that:

a) Worker safety is given priority in planning, pricing, and performing the Work;

b) The Contractor’s officers and supervisory employees have a working knowledge of the duties of a "Constructor" and "employer" as defined by *the Act* and the provisions of the Regulations applicable to the Work, and a personal commitment to comply with them;

c) A copy of the most current version of *the Act* and the Regulations are available at the Contractor's office within the Working Area, or, in the absence of an office, in the possession of the supervisor responsible for the performance of the Work;

d) Workers employed to carry out the Work possess the knowledge, skills, and protective devices required by law or recommended for use by a recognized industry association to allow them to work in safety;

e) The Contractor's supervisory employees are "Competent Persons" as defined in the OHSA, and carry out their duties in a diligent and responsible manner with due consideration for the health and safety of the workers;

f) All Subcontractors and their workers are properly protected from injury while they are at the Working Area; and

g) Following execution of the Contract and prior to the issuance of the order to commence by the Owner, upon request the Contractor submits to the Contract Administrator a copy of the Notice of Project issued to the Ministry of Labour.

.02 When requested, the Contractor shall provide the Owner with a copy of its health and safety policy and program at the pre-start meeting and shall respond promptly to requests from the Owner for confirmation that its methods and procedures for carrying out the Work comply with *the Act* and Regulations. The Contractor shall cooperate with representatives of the Owner and the inspectors appointed to enforce *the Act* and the Regulations in any investigations of worker health and safety in the performance of the Work. The Contractor shall indemnify and save the Owner harmless from any additional expense that the Owner may incur to have the Work performed as a result of the Contractor's failure to comply with the requirements of *the Act* and the Regulations.

.03 Prior to commencement of the Work, the Contractor shall provide to the Contract Administrator a list of those products controlled under the Workplace Hazardous Materials Information System "WHMIS", which the Contractor expects to use on the Contract. Related Safety Data Sheets shall accompany the submission. All containers used in the application of products controlled under "WHMIS" shall be labelled. The Contractor shall notify the Contractor Administrator in writing of changes in the products to be used and provide relevant Safety Data Sheets.

.04 During the course of the Work, the Contractor shall furnish forthwith to the Contract Administrator a copy of all correspondence, reports, orders or charges respecting occupational health and safety, including under *the Act*, *Technical Standards and Safety Act*, 2000, S.O. 2000, c.16 as amended, and the Criminal Code, R.S.C., 1985, c. C-46 as amended, which are received by, or which come to the notice of, the Contractor that apply or are relevant to any of the Work or activities conducted under the terms of the Contract.

.05 Nothing in this Contract shall be construed as requiring the Owner to monitor or approve the workplace health and safety practices of the Contractor.

GC 7.01.05 Contractor's Representatives

.01 The Contractor shall have an authorized representative on the site while any Work is being performed, to supervise the Work and act for or on the Contractor's behalf. Prior to commencement of construction, the Contractor shall notify the Contract Administrator of the names, addresses, positions, and cell phone, and telephone numbers of the Contractor's representatives who can be contacted at any time to deal with matters relating to the Contract, and update as necessary.

.02 The Contractor shall designate a person to be responsible for traffic control and work zone safety. The designated person shall be a competent worker who is qualified because of:

a) Knowledge, training, and experience to perform the duties;

b) Is familiar with Book 7 of the Ontario Traffic Manual; and

c) Has knowledge of all potential or actual danger to workers and motorists.

Prior to the commencement of construction, the Contractor shall notify the Contract Administrator of the name; address; position; cell phone, and telephone numbers of the designated person, and update as necessary. The designated person may have other responsibilities, including other construction sites, and need not be present in the Working Area at all times.

GC 7.01.06 Assistance to the Contract Administrator

.01 The Contractor shall, at no additional cost to the Owner, furnish all reasonable aid, facilities, and assistance required by the Contract Administrator for the proper inspection and examination of the Work or the taking of measurements for the purpose of payment.

GC 7.01.07 Schedule

.01 The Contractor shall prepare and update, as required, a construction schedule of operations, indicating the proposed methods of construction and sequence of Work and the time the Contractor proposes to complete the various items of Work within the time specified in the Contract Documents. The schedule shall be submitted to the Contract Administrator within 14 Days from the Contract award. If the Contractor's schedule is materially affected by changes in the work, the Contractor shall submit an updated construction schedule, if requested by the Contract Administrator, within 7 Days of the request. This updated schedule shall show how the Contractor proposes to perform the balance of the Work, to complete the Work within the time specified in the Contract Documents.

.02 For Contracts with a specified number of Working Days, the construction time shown on the initial schedule shall not exceed the specified number of Working Days. The activities on the critical path shall assist the Contract Administrator in determining the Controlling Operation for the purpose of the charging of Working Days. The construction schedule shall include all non-working periods and appropriate allowances for Inclement Weather.

.03 For Contracts which specify a Contract Time, the construction time shown on the initial construction schedule shall not extend beyond the specified Contract Time. The construction schedule shall include all non-working periods and appropriate allowances for Inclement Weather.

GC 7.01.08 Errors and Inconsistencies Relating to the Contract

.01 Where the Contractor finds any error, inconsistency, or omission relating to the Contract, the Contractor shall promptly report it to the Contract Administrator and shall not proceed with the activity affected until receiving direction from the Contract Administrator.

.02 The Contractor shall promptly notify the Contract Administrator in writing if the subsurface conditions observed in the Working Area differ materially from those indicated in the Contract Documents.

GC 7.01.09 Utilities

.01 The Contractor shall arrange with the appropriate Utility authorities for the stake out of all underground Utilities and service connections that may be affected by the Work. The Contractor shall observe the location of the stake outs prior to commencing the Work and if there is a discrepancy between the location of the stake outs and the locations shown on the Contract Documents, that may affect the Work, the Contractor shall immediately notify the Contract Administrator and the affected Utility companies, in order to resolve the discrepancy. The Contractor shall be responsible for any damage done to the underground

Utilities and service connections by the Contractor's forces during construction if the stake out locations are within the tolerances given in clause GC 2.01.01 (a).

.02 In the case of damage to or interference with any Utilities, pole lines, pipe lines, conduits, farm tiles, or other public or privately-owned works or property, the Contractor shall immediately notify the Owner, Contract Administrator, and the owner of the works of the location and details of such damage or interference.

GC 7.02 Monuments and Layout

.01 Prior to commencement of construction, the Contract Administrator and the Contractor shall locate on site those Monuments that delineate the Working Area and may be used to lay out the Work, all as shown on the Contract Drawings. Property Monuments shall be inventoried in the report format required by the Owner.

.02 These Monuments shall be protected by highly visible T-bars or 1.0 metre tall stakes with survey ribbon set within 0.3 metres of the Monument.

.03 The Contractor shall be responsible for the preservation of all Property Monuments while the Work is in progress, except those Property Monuments that must be removed to facilitate the Work as identified and agreed by the Contractor and Contract Administrator. Monuments removed to facilitate the Work shall be replaced at the Owner's expense, and all others shall be replaced at the Contractor's expense.

.04 All Monuments disturbed, damaged, or removed by the Contractor's operations shall be documented in the inventory report and replaced under the supervision of an Ontario Land Surveyor.

.05 The Monument inventory report referred to in clauses GC 7.02.01 and GC 7.02.04 shall include as a minimum:

a) Contract number, Contract name, Contract Administrator's name;

b) Project/site construction limits;

c) Rough location, type, identification number, and condition of each Monument before and after construction;

d) The solutions for protection of the Monuments that may be impacted by construction;

e) Reference ties;

f) A summary of those Monuments affected by the Work and how they were reset or replaced, and by what type of Monument.

.06 At no extra cost to the Owner, the Contractor shall provide the Contract Administrator with such materials and devices as may be necessary to lay out the baseline and benchmarks, and as may be necessary for the inspection of the Work.

.07 The Contractor shall provide qualified personnel to lay out and establish all lines and grades necessary for construction. The Contractor shall notify the Contract Administrator of any layout work carried out, so that the same may be checked by the Contract Administrator.

.08 The Contractor shall install and maintain substantial alignment markers and secondary benchmarks as may be required for the proper execution of the Work. The Contractor shall supply one copy of all alignment and grade sheets to the Contract Administrator.

.09 The Contractor shall assume full responsibility for alignment, elevations, and dimensions of each and all parts of the Work, regardless of whether the Contractor's layout work has been checked by the Contract Administrator.

.10 All stakes, marks, and reference points shall be carefully preserved by the Contractor. In the case of their destruction or removal, for any reason, before the end of the Contract Time such stakes, marks, and reference points shall be replaced, unless otherwise mutually agreed between the Contractor and the Contract Administrator, at the Contractor's expense.

.11 Benchmarks and survey monuments identified in the Contract Documents shall be protected by the Contractor. In the case of their destruction or removal, such benchmarks and survey monuments shall be replaced by the Owner at the Contractor's expense.

GC 7.03 Working Area

.01 The Contractor shall maintain the Working Area in a tidy condition and free from the accumulation of debris and prevent dust nuisance, mud, and ponding water, other than that caused by the Owner or others.

.02 The Contractor's sheds, site offices, toilets, other temporary structures, and storage areas for Material and Equipment shall be grouped in a compact manner, maintained in a neat and orderly condition at all times and removed upon completion of the Work.

.03 The Contractor shall confine the construction operations to the Working Area. Should the Contractor require additional space, the Contractor shall obtain such space at no additional cost to the Owner.

.04 The Contractor shall not enter upon or occupy any private property for any purpose, unless the Contractor has received prior written permission from the property owner.

.05 Upon completion of the Contract, the Working Area used by the Contractor shall be restored to its original condition or better unless otherwise specified in the Contract Documents including the removal of all excavated and stockpiled materials at the Contractor's expense.

GC 7.04 Damage by Vehicles or Other Equipment

.01 If at any time, in the opinion of the Contract Administrator, damage is being done or is likely to be done to any Roadway or any improvement thereon, outside the Working Area, by the Contractor's vehicles or other Equipment, whether licensed or unlicensed Equipment, the Contractor shall, on the direction of the Contract Administrator, and at no extra cost to the Owner, make changes or substitutions for such vehicles or Equipment, and shall alter loadings, or in some other manner, remove the cause of such damage to the satisfaction of the Contract Administrator.

GC 7.05 Excess Loading of Motor Vehicles

.01 Where a vehicle is hauling Material for use on the Work, in whole or in part; upon a Highway; and where motor vehicle registration is required for such vehicle, the Contractor shall not cause or permit such vehicle to be loaded beyond the legal limit specified in the *Highway Traffic Act*, R.S.O. 1990, c.H.8, as amended, whether such vehicle is registered in the name of the Contractor or otherwise, except where there are designated areas within the Working Area where overloading is permitted. The Contractor shall bear the onus of weighing disputed loads.

GC 7.06 Maintaining Roads and Detours

.01 Unless otherwise specified in the Contract Documents, if an existing Roadway is affected by construction, it shall be kept open to both vehicular and pedestrian traffic.

.02 Subject to the approval of the Contract Administrator, the Contractor shall, at no additional cost to the Owner, be responsible for providing and maintaining for the duration of the Work an alternative route for both pedestrian and vehicular traffic through the Working Area according to the OTM, whether along the existing Highway under construction or on a detour road beside or adjacent to the Highway under construction.

.03 Subject to the approval of the Contract Administrator, the Contractor may block traffic for short periods of time to facilitate construction of the Work according to the OTM. Any temporary lane closures shall be kept to a minimum.

.04 The Contractor shall not be required to maintain a road through the Working Area until such time as the Contractor has commenced operations or during seasonal shut down or on any part of the Contract that has been accepted according to these General Conditions. The Contractor shall not be required to apply de-icing chemicals or abrasives or carry out snowplowing.

.05 Where only localized and separated sections of the Highway are affected by the Contractor's operations, the Contractor shall not be required to maintain intervening sections of the Highway until such times as these sections are located within the limits of the Highway affected by the Contractor's general operations under the Contract.

.06 Where the Contract Documents provide for or the Contract Administrator requires detours at specific locations, payment for the construction of the detours and, if required, for the subsequent removal of the detours, shall be made at the Contract prices appropriate to such Work.

.07 Compensation for all labour, Equipment, and Materials to do this Work shall be at the Contract prices appropriate to the Work and, where there are no such prices, at negotiated prices. Notwithstanding the foregoing, the cost of blading required to maintain the surface of such roads and detours shall be deemed to be included in the prices bid for the various tender items and no additional payment shall be made.

.08 Where Work under the Contract is discontinued for any extended period, including seasonal shutdown, the Contractor shall, when directed by the Contract Administrator, open and place the Roadway and detours in a passable, safe, and satisfactory condition for public travel.

.09 Where the Contractor constructs a detour that is not specifically provided for in the Contract Documents or required by the Contract Administrator, the construction of the detour and, if required, the subsequent removal shall be performed at the Contractor's expense. The detour shall be constructed and maintained to structural and geometric standards approved by the Contract Administrator. Removal and site restoration shall be performed as directed by the Contract Administrator.

.10 Where, with the prior written approval of the Contract Administrator, the Highway is closed and the traffic diverted entirely off the Highway to any other Highway, the Contractor shall, at no extra cost to the Owner, supply, erect, and maintain traffic control devices according to the OTM.

.11 Compliance with the foregoing provisions shall in no way relieve the Contractor of its obligations under subsection GC 6.01, Protection of Work, Persons, and Property, dealing with the Contractor's responsibility for damage claims, except for claims arising on sections of Highway within the Working Area that are being maintained by others.

GC 7.07 Access to Properties Adjoining the Work and Interruption of Utility Services

.01 The Contractor shall provide at all times and at no extra cost to the Owner:

a) Safe and adequate pedestrian and vehicular access;

b) Continuity of Utility services; and

c) Access for emergency response services;

to properties adjoining the Working Area.

.02 The Contractor shall provide at all times and at no extra cost to the Owner access to fire hydrants, water and gas valves, and all other Utilities located in the Working Area.

.03 Where any interruptions in the supply of Utility services are required and are authorized by the Contract Administrator, the Contractor shall give the affected property owners notice according to subsection GC 7.11, Notices by the Contractor, and shall arrange such interruptions so as to create a minimum of interference to those affected.

GC 7.08 Approvals and Permits

.01 Except as specified in subsection GC 4.02, Approval and Permits, the Contractor shall obtain and pay for any permits, licences, and certificates, which at the date of tender closing, are required for the performance of the Work.

.02 The Contractor shall arrange for all necessary inspections required by the approvals and permits specified in clause GC 7.08.01, Approvals and Permit.

GC 7.09 Suspension of Work

.01 The Contractor shall, upon written notice from the Contract Administrator, discontinue or delay any or all of the Work and Work shall not be resumed until the Contract Administrator so directs in writing. Delays, in these circumstances, shall be administered according to subsection GC 3.07, Delays.

GC 7.10 Contractor's Right to Stop the Work or Terminate the Contract

.01 If the Owner is adjudged bankrupt or makes a general assignment for the benefit of creditors because of insolvency or if a receiver is appointed because of insolvency, the Contractor may, without prejudice to any other right or remedy the Contractor may have, by giving the Owner or receiver or trustee in bankruptcy written notice, terminate the Contract.

.02 If the Work is stopped or otherwise delayed for a period of 30 Days or more under an order of a court or other public authority and provided that such order was not issued as the result of an act or fault of the Contractor or of anyone directly employed or engaged by the Contractor, the Contractor may, without prejudice to any other right or remedy the Contractor may have, by giving the Owner written notice, terminate the Contract.

.03 The Contractor may notify the Owner in writing, with a copy to the Contract Administrator, that the Owner is in default of contractual obligations if:

a) The Contract Administrator fails to issue certificates according to the provisions of section GC 8.0, Measurement and Payment;

b) The Owner fails to pay the Contractor, within 28 Days of the due dates identified in clause GC 8.02.04, Certification and Payment, the amounts certified by the Contract Administrator or within 28 Days of an award by an arbitrator or court; or

c) The Owner fails to comply with the requirements of the Contract.

.04 The Contractor's written notice to the Owner shall advise that if the default is not corrected in the 7 Days immediately following receipt of the written notice, the Contractor may, without prejudice to any other right or remedy the Contractor may have, stop the Work or terminate the Contract.

.05 If the Contractor terminates the Contract under the conditions set out in subsection GC 7.10, Contractor's Right to Stop the Work or Terminate the Contract, the Contractor shall be entitled to be paid for all Work performed according to the Contract Documents and for any losses or damage as the Contractor may sustain as a result of the termination of the Contract.

GC 7.11 Notices by the Contractor

.01 Before any Work is carried out that may affect the property or operations of any Ministry or agency of government or any person; company; partnership; or corporation, including a municipal corporation or any board or commission thereof, and in addition to such notices of the commencement of specified operations as are prescribed elsewhere in the Contract Documents, the Contractor shall give at least 48 hours advance written notice of the date of commencement of such Work to the person, company, partnership, corporation, board, or commission so affected.

GC 7.12 Environmental Incident Management under Legislation Protecting the Environment and Natural Resources

.01 The Contractor shall be in strict compliance with the requirements of the following legislation, as amended, regarding environmental incidents under the control of the Contractor or that are a result of the Contractor's operations:

a) *Environmental Protection Act*, R.S.O. 1990, c. E.19

b) *Fisheries Act*, R.S.C. 1985, c. F-14

c) *Technical Standards and Safety Act*, 2000, S.O. 2000, c. 16

d) *Pesticides Act*, R.S.O. 1990, c. P.11

e) *Ontario Water Resources Act*, R.S.O. 1990, c. O.40

f) *Transportation of Dangerous Goods Act*, 1992, S.C.1992, c. 34

.02 The requirements of the legislation listed in clause GC 7.12.01 include but are not restricted to:

a) Immediate containment of the material, pollutant, contaminant, deleterious substance, or dangerous good;

b) Immediate notification of the environmental incident to the proper authority; and

c) Clean up and restoration of the environment to preconditions.

.03 The Contractor shall possess a plan demonstrating that environmental incidents shall be managed to satisfy the requirements of clauses GC 7.12.01 and GC 7.12.02.

.04 The Contractor shall provide a copy of the environmental incident plan to the Contract Administrator when required and shall inform the Contract Administrator immediately of:

a) An environmental incident when it occurs; and

b) Any actions taken or intended to be taken by the Contractor regarding the environmental incident.

.05 The Contractor shall indemnify and save the Owner harmless from any additional expense that the Owner may incur to have the Work performed as a result of the Contractor's failure to comply with the requirements of the legislation listed in clause GC 7.12.01.

GC 7.13 Obstructions

.01 Except as otherwise noted in these General Conditions, the Contractor assumes all the risks and responsibilities arising out of any obstruction encountered in the performance of the Work and any traffic conditions, including traffic conditions on any Highway or road giving access to the Working Area caused by such obstructions, and the Contractor shall not make any claim against the Owner for any loss, damage, or expense occasioned thereby.

.02 Where the obstruction is an underground Utility or other human-made object, the Contractor shall not be required to assume the risks and responsibilities arising out of such obstruction, unless the location of the obstruction is shown on the Plans or described in the Contract Documents and the location so shown is within the tolerance specified in clause GC 2.01.01 a), or unless the presence and location of the obstruction has otherwise been made known to the Contractor or could have been determined by the visual site investigation made by the Contractor according to these General Conditions.

.03 During the course of the Contract, it is the Contractor's responsibility to consult with Utility companies or other appropriate authorities for further information in regard to the exact location of these Utilities, to exercise the necessary care in construction operations, and to take such other precautions as are necessary to safeguard the Utilities from damage.

GC 7.14 Limitations of Operations

.01 Except for such Work as may be required by the Contract Administrator to maintain the Work in a safe and satisfactory condition, the Contractor shall not carry out operations under the Contract on Saturdays, Sundays, and any holidays recognized by the Owner without permission in writing from the Contract Administrator.

.02 The Contractor shall cooperate and coordinate the Work with other Contractors, Utility companies, and the Owner and they shall be allowed access to their Work or plant at all reasonable times.

GC 7.15 Cleaning Up Before Acceptance

.01 Upon attaining Substantial Performance of the Work, the Contractor shall remove surplus materials, tools, and Equipment not required for the performance of the remaining Work. The Contractor shall also remove all temporary works and debris other than that caused by the Owner or others and leave the Work and Working Area clean and suitable for occupancy by the Owner, unless otherwise specified.

.02 The Work shall not be deemed to have reached Completion until the Contractor has removed surplus materials, tools, and Equipment. The Contractor shall also have removed debris, other than that caused by the Owner, or others.

GC 7.16 Warranty

.01 Unless otherwise specified in the Contract Documents for certain Materials or components of the Work, the Contractor shall be responsible for the proper performance of the Work only to the extent that the design and standards permit such performance.

.02 Subject to the previous paragraph the Contractor shall correct promptly, at no additional cost to the Owner, defects or deficiencies in the Work that appear:

a) Prior to and during the period of 12 months from the date of Substantial Performance of the Work, as set out in the Certificate of Substantial Performance of the Work,

b) Where there is no Certificate of Substantial Performance, 12 months from the date of Completion of the Work as set out in the Completion Certificate, or

c) Such longer periods as may be specified in the Contract Documents for certain Materials or some of the Work.

The Contract Administrator shall promptly give the Contractor written notice of observed defects or deficiencies.

.03 The Contractor shall correct or pay for damage resulting from corrections made under the requirements of clause GC 7.16.02.

GC 7.17 Contractor's Workers

.01 The Contractor shall only employ orderly, competent, and skillful workers to do the Work and whenever the Contract Administrator shall inform the Contractor in writing that any worker or workers involved in the Work are, in the opinion of the Contract Administrator, incompetent, or disorderly such worker or workers shall be removed from the Work and shall not be employed on the Work again without the consent in writing of the Contract Administrator.

GC 7.18 Drainage

.01 During construction and until the Work is completed, the Contractor shall make all reasonable efforts to keep all portions of the Work properly and efficiently drained, to at least the same degree as that of the existing drainage conditions.

SECTION GC 8.0 - MEASUREMENT AND PAYMENT

GC 8.01 Measurement

GC 8.01.01 Quantities

.01 The Contract Administrator shall make an Estimate in writing once a month, unless otherwise specified in the Contract Documents, of the quantity of Work performed and provide such Estimate to the Contractor within 10 Days of the Cut-Off Date.

.02 Quantities for progress payments shall be construed and held to be approximate. The final quantities for the issuance of the Completion Payment shall be based on the measurement of Work completed.

.03 Measurement of the quantities of the Work performed may be either by Actual Measurement or by Plan Quantity principles as indicated in the Contract Documents. Adjustments to Plan Quantity measurements shall normally be made using Plan Quantity principles but may, where appropriate, be made using Actual Measurements. Those items identified on the Tender by the notation (P) in the unit column shall be paid according to the Plan Quantity. Items where the notation (P) does not occur shall be paid according to Actual Measurement or lump sum.

GC 8.01.02 Variations in Tender Quantities

.01 Where it appears that the quantity of work to be done or Material to be supplied or both by the Contractor under a unit price tender item may exceed or be less than the tender quantity, the Contractor shall proceed to do the work or supply the Material or both required to complete the tender item and payment shall be made for the actual amount of work done or Material supplied or both at the unit prices stated in the Tender except as provided below:

a) In the case of a Major Item where the quantity of work performed or Material supplied or both by the Contractor exceeds the tender quantity by more than 15%, either party to the Contract may make a written request to the other party to negotiate a revised unit price for that portion of the work performed or Material supplied or both which exceeds 115% of the tender quantity. The negotiation shall be carried out as soon as reasonably possible. Any revision of the unit price shall be based on the actual cost of doing the work or supplying the Material or both under the tender item plus a reasonable allowance for profit and applicable overhead.

b) In the case of a Major Item where the quantity of work performed or Material supplied or both by the Contractor is less than 85% of the tender quantity, the Contractor may make a written request to negotiate for the portion of the actual overheads and fixed costs applicable to the amount of the underrun in excess of 15% of the tender quantity. For purposes of the negotiation, the overheads and fixed costs applicable to the item are deemed to have been prorated uniformly over 100% of the tender quantity for the item. Overhead costs shall be confirmed by a statement certified by the Contractor's senior financial officer or auditor and may be audited by the Owner. Alternatively, where both parties agree, an allowance equal to 10% of the unit price on the amount of the underrun in excess of 15% of the tender quantity shall be paid.

Written requests for compensation must be received no later than 60 Days after the issuance of the Completion Payment.

GC 8.02 Payment

GC 8.02.01 Non-Resident Contractor

.01 If the Contractor is not a registered entity in Ontario, the Contractor shall obtain all necessary approvals, consents, permits, licences, certificates, registrations, and other authorizations prior to execution of the Contract.

.02 The Contractor shall ensure that all Subcontractors the Contractor proposes to use for carrying out any of the Work required by the Contract and who are not a registered entity in Ontario have obtained all necessary approvals, consents, permits, certificates, registrations, and other authorizations prior to execution of the subcontract.

GC 8.02.02 Price for Work

.01 Prices for the Work shall be full compensation for all labour, Equipment and Material required to do the work. The term "all labour, Equipment, and Material" shall include Hand Tools, supplies, and other incidentals.

.02 Payment, for Work which is identified in the Contract Documents but not specifically detailed as part of any one item shall be deemed to be included in the items with which it is associated.

GC 8.02.03 Advance Payments for Material

.01 The Owner shall make advance payments for Material intended for incorporation in the Work upon the written request of the Contractor and according to the following terms and conditions:

a) The Contractor shall deliver the Material to a site approved by the Contract Administrator and the Contractor shall, in advance of receipt of the shipment of the Material, arrange for adequate and proper storage facilities.

b) The value of aggregates, processed and stockpiled, shall be assessed by the following procedure:

i. Sources Other Than Commercial

(A) Granular A, B, BI, BII, BIII, M, and O shall be assessed at the rate of 60% of the Contract price.

(B) Coarse and fine aggregates for hot mix asphaltic concrete, surface treatment and cement concrete shall be assessed at the rate of 25% of the Contract price for each aggregate stockpiled.

ii. Commercial Sources

(A) Payment for separated coarse and fine aggregates shall be considered at the above rate when such Materials are stockpiled at a commercial source where further processing is to be carried out before incorporating such Materials into a final product. Advance payments for other Materials located at a commercial source shall not be made.

c) Payment for all other Materials, unless otherwise specified elsewhere in the Contract Documents, shall be based on the invoice price, and the Contractor shall submit proof of cost to the Contract Administrator before payment can be made by the Owner.

d) The payment for all Materials shall be prorated against the appropriate tender item by paying for sufficient units of the item to cover the value of the Material. Such payment shall not exceed 80% of the Contract price for the item.

e) All Materials for which the Contractor wishes to receive advance payment shall be placed in the designated storage location immediately upon receipt of the Material and shall thenceforth be held by the Contractor in trust for the Owner as collateral security for any monies advanced by the Owner and for the due completion of the Work. The Contractor shall not exercise any act of ownership inconsistent with such security, or remove any Material from the storage locations, except for inclusion in the Work, without the consent, in writing, of the Contract Administrator.

f) Such materials shall remain at the risk of the Contractor who shall be responsible for any loss, damage, theft, improper use, or destruction of the Material however so caused.

.02 Where the Owner makes advance payments subject to the conditions listed in clause GC 8.02.03.01, such payment shall not constitute acceptance of the Material by the Owner. Acceptance shall only be determined when the Material meets the requirements of the appropriate specification.

GC 8.02.04 Certification and Payment

GC 8.02.04.01 Progress Payment

.01 The Contractor shall submit a Proper Invoice for progress payments monthly or at intervals specified in the Contract Documents after starting the Work on this Contract. The Contractor shall submit the Proper Invoice to the Contract Administrator and to the Owner. This Proper Invoice shall be for work completed at the agreed to Cut-Off Date.

.02 A Proper Invoice shall include;

a) the requirements as set out in section 6.1 of the *Construction Act*;

b) the quantities of Work performed;

c) the value of Work performed;

d) any advanced payment for Material;

e) the amount of Statutory Holdback, liens, Owner's set-off;

f) the amount of any applicable taxes;

g) the amount due to the Contractor; and

h) any other information that may be prescribed in the Contract Documents.

.03 Payment shall be made within 28 Days of the submission of the Proper Invoice unless a notice of non-payment has been issued according to the *Construction Act*.

.04 The Owner shall retain the Statutory Holdback in the form and amount as required under the *Construction Act*.

GC 8.02.04.02 Certification of Subcontract Completion

.01 Before the Work has reached the stage of Substantial Performance, the Contractor may notify the Contract Administrator, in writing that a subcontract is completed satisfactorily and ask that the Contract Administrator certify the completion of such subcontract.

.02 The Contract Administrator shall issue a Certificate of Subcontract Completion, if the subcontract has been completed in a form satisfactory to the Contract Administrator, and all required inspection and testing of the works covered by the subcontract have been carried out and the results are satisfactory to the Contract Administrator.

.03 The Contract Administrator shall set out in the Certificate of Subcontract Completion the date on which the subcontract was completed and, within 7 Days of the date the subcontract is certified complete, the Contract Administrator shall give a copy of the certificate to the Contractor and to the Subcontractor concerned.

GC 8.02.04.03 Subcontract Statutory Holdback Release Certificate and Payment

.01 Following receipt of the Certificate of Subcontract Completion, the Owner shall release and pay the Contractor the Statutory Holdback retained in respect of the subcontract. Such release shall be made 61 Days after the date the subcontract was certified complete and providing the Contractor submits the following to the Contract Administrator:

a) A document satisfactory to the Contract Administrator that shall release the Owner from all further claims relating to the subcontract, qualified by stated exceptions such as holdback monies;

b) Evidence satisfactory to the Contract Administrator that the Subcontractor has discharged all liabilities incurred in carrying out the subcontract;

c) A satisfactory clearance certificate or letter from the Workplace Safety and Insurance Board relating to the subcontract; and

d) A copy of the contract between the Contractor and the Subcontractor and a satisfactory statement showing the total amount due the Subcontractor from the Contractor.

.02 Clause GC 8.02.04.03.01 (d), shall only apply to Lump Sum Items and then only when the Contract Administrator specifically requests it.

.03 Upon receipt of the Statutory Holdback, the Contractor shall forthwith give the Subcontractor the payment due under the subcontract.

.04 Release of Statutory Holdback by the Owner in respect of a subcontract shall not relieve the Contractor, or the Contractor's Surety, of any of their responsibilities.

GC 8.02.04.04 Substantial Performance of Work

.01 The Contractor, as part of the application for Substantial Performance, shall submit an itemized list of the outstanding work.

.02 Upon application by the Contractor and when the Contract Administrator has verified that the Contract has been substantially performed, the Contract Administrator shall issue a Certificate of Substantial Performance.

.03 The Contract Administrator shall set out in the Certificate of Substantial Performance the date on which the Contract was substantially performed and, within 7 Days after signing the said certificate, and shall provide a copy to the Contractor.

.04 Upon receipt of a copy of the Certificate of Substantial Performance, the Contractor shall forthwith, as required by Section 32(1) Paragraph 5 of the *Construction Act*, as amended, publish a copy of the certificate in the manner set out in the regulations.

.05 Where the Contractor fails to publish a copy of the Certificate of Substantial Performance as required above within 7 Days after receiving a copy of the certificate signed by the Contract Administrator, the Owner may publish a copy of the certificate at the Contractor's expense.

.06 Except as otherwise provided for in Section 31 of the *Construction Act*, the 60 Day lien period prior to the release of holdback as referred to in clause GC 8.02.04.05, Substantial Performance Payment and Statutory Holdback Release Payment Certificates, shall commence from the date of publication of the Certificate of Substantial Performance as provided for above.

GC 8.02.04.05 Substantial Performance Payment and Substantial Performance Statutory Holdback Release Payment Certificates

.01 Prior to the Contract Administrator issuing the Certificate of Substantial Performance, the Contractor shall submit a Proper Invoice for the Work completed. In addition to the requirements specified under section 8.02.04.01.02, the Proper Invoice shall include:

a) The value of Work performed to the date of Substantial Performance;

b) The value of outstanding or incomplete Work;

c) The amount of the Statutory Holdback, allowing for any previous releases of Statutory Holdback to the Contractor in respect of completed subcontracts and deliveries of pre-selected Equipment; and

d) The amount due to the Contractor.

.02 Payment shall be made within 28 Days of the date of submission of the Proper Invoice.

.03 The Substantial Performance Statutory Holdback Release Payment Certificate shall be a payment certificate releasing to the Contractor the Statutory Holdback due in respect of Work performed up to the date of Substantial Performance. Payment of such Statutory Holdback shall be due 61 Days after the date of publication of the Certificate of Substantial Performance but subject to the provisions of the *Construction Act* and the submission by the Contractor of the following documents:

a) A satisfactory Certificate of Clearance from the Workplace Safety and Insurance Board; and

b) Proof of publication of the Certificate of Substantial Performance.

.04 Any amount of security retained shall be identified on the Substantial Performance Payment Certificate.

GC 8.02.04.06 Certification of Completion

.01 Upon application by the Contractor and when the Contract Administrator has verified that the Contract has reached Completion, the Contract Administrator shall issue a Completion Certificate.

.02 The Contract Administrator shall set out in the Completion Certificate the date on which the Work was completed and, within 7 Days of signing the said certificate, the Contract Administrator shall provide a copy to the Contractor.

GC 8.02.04.07 Completion Payment and Completion Statutory Holdback Release Payment Certificates

.01 Prior to the Contract Administrator issuing the Completion Certificate, the Contractor shall submit a Proper Invoice for the Work completed. In addition to the requirements noted under section 8.02.04.01.02, the Proper Invoice shall include:

a) Measurement and value of Work at Completion;

b) The amount of the further Statutory Holdback based on the value of further Work completed over and above the value of Work completed shown in the Substantial Performance Payment Certificate referred to above; and

c) The amount due to the Contractor.

.02 The Completion Statutory Holdback Release Payment Certificate shall be a payment certificate releasing to the Contractor the further Statutory Holdback. Subject to any outstanding liens and permissible set-offs

and upon submission of a satisfactory Certificate of Clearance from the Workplace Safety and Insurance Board, the Owner shall pay the remaining holdback on the Work done, within 28 Days after the expiration of the 60-Day lien period.

.03 Any amount of security retained shall be identified on the Completion Payment Certificate.

GC 8.02.04.08 Interest

.01 Interest due to the Contractor shall be based on simple interest and calculated using the applicable Rate of Interest. Interest shall begin to accrue on an amount that is not paid when it is due to be paid under Part-I of the *Construction Act*, at the prejudgment interest rate determined under subsection 127 (2) of the *Courts of Justice Act* or, if the Contract specifies a different interest rate for this purpose, the greater of the prejudgment interest rate and the interest rate specified in the Contract.

GC 8.02.04.09 Interest for Late Payment

.01 Provided the Contractor has complied with the requirements of the Contract, including all documentation requirements, when payment by the Owner to the Contractor for Work performed, or for release of Statutory Holdback, is delayed by the Owner, then the Contractor shall be entitled to receive interest on the outstanding payment at the Rate of Interest, if payment is not received on the dates set out below:

a) Progress Payment: 28 Days after submission of Proper Invoice;

b) Subcontract Statutory Holdback Release Payment: 89 Days after the date on which the subcontract was completed;

c) Substantial Performance Payment: 28 Days after the date of issuance of the certificate;

d) Substantial Performance Statutory Holdback Release Payment: 89 Days after publication of the Payment Certificate of Substantial Performance;

e) Completion Payment: 28 Days after the date certified as the date on which the Contract reached Completion; and

f) Completion Statutory Holdback Release Payment: 89 Days after the date certified as the date that the Work was completed.

.02 If the Contractor has not complied with the requirements of the Contract, including all documentation requirements, prior to expiration of the time periods described in clause GC 8.02.04.09.01, interest shall only begin to accrue when the Contractor has completed those requirements.

GC 8.02.04.10 Interest for Negotiations and Claims

.01 Except as hereinafter provided, where a notice of negotiation, notice of intent to claim and the subsequent claims are submitted according to the time limits or procedure or both described by subsection GC 3.13, Claims, Negotiations, Mediation, the Owner shall pay the Contractor the Rate of Interest on the amount of the negotiated price for that part of the Work or on the amount of the settled claim. Such interest shall not commence until 30 Days after the satisfactory completion of that part of the Work.

.02 Where the Contractor fails to give notice of a claim within the time limit prescribed by subsection GC 3.13, Claims, Negotiations, Mediation, interest shall not be paid.

.03 Where a Contractor fails to comply with the 30 Day time limit and the procedures prescribed in clause GC 3.13.03.03 for submission of claims, interest shall not be paid for the delay period.

GC 8.02.04.11 Owner's Set-Off

.01 Pursuant to the *Construction Act*, the Owner may retain from monies owing to the Contractor under this Contract an amount sufficient to cover any outstanding or disputed liabilities, including the cost to remedy deficiencies, the reduction in value of substandard portions of the Work, claims for damages by third parties that have not been determined in writing by the Contractor's insurer, undetermined claims by the Owner, and any assessment due the Workplace Safety and Insurance Board.

.02 Under these circumstances the Owner will give the Contractor appropriate notice of such action.

GC 8.02.04.12 Delay in Payment

.01 The Owner shall not be deemed to be in default of the Contract provided any delay in payment does not exceed the due dates as defined in clause GC 8.02.04.09.01.

GC 8.02.05 Payment on a Time and Material Basis

GC 8.02.05.01 Definitions

.01 For the purpose of clause GC 8.02.05 the following definitions apply:

Cost of Labour means the amount of wages, salary, travel, travel time, food, lodging, or similar items and Payroll Burden paid or incurred directly by the Contractor to or in respect of labour and supervision actively and necessarily engaged on the Work based on the recorded time and hourly rates of pay for such labour and supervision but shall not include any payment or costs incurred for general supervision, administration, and management time spent on the entire Work or any wages, salary, or Payroll Burden for which the Contractor is compensated by any payment made by the Owner for Equipment.

Cost of Material means the cost of Material purchased or supplied from stock and valued at current market prices for the purpose of carrying out Extra Work by the Contractor or by others, when such arrangements have been made by the Contractor for completing the Work, as shown by itemized invoices.

Operated Rented Equipment means Rented Equipment for which an operator is provided by the supplier of the Equipment and for which the rent or lease includes the cost of the operator.

Payroll Burden means the payments in respect of workplace insurance, vacation pay, employment insurance, public liability and property damage insurance, sickness and accident insurance, pension fund, and such other welfare and benefit payments forming part of the Contractor's normal labour costs.

Rented Equipment means Equipment that is rented or leased for the special purpose of Work on a Time and Material Basis from a person, firm, or corporation that is not an associate of the lessee as the word “associate” is defined by the *Securities Act*, R.S.O. 1990, c.S.5, as amended, and is approved by the Contract Administrator.

Road Work means the preparation, construction, finishing, and construction maintenance of roads, streets, Highways, and parking lots and includes all work incidentals thereto other than Work on structures.

Sewer and Watermain Work means the preparation, construction, finishing, and construction maintenance of sewer systems and watermain systems, and includes all work incidental thereto other than Work on structures.

Standby Time means any period of time that is not considered Working Time and which together with the Working Time does not exceed 10 hours in any one Working Day and during which time a unit of Equipment cannot practically be used on other Work but must remain on the site in order to continue with its assigned task and during which time the unit is in fully operable condition.

Structure Work means the construction, reconstruction, repair, alteration, remodelling, renovation, or demolition of any bridge, building, tunnel, or retaining wall and includes the preparation for and the laying of the foundation of any bridge, building, tunnel, or retaining wall and the installation of Equipment and appurtenances incidental thereto.

The 127 Rate means the rate for a unit of Equipment as listed in OPSS.PROV 127, Schedule of Rental Rates for Construction Equipment, Including Model and Specification Reference, that is current at the time the work is carried out or for Equipment that is not so listed, the rate that has been calculated by the Owner, using the same principles as used in determining The 127 Rate.

Work on a Time and Material Basis means Changes in the Work, Extra Work, and Additional Work approved by the Contract Administrator for payment on a Time and Material basis. The Work on a Time and Material Basis shall be subject to all the terms, conditions, Standard Specifications and provisions of the Contract.

Working Time means each period of time during which a unit of Equipment is actively and of necessity engaged on a specific operation and the first 2 hours of each immediately following period during which the unit is not so engaged but during which the operation is otherwise proceeding and during which time the unit cannot practically be transferred to other Work but must remain on the site in order to continue with its assigned tasks and during which time the unit is in a fully operable condition.

GC 8.02.05.02 Daily Work Records

.01 Daily Work Records, prepared as the case may be by either the Contractor's representative or the Contract Administrator reporting the labour and Equipment employed and the Material used on each Time and Material project, should be reconciled and signed each Day by both the Contractor's representative and the Contract Administrator. If it is not possible to reconcile the Daily Work Records, then the Contractor shall submit the un-reconciled Daily Work Records with its claim, whereby the resolution of the dispute about the Daily Work Records shall not be resolved until there is a resolution of the claim.

GC 8.02.05.03 Payment for Work

.01 Payment as herein provided shall be full compensation for all labour, Equipment, and Material to do the Work on a Time and Material Basis except where there is agreement to the contrary prior to the commencement of the Work on a Time and Material Basis. The payment adjustments on a Time and Material basis shall apply to each individual Change Order authorized by the Contract Administrator.

GC 8.02.05.04 Payment for Labour

.01 The Owner shall pay the Contractor for labour employed on each Time and Material project at 135% of the Cost of Labour up to $3,500, then at 120% of any portion of the Cost of Labour in excess of $3,500.

.02 The Owner shall make payment in respect of Payroll Burden for Work on a Time and Material Basis at the Contractor's actual cost of Payroll Burden.

.03 At the Owner's discretion, an audit may be conducted in which case the actual Payroll Burden so determined shall be applied to all Time and Material work on the Contract.

GC 8.02.05.05 Payment for Material

.01 The Owner shall pay the Contractor for Material used on each Time and Material project at 120% of the Cost of the Material up to $3,500, then at 115% of any portion of the Cost of Material in excess of $3,500.

GC 8.02.05.06 Payment for Equipment

GC 8.02.05.06.01 Working Time

.01 The Owner shall pay the Contractor for the Working Time of all Equipment, other than Rented Equipment and Operated Rented Equipment, used on the Work on a Time and Material basis at the 127 Rate.

.02 The Owner shall pay the Contractor for the Working Time of Rented Equipment used on the Work on a Time and Material Basis at 110% of the invoice price approved by the Contract Administrator up to a maximum of 110% of the 127 Rate. This constraint shall be waived when the Contract Administrator approves the invoice price prior to the use of the Rented Equipment.

.03 The Owner shall pay the Contractor for the Working Time of Operated Rented Equipment used on the Work on a Time and Material Basis at 110% of the Operated Rented Equipment invoice price approved by the Contract Administrator prior to the use of the Equipment on the Work on a Time and Material Basis.

GC 8.02.05.06.02 Standby Time

.01 The Owner shall pay the Contractor for Standby Time of Equipment at 35% of The 127 Rate or 35% of the invoice price whichever is appropriate. The Owner shall pay reasonable costs for Rented Equipment where this is necessarily retained in the Working Area for extended periods agreed to by the Contract Administrator. This shall include Rented Equipment intended for use on other work, but has been idled due to the circumstances giving rise to the Work on a Time and Material Basis.

.02 In addition, the Owner shall include the Cost of Labour of operators or associated labourers who cannot be otherwise employed during the Standby Time or during the period of idleness caused by the circumstances giving rise to the Work on a Time and Material Basis.

.03 The Contract Administrator may require Rented Equipment idled by the circumstances giving rise to the Work on Time and Material Basis to be returned to the lessor until the Work requiring the Equipment can be resumed. The Owner shall pay such costs as a result from such return.

.04 When Equipment is transported, solely for the purpose of the Work on a Time and Material Basis, to or from the Working Area on a Time and Material basis, payment shall be made by the Owner only in respect of the transporting units. When Equipment is moved under its own power it shall be deemed to be working. The method of moving Equipment and the rates shall be subject to the approval of the Contract Administrator.

GC 8.02.05.07 Payment for Hand Tools

.01 Notwithstanding any other provision of this Section, no payment shall be made to the Contractor for or in respect of Hand Tools or Equipment that are tools of the trade.

GC 8.02.05.08 Payment for Work by Subcontractors

.01 Where the Contractor arranges for Work on a Time and Material Basis, or a part of it, to be performed by Subcontractors on a Time and Material basis and has received approval prior to the commencement of such Work, according to the requirements of subsection GC 3.09, Subcontracting by the Contractor, the Owner shall pay the cost of Work on a Time and Material Basis by the Subcontractor calculated as if the Contractor had done the Work on a Time and Material Basis, plus a markup calculated on the following basis:

a) 20% of the first $3,500; plus

b) 15% of the amount from $3,500 to $12,000; plus

c) 5% of the amount in excess of $12,000.

.02 No further markup shall be applied regardless of the extent to which the work is assigned or sublet to others. If Work on a Time and Material Basis is assigned or sublet to a related entity or associated corporation with common ownership to the Contractor as defined by the *Securities Act*, RSO 1990, cS.5, then the Contractor markup is not permitted.

GC 8.02.05.09 Submission of Invoices

.01 At the start of the Work on a Time and Material Basis, the Contractor shall provide the applicable labour and Equipment rates not already submitted to the Contract Administrator during the course of such Work.

.02 Separate summaries shall be completed by the Contractor. Each summary shall include the Change Directive or Change Order number and covering dates of the Work and shall itemize separately the labour, Materials, and Equipment. Invoices for Materials, Rented Equipment, and other charges incurred by the Contractor on the Work on a Time and Material Basis shall be included with each summary.

.03 Each month the Contract Administrator shall include with the monthly progress payment, the costs of the Work on a Time and Material Basis incurred during the preceding month all according to the Contract administrative procedures and the Contractor's invoice of the Work on a Time and Material Basis.

.04 The final summary as per clause 8.02.05.09.02 shall be submitted by the Contractor within 60 Days after the completion of the Work on a Time and Material Basis.

GC 8.02.05.10 Payment Other Than on a Time and Material Basis

.01 Clause GC 8.02.05 does not preclude the option of the Contract Administrator and the Contractor negotiating a Lump Sum Item or unit price payment for Change in the Work, Extra Work, and Additional Work.

GC 8.02.05.11 Payment Inclusions

.01 Except where there is agreement in writing to the contrary, the compensation, as herein provided, shall be accepted by the Contractor as compensation in full for profit and all costs and expenses arising out of the Work on a Time and Material Basis, including all cost of general supervision, administration, and management time spent on the Work on a Time and Material Basis, and no other payment or allowance shall be made in respect of such Work on a Time and Material Basis.

GC 8.02.06 Final Acceptance Certificate

.01 After the acceptance of the Work or, where applicable, after the Warranty Period has expired, the Contract Administrator shall issue the Final Acceptance Certificate. The Final Acceptance Certificate shall not be issued until all known deficiencies have been adjusted or corrected, as the case may be, and the Contractor has discharged all obligations under the Contract.

.02 Any remaining amount of security shall be released upon Final Acceptance of the Contract.

GC 8.02.07 Records

.01 The Contractor shall maintain and keep accurate Records relating to the Work, Changes in the Work, Extra Work, Additional Work and claims arising therefrom. Such Records shall be of sufficient detail to support the total cost of the Work, Changes in the Work, Extra Work, Additional Work and claims arising therefrom. The Contractor shall preserve all such original Records until 12 months after the Final Acceptance Certificate is issued or until all claims have been settled, whichever is longer. The Contractor shall require that Subcontractors employed by the Contractor preserve all original Records pertaining to

the Work, Changes in the Work, Extra Work, Additional Work and claims arising therefrom for a similar period of time.

.02 The Owner may inspect and audit the Contractor's Records relating to the Work, Changes in the Work, Extra Work, and Additional Work at any time during the period of the Contract. The Contractor shall supply certified copies of any part of its Records required, whenever requested by the Owner.

GC 8.02.08 Taxes

.01 Where a change in Canadian Federal or Provincial taxes occurs after the date of tender closing for this Contract, and this change could not have been anticipated at the time of Tender, the Owner shall increase or decrease Contract payments to account for the exact amount of tax change involved.

.02 Claims for compensation for additional tax cost shall be submitted by the Contractor to the Contract Administrator on forms provided by the Contract Administrator to the Contractor. Such claims for additional tax costs shall be submitted not less than 30 Days after the date of Final Acceptance.

.03 Where the Contractor benefits from a change in Canadian Federal or Provincial taxes, the Contractor shall submit to the Contract Administrator on forms provided by the Contract Administrator, a statement of such benefits. This statement shall be submitted not later than 30 Days after Final Acceptance.

.04 Changes in Canadian Federal or Provincial taxes that impact upon commodities, which when left in place form part of the finished Work, or the provision of services, where such services form part of the Work and where the manufacture or supply of such commodities or the provision of such services is carried out by the Contractor or a Subcontractor, are subject to a claim or benefit as detailed above. Services in the latter context means the supply and operation of Equipment, the provision of labour, and the supply of commodities that do not form part of the Work.

.05 The Contractor shall add the Harmonized Sales Tax (HST) to all invoices.

GC 8.02.09 Liquidated Damages

.01 When liquidated damages are specified in the Contract and the Contractor fails to complete the Work according to the Contract, the Contractor shall pay such amounts as are specified in the Contract Documents.

C.2 SUPPLEMENTAL GENERAL CONDITIONS

C.2.1 General Conditions

The words General Conditions in this Contract shall mean OPSS MUNI General Conditions of Contract November 2024 (OPSS.MUNI 100 November 2024). All requirements of these General Conditions shall apply except as amended herein.

If there is any conflict between the General Conditions of Contract and the Supplemental General Conditions, the Supplemental General Conditions shall take precedence.

C.2.2 Designation of Parties

Where the words "Department", "Minister", "Ministry", "Legislature", "Town", "Corporation" or any other words of similar intent are used in the General Conditions, they shall be understood as meaning "Owner".

Where the words "Engineer", "Authority" or "Contract Administrator" are used in this Contract they shall be understood as meaning R.J. Burnside & Associates Limited, or any other delegate designated by the Owner.

C.2.3 Amendments to General Conditions

C.2.3.1 Modify “Major Item” definition in GC 1.04 as follows:

Subsection a), replace “$100,000” with “$200,000”.

Subsection b), replace “5%” with “10%”.

C.2.3.2 Add “Substantial Performance” definition to GC 1.04 as follows:

1. The Work/Contract is substantially performed,
    a) when the improvement to be made under the Contract or a substantial part thereof is ready for use or is being used for the purposes intended; and
    b) when the improvement to be made under the Contract is capable of completion or, where there is a known defect, correction, at a cost of not more than,
        i. 3 percent of the first $1,000,000 of the Contract price;
        ii. 2 percent of the next $1,000,000 of the Contract price;
        iii. 1 percent of the balance of the Contract price.

2. For the purposes of this Contract, where the improvement or a substantial part thereof is ready for use or is being used for the purposes intended and the Owner and the Contractor agree not to complete the improvement expeditiously, the price of the services or materials remaining to be supplied and required to complete the improvement shall be deducted from the Contract price in determining Substantial Performance.

C.2.3.3 Add “Completion” definition to GC 1.04 as follows:

The Work/Contract shall be deemed to be completed, and services or Materials shall be deemed to be last supplied to the improvement when the price of completion, correction of a known defect or last supply is not more than the lesser of,

a) 1 percent of the Contract price; and

b) $5,000.

C.2.3.4 Amend GC 2.01.02 (a) as follows:

Add “Geotechnical or” immediately prior to “Subsurface Report”.

C.2.3.5 Replace GC 2.02.01 with:

.01 In the event of any inconsistency or conflict in the contents of the following documents, such documents shall take precedence and govern in the following descending order from highest to lowest:

a) Articles of Agreement
b) Addenda
c) Contract Drawings (except included standard drawings such as OPSDs)
d) Bid
e) General Requirements
f) Special Provisions
g) Standard Specifications
h) Supplemental General Conditions
i) OPSS.MUNI 100 General Conditions of Contract (Nov. 2024)
j) Standard Drawings (e.g., OPSDs)
k) Working Drawings.

Later dates shall govern within each of the above categories of documents.

C.2.3.6 Amend GC 3.01.11 as follows:

The existing paragraph becomes .11 a) and the following is added:

.11 b) The Contractor shall, at any time so required by the Contract

Administrator, during construction or during the warranty period, make such openings to such extent through any part of the Work as the Contract Administrator may direct for inspection or testing purposes. Upon the completion of the inspections the Contractor shall forthwith make the work good again to the satisfaction of the Contract Administrator. Should the work so opened be found, in the opinion of the Contract Administrator, to be not in compliance with the Contract in any respect, the whole of the expense, including the cost of inspection, shall be borne by the Contractor; but if the work so opened up is found to be in compliance with the Contract, the said expense shall be borne by the Owner (unless the Contract Administrator was not properly notified prior to concealment of the work, in which case the cost will be borne solely by the Contractor).

.11 c) Should the Contractor refuse to make such openings and reinstatements as ordered by the Contract Administrator, then the Contract Administrator may proceed with the work in any manner deemed appropriate in the Contract Administrator's opinion. The cost of such work shall be paid by the Contractor or deducted by the Owner from any monies due to the Contractor.

C.2.3.7 Replace GC 3.02.06 with:

.06 Where applicable, work related to the Working Drawings shall not proceed until the Working Drawings have been initialled or signed, and dated, by the Contract Administrator and marked as "Reviewed" or "Reviewed as Noted".

C.2.3.8 Add the following to GC 3.07 Delays:

.05 Extension(s) to Contract Time shall only be considered if, in the sole opinion of the Contract Administrator, the delay impacts the construction schedule's critical path.

C.2.3.9 Add the following to GC 3.0 Administration of the Contract:

GC 3.16 Site Meetings

.01 The Contractor's site superintendent shall attend regular construction progress meetings and special site meetings as required by the Contract Administrator. Minutes of these meetings, prepared and issued by the Contract Administrator, shall be deemed to be accurate records of these meetings in the absence of timely notice to the contrary.

C.2.3.10 Add the following to GC 4.01 Working Area:

.02 The Owner maintains a right of access to the Working Area for the purpose of performing the Owner's own work.

C.2.3.11 Amend GC 5.02.02 to include the following after "Contract":

Where the Contract Administrator requires documentary evidence substantiating that materials supplied by the Contractor comply with the terms of the Contract, such evidence must be provided by the Contractor in the form of a certified copy of a laboratory report from a recognized testing company or equivalent documentation acceptable to the Contract Administrator. The Contractor shall pay for the entire cost of such testing including sampling and shipping of samples, at no additional cost to the Owner.

C.2.3.12 Add the following to GC 7.01.07.01 Schedule:

The Contractor's schedule is subject to review and acceptance by the Owner and the Contract Administrator. The Contractor shall complete the Work in accordance with the accepted schedule and ultimately by the scheduled date for substantial performance as required by the Contract.

C.2.3.13 Add the following to GC 7.01.08.01:

Furthermore, the Contractor is required to carry out a review of the Contract Documents for errors and inconsistencies, applying a standard of care expected of an experienced and prudent contractor, and report the findings of said review to the Contract Administrator.

C.2.3.14 Add the following to GC 7.06.01:

In order to mitigate traffic hazards, materials and/or equipment shall not be stored within 3 m of the travelled portion of any roadway unless proper protection measures are in place. Excavations within 3 m of the travelled roadway shall be either backfilled or protected by proper measures after hours and on non-working days.

C.2.3.15 Add the following to GC 7.06 Maintaining Roads and Detours:

.12 Prior to moving off site before each weekend, Statutory Holiday, or any non-working day(s), the Contractor shall ensure that all required traffic and pedestrian control measures are in place. Roadways/sidewalks accessible to the public shall be graded to a smooth surface with dust control (water/calcium chloride) applied where/when necessary. The Contractor shall appoint a designated representative to regularly check the above measures during the Contractor's absence from the site and to remedy any issues which may arise in a timely manner. No additional payment will be made for this work.

C.2.3.16 Amend GC 7.10.04 as follows:

Change “7 Days” to “15 Days”.

C.2.3.17 Replace GC 7.14.01 Limitation of Operations with the following:

.01 The Contractor shall not carry out operations under the Contract on Saturdays, Sundays, Statutory Holidays, or at night without permission, in writing, from the Contract Administrator, with the exception of urgent Work required to maintain the Working Area in a safe and satisfactory condition. In all cases and at all times, the Contractor is required to monitor and maintain the Working Area in a safe and satisfactory manner and to respond to issues in a timely manner, whether or not direction from the Contract Administrator is given in this regard.

C.2.3.18 Add the following to GC 7.16 Warranty:

.04 If the Contract Administrator notifies the Contractor in writing of defects or deficiencies prior to expiration of the Warranty Period, the Contractor shall remedy such defects or deficiencies, notwithstanding that the rectification work may commence after or extend beyond the end of the Warranty Period.

C.2.3.19 Add the following to GC 7.0 Contractor’s Responsibilities and Control of the Work:

GC 7.19 Standard of Care

.01 In performing this Contract the Contractor shall exercise a standard of care, skill, judgement and diligence that would normally be exercised by an experienced, skilled and prudent contractor supplying similar services for similar projects. The Contractor acknowledges and agrees that, throughout this Contract, the Contractor’s obligations, duties and responsibilities shall be interpreted in accordance with this standard. The Contractor shall exercise the same standard of care, skill, judgement and diligence in respect of any products, subcontractors, suppliers, personnel or procedures which it may recommend to the Owner or employ on the Project.

.02 The Contractor represents, covenants and warrants to the Owner that:

a) The personnel it assigns to the Project are appropriately experienced;

b) It has sufficient staff of qualified and competent personnel to replace its designated supervisor and project manager, subject to the Owner’s approval, in the event of death,

incapacity, removal or resignation; and

c) There are no pending, threatened or anticipated claims that would have a material effect on the financial ability of the Contractor to perform the Work under the Contract.

.03 The Contractor shall perform the Work so as to avoid disturbing the occupants of the place of the Work and any adjacent structures or the public in general and shall respect and comply with local regulations and requirements regarding permitted work hours, noise levels and work conditions. The Contractor, without in any way limiting its responsibilities under this Contract, shall take all reasonable steps to avoid interference with fire exits, site access and egress, continuity of electric power and all other utilities, to suppress dust and noise, to avoid conditions likely to propagate mould or fungus of any kind and shall take all other steps reasonably necessary to promote and maintain the safety and comfort of the occupants of the place of the Work and any adjacent structures and the public in general, and/or to maintain access to and the operation of the same. Without the Owner's prior approval, the Contractor shall not permit any worker or subcontractors to use any existing facilities including, without limitation, elevators, washrooms, entrances and parking areas other than those designed by the Owner.

C.2.3.20 Replace GC 8.02.04.01.02, Proper Invoice inclusions/requirements, with:

0.2 A Proper Invoice shall include:

a) The Contractor's name and address.
b) The date of the Proper Invoice and the period during which the services or materials were supplied.
c) Information identifying the authority, whether in the Contract or otherwise, under which the services or materials were supplied.
d) A description, including quantity where appropriate, of the services or materials that were supplied.
e) The amount payable for the services or materials that were supplied and the payment terms.
f) The name, title, telephone number and mailing address of the person to whom payment is to be sent.
g) A current Clearance Certificate from the Workplace Safety and Insurance Board (WSIB).
h) A Statutory Declaration and proof that any disputes with sub-contractors/suppliers have been resolved or are in adjudication.
i) A "Unit Payment Schedule", the format for which may be

provided by the Contract Administrator, which will include:

- The Item List, Item No., and Contract Quantity for each item precisely as it appears in the "Schedule of Unit Prices";
- The Unit of Payment and the Unit Price;
- The Contract Total for each item as it appears in the "Schedule of Unit Prices";
- A summary of "Payable Quantities" in the following format:
    i. Previous Quantity Paid;
    ii. Payable Quantity Requested this Invoice;
    iii. Total Quantity Payable to Date.
- Total Payment to Date for each Item;

- Unit Payment Schedule Summary Page showing:
    i. Total Work to Date;
    ii. Total Holdbacks to Date;
    iii. Total Payable to Date;
    iv. Previous Payments;
    v. Subtotal of Requested Payment (per Invoice);
    vi. HST for Requested Payment (per Invoice);
    vii. Total Requested Payment including HST (per Invoice).
- Proof of payable material quantities (e.g., weigh scale/ truck tickets).
- All payable Change Orders/Extra Work/Additional Work ratified by the Owner including supporting documentation such as detailed breakdown of labour, equipment, materials and entitlements;
- Any advanced payment for material on-site, including invoices/proof of payment;
- The amount of liens, Owner's set-off and deductions for deficient work, Statutory Holdback (10%) and **Warranty Holdback (2.5%)**.

Proper Invoice submissions not meeting the above minimum requirements shall be deemed improper and shall therefore not trigger the requirement for payment within 28 days until such time as all Proper Invoice submission requirements have been met; only then will the invoice submission package be deemed a Proper Invoice requiring payment to be made within 28 days, unless a notice of non-payment is subsequently issued in accordance with the *Construction Act*.

C.2.3.21 Add the following to GC 8.02.04.05.01 b):

…and the value of any deficiencies, all as estimated solely by the Contract Administrator. The Owner is entitled to retain a special holdback, representing approximately 200% of the estimated value of deficiencies and outstanding or incomplete work (which is not outstanding or incomplete for reasons beyond control of the Contractor). This 200% holdback can be tracked either as a single aggregate special holdback, or through unpaid or partially paid line items in the Schedule of Unit Prices, or some combination of the two as determined by the Contract Administrator. Furthermore, the full 200% aggregate special holdback will be released in two stages, as follows:

1. First release upon completion of at least half of the outstanding/ incomplete Work and deficiencies.
2. Second and Final Release upon completion of all outstanding/ incomplete Work and deficiencies.

The Contract Administrator may choose to exercise discretion with respect to any potential variance from the process and stages outlined above.

C.2.3.22 Add the following to GC 8.02.04.05.03:

c) a release by the Contractor in a form satisfactory to the Contract Administrator releasing the Owner from all further claims relating to the Contract, qualified by stated exceptions such as outstanding work or matters arising out of subsection GC 3.13, Claims, Negotiations, Mediation;

d) a statutory declaration in a form satisfactory to the Contract Administrator that all liabilities incurred by the Contractor and the Contractor's Subcontractors in carrying out the Contract have been discharged except for statutory holdbacks properly retained.

C.2.3.23 Add the following to GC 8.02.05.08 Payment for Work by Subcontractors:

.03 Where the Contractor arranges for additional work to be performed by a Subcontractor based upon a pre-approved lump sum price, the Owner will pay the Contractor the Subcontractor's lump sum price plus a mark-up calculated on the following basis:

a) ten percent (10%) of the first $5,000; plus
b) five percent (5%) of the amount in excess of $5,000.

C.2.3.24 Replace GC 8.02.09.01 Liquidated Damages with the following:

.01 It is agreed by the parties to the Contract that if all the Work called

for under the Contract is not substantially performed within the number of working days or calendar date set forth elsewhere in the Contract, as extended in accordance with GC 3.07 or elsewhere in the Contract, the Owner will sustain a loss or damage. The parties hereto agree that the Contractor will pay to the Owner the sum of Two Thousand Dollars ($2,000.00) + HST] as liquidated damages for each and every calendar day's delay in finishing the work in excess of the number of working days or calendar date prescribed. Liquidated damages are not to be construed as a penalty but as a reasonable genuine pre-estimate of the damages expected to be incurred by the Owner as a result of late completion.

C.2.3.25 Add the following to GC 8.02 Payment:

GC 8.02.10 Deemed Acceptance

.01 No payment by the Owner under the Contract or use or review of the Work by the Owner shall be deemed acceptance of work which is not in accordance with the Contract.

C.2.3.26 Add the following to GC 8.02 Payment:

GC 8.02.11 Liens

.01 If any liens arising from the performance of the Work are registered against the Working Area or Project, the Contractor shall vacate or discharge such liens within thirty (30) days.

BURNSIDE

Document D

General Requirements

Index to Document D – General Requirements

D.1 GENERAL REQUIREMENTS 1

D.1.1 Contract Time 1
D.1.2 Insurance Requirements 1
D.1.3 OPSS & OPSD 2
D.1.4 Schedule of Work 2
D.1.5 Contract Administrator's Field Office 2
D.1.6 Winter Work 2
D.1.7 Temporary Water and Power 3
D.1.8 Provision for Traffic 3
D.1.9 Dust and Mud Control 3
D.1.10 Disposal of Materials 3
D.1.11 Environmental Requirements 4
D.1.12 Existing Conditions 6
D.1.13 Damage by Vehicles and Other Equipment 6
D.1.14 Measurement and Payment 7
D.1.15 Dewatering 7
D.1.16 Compaction 7

D.1 GENERAL REQUIREMENTS

D.1.1 Contract Time

The Work under this Contract shall be substantially performed by **July 1, 2027**. This completion date is contingent upon Acceptance occurring within three (3) weeks of the Bid Closing Time. The completion date will be adjusted accordingly should Acceptance occur beyond the three (3) week period following the Bid Closing Time. Weather conditions will not constitute a basis for extension of the completion date unless, in the sole opinion of the Contract Administrator, conditions have varied substantially from what is reasonably considered normal for the season(s) (i.e., in the event of abnormal inclement weather).

D.1.2 Insurance Requirements

The successful Bidder is required to provide certificates/proof of insurance for all mandatory coverage required by the General Conditions of Contract.

In addition, in accordance with GC 6.03.01 General, the Contractor shall provide all risks property insurance as per GC 6.03.05.01.

The insurance policies shall name the following parties as additionally insured:

- The Corporation of the Township of North Huron
- R.J. Burnside & Associates Limited
- Tatham Engineering Limited
- CMT Engineering Inc.

and shall insure the Contractor and the above named in the same manner and to the same extent as if a separate policy had been issued to each.

In addition to the above requirements, if blasting operations are used in the Contract, the Contractor shall take out and keep in force an insurance policy providing coverage for blasting operations to the same limits as set out in the General Conditions.

Contractors are hereby specifically notified that any loss or damage to the Work caused by the action of the elements including rain storms, wind storms, floods, etc., shall be sustained and borne by the Contractor at their own expense. Any material and additional work required to make good any loss or damage to work previously completed shall be borne at the cost of the Contractor and no claims for extra payment will be considered.

D.1.3 OPSS & OPSD

Relevant Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD) in effect at the Official Closing Time which are related to, or integral to the Work, apply to this Contract unless otherwise noted. OPSS "Municipal Oriented Specifications" will apply unless this project has been specifically designated as an MTO type “Provincial Oriented” project.

D.1.4 Schedule of Work

Upon being awarded the Contract, the Contractor shall forthwith supply to the Contract Administrator for approval a copy of a detailed planned Schedule of Work, showing clearly that the Work will be completed within the stipulated time.

D.1.5 Contract Administrator’s Field Office

A separate field office for the Contract Administrator **will not** be required for this Contract. Access to the Contractor's Site Office will be required for any construction meetings to be held.

D.1.6 Winter Work

No additional payment will be considered for the protection of the Work as required by the relevant OPSS for cold weather or winter conditions. The Contractor is encouraged to schedule their work to avoid placing concrete, asphalt or other temperature sensitive materials in cold weather and to avoid freezing of granular material during the operations employing these materials. Where the Contractor’s schedule shows work involving temperature sensitive materials during a time frame where cold weather conditions may potentially or can be reasonably expected to occur, the price in the Schedule of Unit Prices shall be deemed to include the necessary cold weather provisions and no additional costs will be considered.

D.1.7 Temporary Water and Power

The Contractor shall make their own arrangements for the supply of temporary water and power.

D.1.8 Provision for Traffic

The Contractor shall be responsible for providing signing and traffic control in accordance with the Ontario Traffic Manual (OTM) and the OTM Book 7 Temporary Conditions – Field Edition.

Access shall be maintained at all times to any entrances within the limits of the Contract.

The Contractor is responsible for notifying any affected emergency agencies, transportation agencies, businesses, residents, etc., regarding access / traffic disruptions.

The Contractor shall provide a watchman or other suitable employee to inspect and maintain the signs, barricades and pedestrian ramps on a daily basis as well as weekends and other times when the Contractor is not working.

The Contractor shall provide an adequate number of traffic control persons to direct traffic at any time during construction as required by the Contract Administrator.

If there is no separate payment item for this work, then the costs are deemed to be included in the Bid Price.

D.1.9 Dust and Mud Control

The Contractor will be responsible for dust control as deemed necessary by the Owner during construction by watering and calcium application as directed by the Contract Administrator. Clean-up of mud tracking off site shall similarly be the Contractor's responsibility.

D.1.10 Disposal of Materials

The Contractor shall dispose of all waste and/or surplus materials in a disposal area selected by the Contractor in accordance with OPSS 180. The site shall be located off the Municipal right-of-way. The Contractor shall be responsible for all work involved in disposing the waste or excess material

including trucking, access roads, levelling, and all haulage and/or dumping fees applicable.

The Contractor shall identify the disposal area and provide a release from the disposal area owner upon completion of the work.

Where any materials are designated to be salvaged, the Contractor can consult the appropriate special provisions for direction.

D.1.11 Environmental Requirements

The preservation, protection and restoration of the local environment will form part of the Work of this Contract.

The requirements set out in any permits issued for the project shall form part of this Contract and shall be strictly adhered to.

The Contractor shall provide rock check dams, straw bale flow checks and any other sediment or erosion control devices indicated on the Contract Drawings, as specified by the Permit Issuing Authorities, and as directed by the Contract Administrator.

Any deviation from the prescribed requirements and/or methods contained in or implied by the permits as issued and this Contract may result in a work stoppage until such time as the Contractor produces suitably approved or revised permits acknowledging the proposed deviation. All costs associated with revised work permits will be solely the responsibility of the Contractor.

The Contractor is expected to undertake the Work in such a manner that allows for the local area to be restored. It will also be required that the Contractor employ all reasonable precautions to minimize the impact of construction on the upstream and downstream environments.

What follows is a partial list of precautionary measures the Contractor may elect to employ in order to execute the Work within the requirements noted above.

NOTE: This listing shall not be taken to represent the full range of precautionary measures available to the Contractor.

.1 The use of heavy construction machinery on the streambed and banks shall be avoided unless specifically approved.

.2 Where the stream is relocated or diverted temporarily, such relocation or diversion should be done through dry construction. The channel of the new stream (including all slope protection) must be completed before the old stream is diverted into the new channel.

.3 The disturbance of low vegetation cover should be avoided as much as possible; the disturbance of soil cover should be minimized, and disturbed areas should be vegetated or otherwise protected from erosion as soon as possible.

.4 Fill material and excavated materials should be located away from the watercourse and protected from erosion.

.5 Any constriction of flow should be compatible with streambed material to prevent erosion or other damage caused by an increased velocity in flow. Stream flow must be maintained throughout the construction period so as not to interfere with fish migration and spawning or other downstream users.

.6 Where water quality impairment is unavoidable, measures to protect downstream users must be taken.

.7 Upon completion of the project, any temporary fill, culverts, refuse, etc. must be removed from the construction area and deposited in an approved disposal area away from the site.

.8 The inlet and the outlet of any culverts should be protected against erosion.

.9 All exposed areas should be redeemed or re-vegetated immediately after construction is completed.

.10 With in-stream work, all efforts must be utilized to contain silt.

.11 A designated refuelling area for construction machinery must be established away from the watercourse.

.12 All efforts must be made to contain silt and mud from being washed downstream during construction. This may be undertaken by one or more of the following methods:

a) a silt barrier of alternating silt fence baffles installed in the stream during construction and removed upon completion of the Work;

b) a silt curtain may be installed across the stream downstream of the construction site during the construction period and removed upon completion of the project.

NOTE:

Fish Habitat Definition According To The Fisheries Act Of Canada

Fish habitat means "spawning ground and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes".

Dam Definition According To The Lakes And Rivers Improvement Act

Dam is "a dam or any work which forwards, holds back or diverts water".

D.1.12 Existing Conditions

The Contractor shall clean up and restore all disturbed areas to condition equal to or better than existing conditions using materials equal to or better than existing materials. This includes the removal and disposal of all layout materials, string lines, batter boards and other such materials.

The Contractor shall maintain flow in all existing sewers, drains, ditches, watercourses, house and inlet connections, as applicable.

Sanitary sewers shall not be used for the discharge of water from excavations or dewatering operations.

D.1.13 Damage by Vehicles and Other Equipment

If at any time, in the opinion of the Contract Administrator, damage is being or is likely to be done to any highway or any improvement thereon, other than such portions as are part of the Work, by the Contractor’s vehicles or other equipment, whether licensed or unlicensed, the Contractor shall, on the direction of the Contract Administrator and at the Contractor’s own expense make changes in or substitutions for such vehicles or other equipment or shall alter loading or shall in some manner remove the cause of such damage to the satisfaction of the Contract Administrator.

D.1.14 Measurement and Payment

Unless otherwise noted in the Schedule of Unit Prices, no measurement of quantities will be made for the General Work and no direct payment will be made for any of the General Work. The cost of such work shall be deemed to be reasonably distributed within the overall cost of the Work.

Payment for payable items shall be based upon the lump sum or unit price bid, as listed in the Schedule of Unit Prices, using actual “as-constructed” quantities (or plan quantities) as determined by the Contract Administrator. In the event of conflict between the Schedule of Unit Prices and OPSS, the basis of payment indicated in the Schedule shall take precedence (as modified by “pay lines” or payment clauses indicated elsewhere in these documents, if applicable).

D.1.15 Dewatering

The Contractor shall dewater excavations / trenches and maintain the groundwater level at least 0.5 m below the excavation bases, thereby facilitating proper completion of the Work in reasonably dry, stable conditions.

D.1.16 Compaction

Unless otherwise noted, all granular materials shall be compacted to one hundred percent (100%) SPMDD and all subsoil to ninety-five percent (95%) SPMDD.

BURNSIDE

Document E

Drawings and Specifications

Index to Document E – Drawings and Specifications

E.1 CONTRACT DRAWINGS.....1

E.2 STANDARD SPECIFICATIONS.....2

E.1 CONTRACT DRAWINGS

The Work required under this Contract shall be performed in strict accordance with the following drawings:

DRAWING NO.	DRAWING TITLE
CIVIL	
C101	Existing Conditions and Removals Site Plan
C102	Proposed Site Plan
PROCESS	
P101	Standpipe Detail
DETAILS	
D201	Notes and Details
D202	Typical Details (OPSD)
ELECTRICAL	
E1.1	Legend, Ductbank and Cable Mounting Details
E1.2	Site Plan – Existing Conditions
E1.3	Site Plan – Proposed Conditions
E2.1	Single Line Diagram and Miscellaneous Wiring Diagrams
E2.2	Control Building Details
E3.1	Standpipe Details

These drawings are the Contract Drawings and form part of this Contract. Additional drawings showing details in accordance with which the Work is to be constructed may be furnished from time to time by the Contract Administrator, if found necessary, to supplement or supersede the drawings hereto attached. Such additional drawings shall thereupon become a part of this Contract. The Contract Drawings are complementary to the Contract Documents; any item or information found in one applies to both.

The Contractor shall be governed by the figured dimensions, as given on the drawings. The Contractor shall confirm all relevant dimensions and report any discrepancies to the Contract Administrator immediately.

Where required dimensions are not shown in figures, the Contractor shall obtain the said dimensions from the Contract Administrator before proceeding with the construction of the portion of the Work to which they refer. In every case, detailed drawings shall take precedence over general drawings. In no instance shall dimensions be scaled from drawings.

E.2 STANDARD SPECIFICATIONS

Division 1 – General

General Instructions	01007
Mobilization and Demobilization	01050
Cash Allowances	01070
Submittals	01340
Hazardous Materials	01400
Testing Laboratory Services	01410
Temporary Facilities	01500
Health and Safety	01545
Environmental Protection and Procedures	01560
Disinfection	01564
Material and Equipment	01600
Cleaning	01710
Testing	01715
As-Built Drawings	01720
Equipment/System Start-up, Commissioning, Performance and Reliability Run, and Training Requirements	01725
Operating and Maintenance Data	01730
Construction Sequencing	01735

Division 2 – Site Works

Removals and Demolition	02050
Site Preparation	02210
General Excavation, Dewatering and Backfilling	02220
Excavating and Backfilling around Structures	02222
Excavation and Backfilling in Trench	02224
Aggregates	02225
Restoration	02226
Landscaping	02232
Sewer Systems	02236
Watermains	02238
Temporary and Permanent Fences	02821

Division 3 – Concrete

Cast-in-Place Concrete	03300

Division 13 – Special Construction

Above Grade Reservoirs	13010

Division 16 – Electrical

General Electrical Requirements	16010

Shop Drawing Log	16011
Underground Duct System	16105
Raceway Systems	16110
Wire and Cables	16120
Electrical Boxes	16130
Wire Devices	16140
Basic Electrical Equipment	16400
Services for Mechanical Equipment	16850
Control Narrative	16920

PART 1 GENERAL

1.1 TENDER/CONTRACT FORMAT

.1 This is a Lump Sum Construction Tender and Contract and includes certain works that are payable on a unit price basis.

.2 Include the total cost of doing all the work shown on the drawings and specified herein. The total cost shall include a fully operational system.

.3 Include incidental costs incurred in completing the work in which the incidental cost is related.

.4 For the purpose of the Contract, the term “Contract Administrator”, “Engineer”, “Owner’s Representative” and “Consultant” shall be deemed to mean the same and are used interchangeably unless noted otherwise.

.5 For the purpose of the Contract, the term “Owner”, the “Township” and the “Township of North Huron” shall be deemed to mean the same and are used interchangeable unless noted otherwise.

.6 The General Contractor is responsible to ensure that all trades, suppliers, and subcontractors are familiar with, and have a copy of this Section (Section 01007) as well as all other relevant sections of Division 1 so that they are familiar with the specific requirements of this project including, but not limited, to submittals, allowable working hours, pipe/conduit concealment, start-up and commissioning, training, etc. These items may not be specifically covered in other technical specifications but shall be considered by all trades, suppliers, subcontractors, etc.

.7 Where a Technical Specification does not specifically identify “Part 4 – Payment”, include all costs related to meeting the requirements of that particular Technical Specification in the respective item in the Schedule of Unit Prices. Where an item that is shown on the Contract Drawings or mentioned in Technical Specifications is not specifically identified in the Schedule of Unit Prices, include all related costs in the Total Tender Price. There shall be no additional payment for any such items that are required for a fully operational system and not specifically identified in the Schedule of Unit Prices. Include all costs in the Total Tender Price.

.8 Regardless of the unit price or lump sum price bid for each item, the Total Tender Price shall include the supply, installation, testing, start-up, commissioning, training and operation during the Performance and Reliability Run Period of all proposed works as shown on the Contract Drawings and specified in the Technical Specifications. Include the total cost of doing all the work shown on the drawings and specified herein. Include incidental costs incurred in completing the work in which the incidental cost is related. The total cost shall include a fully operational system.

1.2 LOCATION OF WORK

.1 The work is located at 199 John St. E., in community of Wingham in the Township of North Huron, Ontario.

1.3 SUBMITTALS

.1 Submittals such as execution plans, schedules, shop drawings and product data shall be submitted for review in accordance with the requirements of Section 01340 – Submittals.

1.4 SUPPLEMENTAL INFORMATION

.1 The following supplemental information is available and is provided for reference only (Reference Documents):

.1 Asbestos Management Plant, Wingham Standpipe Control Building, R.J. Burnside & Associates Limited, December 2025.

.2 Designated Substances and Hazardous Materials Survey, Wingham Standpipe, Wingham Ontario, R.J. Burnside & Associates Limited, March 2023.

.3 Geotechnical Investigation, Proposed Standpipe Replacement, Township of North Huron, CMT Engineering Inc., August 2022.

.4 Report on Soil Investigation for Proposed Standpipe, Town of Wingham, B.M. Ross & Associates Limited, October 1973.

.5 Standpipe Structural Condition Assessment, Township of North Huron, R.J. Burnside & Associates Limited, September 2015.

.6 Wingham Inspection Report No. TT5-21, Township of North Huron, Landmark Tank & Tower Services, May 2005

.7 Construction Drawings, Structural Details, Town of Wingham, The Canada Gunite Co. Ltd., May 1974.

.8 As Constructed Drawing M236-4, Plan and Profile John Stree East Reconstruction, Town of Wingham, Maitland Engineering Services Ltd., January 1995.

.9 Plan of Survey of Part of Lot 4, Concession I, Town of Wingham, B.M. Ross OLS, October 1973.

1.5 GENERAL DESCRIPTION OF WORKS

.1 Decommissioning, demolition and disposal of an existing concrete standpipe structure.

.2 Construction of a new glass fused steel tank standpipe at the same site and integration into the existing water system.

.3 Protection and connection to the existing control building with provisions for future booster pumping station at the site.

1.6 WORK HOURS

.1 The Contractor must acquaint themselves with and construct work in accordance with local municipal by-laws concerning work hours.

1.7 MINIMUM STANDARDS

.1 Execute work to meet or exceed:

.1 Ontario Building Code 2024, including all amendments up to project date.

.2 Rules and regulations of authorities having jurisdiction.

.3 Fire Commissioner of Canada, No. 301, Standard for Construction.

.4 Occupational Health and Safety Act, 1990, Ontario Regulations, 213/91 and 714/82.

.5 Canadian Construction Safety Code, 2008.

.6 Contract Documents.

.7 Ontario Plumbing Code.

.8 Ontario Electrical Safety Code.

.9 Relevant Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD).

.2 The execution of the work proposed under this contract, and the materials to be used, shall comply in every respect to the specifications and standards of the municipality, whether specifically identified in the tender documents or not.

.3 In the event the municipal standards do not exist or apply, OPSS and OPSD shall apply. Where a conflict exists, Supplemental Specifications shall take precedence over OPSS and OPSD.

.4 Supervision of construction of the proposed works may be provided by the local authorities and the Contractor shall comply with each municipal authority's regulations. Each tenderer shall satisfy themselves by personal examination of all municipal standards documents, as to local requirements and specifications. Claims from the Contractor at any time after submission of their tender that there was any misunderstanding as to the standards of the local municipality with respect to materials, workmanship or testing, will not be considered.

.5 Where standards identified in the tender documents differ from municipal standards, clarification shall be sought by the Contractor. In the absence of clarification being provided before tender close, the Contractor shall base their price on the standard resulting in the highest cost to the Contractor. Following award, the Contractor shall identify all conflicts in standards and shall request in writing to the contract administrator, for clarification as to which standard applies.

.6 Prior to tender close, the Contractor is required to obtain a copy of the most recent Municipal Engineering Standards.

.7 Special Provisions are provided for some items to provide further clarification of the work involved in a given item in the schedule of unit prices. These special provisions are not intended to be comprehensive, rather infer beyond reasonable doubt, what the item covers. The Contractor shall review the works to determine all necessary materials, labour, and equipment to complete the works described, whether identified in the special provision or not.

1.8 EXISTING SERVICES

.1 Before commencing work, contact local utilities companies and municipal representatives to establish location and extent of existing services and notify the Engineer of findings.

.2 The Engineer has endeavored to plot on the Contract Drawings known existing utilities, pipes, catchbasins, conduits, poles, chambers or other objects, being located underground, on the surface, or above ground; but shall the plottings of such be found to be incorrect, incomplete or omitted, the Contractor shall have no claim on that account.

.3 The Contractor shall, at the Contractor's own expense, obtain the necessary drawings and perform any necessary sub-surface investigations to determine the exact number and location of all existing utility services, structures, underground pipes, cables, and all similar items. The location for existing structures and underground pipes, cables, utilities, and other similar items as shown on the Contract Drawings do not relieve the Contractor of this responsibility.

.4 Whenever it is necessary to cut, interfere with, or connect to existing services of facility do so at hours and times recommended by governing authorities and approved by the Engineer; and with minimum disturbance to occupants, pedestrian and vehicular traffic and public and private property. It may be necessary to conduct this work at night and if required the Contractor shall have no basis for additional claim.

.5 Utility Supports in accordance with OPSD 1007.01 may need to be implemented to protect existing services.

.6 Submit schedule to and obtain approval from the Engineer for each proposal shutdown of active service or facility. Adhere to approved schedule and provide notice to affected parties.

.7 If unknown services are encountered, immediately notify the Engineer and confirm findings in writing and/or on Drawings. Obtain the Engineer's written direction if such services require cutting, capping or relocation to do work.

.8 Should access or services be affected by the work, the notification of emergency agencies and/or affected homeowners shall be the responsibility of the Contractor.

1.9 STORAGE OF EQUIPMENT AND MATERIALS

.1 A portion of the existing asphalt parking lot adjacent to the site will be made available to the Contractor for staging and storage of materials, etc. as indicated on the drawings. Requests for additional storage areas are subject to the approval of the Owner.

.2 The Contractor will provide temporary fencing around this area and ensure gates are locked when the Contractor is not present on site.

.3 The Contractor will note the requirements for temporary facilities specified under the appropriate sections.

.4 The provision of 24-hour security is at the discretion of the Contractor, and any associated costs shall be borne by them.

1.10 TAXES

.1 Refer to the Instructions for Tenderers.

1.11 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits when requested.

.4 Pay customs bonds as required when transporting through the United States.

1.12 CONTRACT DOCUMENTS

.1 The Contract Documents consist of:

Addenda, if any;
Table of Contents;
Information for Tenders;

Form of Tender;
Contract Documentation Forms (including Form of Agreement, etc.);
Special Provisions;
General Conditions;
Standard Specifications;
Contract Administration Forms;
Contract Drawings.

.2 Contract Drawings listed in Document E – Drawings and Specifications form part of Contract Documents.

.3 Keep one copy of Contract Documents and shop drawings on the site.

.4 Keep two additional sets of full size white prints on site for As-Built Drawing purposes.

.5 At the onset of construction, the Engineer will provide the Contractor with an electronic version of the Contract Drawings and Specifications in pdf. format free of charge. The Contractor will be required to make their own hard copy sets at the Contractor's cost.

1.13 AS-BUILT DRAWINGS

.1 As work progresses and as required, record significant deviations from the Contract Drawings.

.2 Obtain and record all pipe invert elevations, pipe and conduit locations, any changes to structural, mechanical, process, electrical and control, HVAC, including but not limited to above or below grade pipe or equipment sizes or locations, electrical or control wiring changes. The As-Built Drawings shall accurately reflect the final works.

.3 Assist Engineer in recording ties to all manholes, curb stops, valve boxes and hydrants.

.4 Prior to a request for a Substantial Performance submit one preliminary copy of As-Built Drawings to the Engineer for review and comment. The accuracy of the As-Built Drawings will be confirmed at the Substantial Performance inspection. The Contractor shall retain a copy for their use for the final submission. The Substantial Performance deficiency list will include, in addition to physical deficiencies, any items not accurately reflected in the preliminary As-Built Drawings. Following rectification of all on-site deficiencies, the Contractor shall revise and submit a final set of As-Built Drawings. A $10,000.00 holdback will be retained by the Contract Administrator until acceptable final As-Built Drawings are submitted by the Contractor and approved by the Contract Administrator.

1.14 ADDITIONAL DRAWINGS

.1 Engineer may furnish additional drawings to clarify work.

.2 Such drawings become part of Contract Documents.

1.15 MATERIAL AND EQUIPMENT

.1 Use new products unless otherwise specified.

.2 Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.

1.16 CONCEALMENT

.1 Conceal pipes, ducts, conduit and wiring in finished areas unless otherwise specified.

1.17 CUTTING AND REMEDIAL WORK

.1 Coordinate work to keep cutting and remedial work to a minimum.

.2 Execute cutting and remedial work required. Obtain Engineer's approval before cutting, boring or sleeving structural members.

.3 Use specialists in affected material to execute cutting and remedial work.

.4 Match work to adjoining construction and finishes.

.5 Fit components tight to adjoining surfaces.

.6 When coring, drilling or cutting through existing concrete, enlist the services of a company specializing in locating services in concrete to provide a plan of existing services, prior to coring, drilling or cutting. Request in writing from the Engineer, any existing drawings which may exist. The Contractor Administrator will in turn contact the municipality for such drawings. Such drawings are not to be considered comprehensive or accurate. Coordinate with the Contract Administrator to have operational staff on-site to assist specialist in locating electrical/control wiring by operating equipment as requested by the specialist. A plan showing the accurate locations of all services, superimposed over all existing services shown on drawings provided and proposed works shown on Contract Drawings, shall be provided to the Engineer for review and approval prior to undertaking work. Allow suitable time in construction schedule for coordination and approval of this work.

1.18 FASTENINGS

.1 Provide fastenings of type, size and spacing required to assure secure anchorage.

.2 Obtain Engineer's approval before using explosive actuated fasteners.

1.19 INSPECTION AND TESTING

.1 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Engineer on corrected work.

1.20 CONSTRUCTION TIME AND SCHEDULING

.1 On award of contract, submit monthly cash flow projection and bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been approved by the Engineer, take necessary measures to complete work within scheduled time. Do not change schedule without Engineer's approval.

.2 General Contractor shall ensure that all subcontractors and suppliers are notified of construction schedule. General Contractor shall be solely responsible for liquidated damages and associated costs if the construction completion deadline is not met.

.3 In conjunction with and in form acceptable to Engineer provide within 10 working days after contract award, schedule showing dates for:

.1 Submission of shop drawings, material tests and samples.

.2 Delivery of equipment and materials.

.3 Commencement and completion of work of each major component of the work.

.4 Substantial Completion date within time period required by Contract Documents.

.4 Interim review of work progress based on schedule submitted will be conducted as decided by Engineer and Schedule updated by Contractor in conjunction with and to approval of Engineer.

.5 Engineer will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

1.21 ENERGY CONSERVATION

.1 The policy of the Owner is to effectively conserve energy and non-renewable natural resources in the design and construction of public works.

.2 The Contractor is encouraged to employ all reasonable means at their disposal to carry out an effective energy and natural resources conservation program and use energy saving construction techniques throughout the entire construction period.

.3 With due regard for necessary protection of the property, the safety of workmen and public, and overriding By-laws and Regulations, Contractor shall conserve energy and non-renewable natural resources, in such ways as:

.1 Switching off unnecessary lighting, particularly during inactive periods.

.2 Utilizing efficient methods, controls, equipment and enclosures to conserve temporary heating.

.3 Any other construction activities which may result in saving of energy and natural resources.

1.22 SETTING OUT OF WORK

.1 Engineer will provide construction control points and bench marks at the onset of the work. An AutoCAD file (Version 2018 or newer) showing the Site Plan Drawing complete with co-ordinates shall be provided to the Contractor pending the Contractor’s agreement to only use the AutoCAD file for layout purposes.

.2 If the Contractor removes control points, the Contractor shall bear the cost of their replacement.

.3 The Contractor is responsible for the layout of all construction works and the minimum degree of layout required is specified below.

.1 Set out works to correct lines, grades and levels.

.2 Establish control lines and levels for construction of work.

.3 Provide a minimum of three (3) consecutive reference points at a distance not exceeding fifteen (15) metres for each section of work.

.4 Provide reference points at closer spacing as required or as directed by Engineer.

.5 Control of lines and grades by use of lasers or other methods may be used if approved by Engineer.

.6 Do not lay pipe unless all reference points and levels are in place along section of work under construction.

.4 Payment for setting out of works to be included with the applicable item for which layout is required.

1.23 SUPERVISION

.1 Provide the necessary supervision and qualified tradesmen to ensure the flow of materials and on-site installation compatible with the overall project schedule and progress.

.2 No separate payment will be made under this item and the Contractor shall include this cost in the cost of the work being supervised.

1.24 PROTECTION OF SURVEY BARS

.1 Protect survey bars from damage or displacement.

.2 Replacement of bars within the area of work is to be included in the cost of the related work.

.3 Replacement of bars damaged or displaced during construction and which fall outside of the area of work is to be at the Contractor's expense.

.4 All survey bars damaged or displaced during construction are to be replaced by a Legal Surveyor prior to completion of the work.

1.25 PAYMENT ITEMS

.1 Payment shall be based upon the lump sum or unit price bid, as listed in the Schedule of Unit Prices, using actual as-constructed quantities as determined by the Engineer. In the event of any conflict between the Schedules of Unit Prices and Specifications, the basis of payment indicted in the schedules shall take precedence (as modified by "pay lines" indicated elsewhere in this document, if applicable).

1.26 DUST CONTROL & CLEAN-UP DURING CONSTRUCTION

.1 All dust control and clean-up of mud tracking on existing roads shall be deemed to be included in the Total Tender Price.

1.27 EQUIVALENT OR APPROVALS EQUALS

.1 Where pursuant to the Specifications, the Contractor is required to supply an article or group of related articles designated by a trade or other name or an "approved equal or alternate", the tender shall be based only upon supplying the article or group of articles so designated, which shall be regarded as the standard of quality required by the Specification. After the acceptance of a tender, the Contractor may apply to the Engineer to substitute as an approved equal another article or group of related articles designated as aforesaid. The application shall be in writing and shall state the price for the proposed substitute article or group of related articles, the price for the article or group of articles designated as aforesaid and such other information as the Engineer may require.

.2 No ruling on a proposed substitution will be made prior to the acceptance of a tender. No substitution shall be made without the prior approval of the Engineer. The approval or rejection of a proposed substitution shall be at the discretion of the Engineer and the decision shall be final.

1.28 ALTERNATES

.1 Where more than one trade or supplier's name is given in the Contract Documents, as an approved/acceptable supplier/manufacturer, or similar wording, the Contractor is advised that the design as shown on the drawings and/or described in the specifications has been based on the first name listed. The Contractor shall base their Tender on any of the named products/suppliers, unless otherwise noted in the specifications subject to the following:

.1 The material and equipment supplied must be equal in quality, and performance to the first named;

.2 Any design and/or construction changes necessitated by use of a second or subsequent named, shall be borne by the Contractor;

.3 The Contractor assumes responsibility for proper fit and matching of all materials or equipment.

1.29 CONTRACTOR'S USE OF PREMISES

.1 The Owner has arranged for easements for construction, storage and access as shown on Contract Drawings.

.2 Make arrangements with property owners if additional areas are required. Obtain written agreements and submit copies to the Engineer.

.3 Confine operations within easements for construction, storage and access as shown on Contract Drawings.

.4 Install and maintain snow fencing along working and storage areas and access routes.

.5 Do not enter upon or occupy with workers, tools or materials any lands other than public streets, roadways, rights-of-way or easements shown on Contract Drawings except after written consent has been received from property owner.

1.30 PROJECT COORDINATION

.1 Other Contracts may be awarded by Owner for work to be done adjacent to and/or within limits of construction as shown on Contract Drawings. Limits of work included in any such contracts are identified on Contract Drawings or elsewhere in Contract Documents.

.2 Do not undertake any part of work without permission of Engineer.

.3 Cooperate and make suitable working arrangements with other Contractor(s) to ensure satisfactory completion of work.

.4 Obtain approval in writing from Engineer for all arrangements made with other Contractor(s).

.5 Engineer will determine coordination and execution of work in the event that Contractors are unable to reach satisfactory working agreement.

1.31 PUBLIC RELATIONS AND NOTICES

.1 Appoint competent representative to receive and deal with any complaints from public in regard to safety, protection of traffic, condition of road surfaces along line of work, or nuisances on account of work.

.2 Inform Engineer, Owner and local police of name, address and telephone number of public relations representative within two (2) weeks after date of order to commence work.

.3 Deal promptly with all complaints received and carry out remedial actions to prevent further complaints.

.4 Give adequate notice of schedule (timing and location) of movement of materials, construction activities, maintenance and repairs to affected landowners and occupants of properties adjacent to work areas.

.5 Notify Engineer immediately of any complaints of damage to property or personal injury.

.6 Notify Engineer as soon as possible of action taken in respect to any complaints and outcome of such actions.

1.32 ABBREVIATIONS

.1 Abbreviations used in this document:

AASHTO	-	American Association of State Highway and Transportation Officials
ACI	-	American Concrete Institute
AISI	-	American Iron and Steel Institute
ANSI	-	American National Standard Institute
APWA	-	American Public Works Association
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
AWPA	-	American Wood Preserver's Association
AWWA	-	American Water Works Association
CGSB	-	Canadian General Standards Board
CSA	-	Canadian Standards Association
HEPC	-	Hydro Electric Power Commission
MOE	-	Ontario Ministry of Environment
MTO	-	Ministry of Transportation of Ontario
OCWA	-	Ontario Clean Water Agency
OPSD	-	Ontario Provincial Standard Drawings
OPSS	-	Ontario Provincial Standard Specifications

1.33 PROJECT MEETINGS

.1 Attend any and all project meetings scheduled by Engineer.

.2 Pre-Construction Meeting:

.1 Engineer will schedule meetings and notice will be given in writing at least two (2) days before date of meeting.

.2 Location: Designated by the Engineer.

.3 Attendance:

Owner’s Representative
Contractor's Superintendent
Resident Inspector
Others as appropriate

.3 Progress Meetings:

.1 Location: Contractor’s Site Office.

.2 Attendance:

Owner’s Representative
Contractor's Superintendent
Resident Inspector
Others as appropriate

.4 Representatives of Contractor attending meeting should be thoroughly informed and knowledgeable with respect to proposed topic of discussion and authorized to act and make commitments with respect to matters agreed to at the meeting.

.5 Contractor to ensure at least one representative of Operations Staff attend the daily and/or weekly meetings held by the Contractor to make them aware of planned construction activities and if there will be a requirement for planned overtime

.6 Contractor to conduct weekly “tool box” safety talks with Engineer’s representative and Operators to advise of any potential safety concerns.

1.34 QUALITY CONTROL

.1 Adhere to manufacturer's recommendations with respect to handling, preparation, installation, testing, operation or protection of any product or material to be incorporated in work.

.2 Ensure that all materials supplied are compatible with each other unless specific adjacent materials have been specified. Correct any defective work caused by non-compatibility of materials.

.3 Where practical or desirable, tests will be conducted by Engineer on materials and equipment to be incorporated into permanent works before delivery to site.

.4 Submit to Engineer full information on materials, equipment and related arrangements to be furnished.

.5 Submit information in a form approved by Engineer.

.6 Submit sufficient information to enable Engineer to determine whether proposed materials, equipment and arrangements meet contract requirements.

1.35 TRAFFIC AND PEDESTRIAN CONTROL

.1 Adhere to the following requirements when roads are to be closed to traffic:

.1 Provide and maintain pedestrian access to all properties

.2 Provide and maintain emergency access for fire trucks, ambulances and other vehicles for emergency services.

.2 Provide and maintain detours for traffic where required. Mark detours as directed by Police Department, Works Department and Engineer.

.3 Supply and place crushed stone on road shoulder to maintain traffic on road shoulders as required.

1.36 PROJECT IDENTIFICATION AND SIGNS

.1 Supply and erect signs at locations designated by Engineer.

.2 Fabricate sign boards to dimensions and details specified.

.3 Provide and erect a suitable, portable and stable framework to support each sign.

.4 Remove and dispose of sign boards when directed or on completion of project.

1.37 MAINTENANCE WORK

.1 Perform all maintenance work required during progress of work.

.2 Submit to Engineer a letter setting out arrangements made for carrying out warranty work during period of guaranteed maintenance.

.3 Include in letter telephone number and address for receipt of notices relating to matters requiring action by Contractor at job site.

.4 Maintenance During Construction

.1 Keep pavement surfaces adjacent to and within work area clean.

.2 Keep temporary road surfaces over backfilled excavations free from potholes.

.3 Maintenance all surfaces in good condition.

.4 Keep all temporary works (i.e. security fence, silt fencing, etc.) in good operational and aesthetic conditions.

.5 Warranty Work During Guarantee Period

.1 Perform all warranty work required upon receipt of verbal or written notice from Engineer.

.2 Repair or make good sinkages and defects on surfaces of backfilled trenches or excavations.

.3 Repair all damages to structures caused by settlement of ground adjacent to or over excavations.

.4 Repair all damage to work included in contract or damages to adjacent work caused as a result of defect.

.6 Maintenance by Owner

.1 The Owner will, without giving notice to Contractor, repair shrinkages or defects which are dangerous in nature and constitute an emergency.

.2 Engineer will notify Contractor of emergency work performed by Owner.

.3 Cost of labour, equipment and material to perform emergency work to be charged to Contractor.

1.38 SUPPLEMENTING LOCAL WATER SUPPLY

.1 This section specifies requirements for supplying temporary potable water supplies to residences and other establishments where normal water supplies have been interfered with by Contractor's construction operations for a period exceeding the allowable shutdown durations specified in the contract when scheduled, when activities by the Contractor have resulted in compromised water quality or supply conditions in the system.

.2 Water to be obtained from an approved source.

.3 Water to conform to Ontario Water Regulation 169/03 (amended to 248/06), as amended from time to time.

.4 Submit to Engineer in writing before commencing construction proposed arrangements for supplying potable water.

.5 Contractor's Responsibilities

.1 Supply potable water to fill reservoirs within twenty-four hours after order from Engineer in quantities as need by occupants.

.2 Basis of Payment

.1 No direct compensation shall be made for this item, if required. The cost of providing temporary water shall be at the Contractor’s expense and shall be considered as included in the overall cost of the project.

1.39 REMOVE AND SALVAGE ITEMS

.1 The Owner shall have first right of refusal on items designated to be removed from the area of construction. Prior to removal, the Contractor shall give reasonable notice (10 working days minimum) to the Owner of their intention to remove items. During this period the Contractor shall allow the Owner access to the site to dismantle and remove items designated for removal under the contract. Items specifically identified in the contract as being salvage items, shall be dismantled by the Contractor and delivered to the Owner. Any equipment not salvaged by the Owner shall be removed from the site by the Contractor and disposed of at a location chosen by the Contractor and approved by the Engineer.

1.40 FIRE RATED ASSEMBLIES

.1 The general contractor and their subcontractors are required to review the structural/architectural drawings to determine if any of their material (i.e., piping, sleeves, ventilation ducts, conduit, etc., pass through fire rated assemblies. If they do, the contractor/ subcontractor shall modify the material passing through the fire rated assembly to meet the latest requirements of the Building Code at no additional cost to the Owner.

1.41 PRE-CONSTRUCTION SURVEY

.1 Undertake a pre-construction crack survey of all existing buildings and structures within a 100 m radius of proposed construction areas, with the engineer.

.2 Document findings of existing surface finish conditions with photographs and in writing and submit to Engineer.

.3 Contractor will be responsible for repairing any damage caused to adjacent buildings or structures due to their construction operations.

1.42 DAMAGE TO EXISTING INFRASTRUCTURE

.1 The Contractor shall take the necessary steps to ensure that no damage is caused to existing structures, buildings, foundations, roads, sidewalks, property, utility services, and other similar items during the progress of the work.

.2 If any damage is caused, the Contractor shall repair and make good such damage at the Contractor's own expense within a reasonable time and to the complete satisfaction of the Engineer.

1.43 APPROVALS

.1 It shall be the responsibility of the Contractor to ensure that they comply with all requirements of all permits including coordinating and scheduling all required inspections as well as implementing necessary changes as a result of regulatory agency inspections and providing all close out documentation.

PART 2 PRODUCTS

Not applicable.

PART 3 EXECUTION

Not applicable.

END OF SECTION

053193_Division 1_01007-General Instructions.doc
14/04/2026 10:55 AM

PART 1 GENERAL

1.1 SCOPE

.1 This portion outlines the payment for construction mobilization and demobilization.

.2 The Contractor shall enter a price in the Schedule of Unit Prices to cover their costs of mobilization and demobilization.

.3 The price entered for this item shall be consistent with the costs involved but shall not, in any event, exceed ten percent (10%) of the total price.

.4 If the Tenderer has entered against this item in their tender a price in excess of ten percent of the total tender price, the Owner shall, in preparing Contract Documents based upon the tender, reduce the price for the said item to an amount not exceeding ten percent of the total tender price and shall add the amount of the reduction to the price for another lump sum item so that the total tender price shall not be affected.

.5 The lump sum price entered for this item will include the cost of transportation of all personnel, construction equipment, fuel and other items which shall not become part of the permanent works. The transportation costs of materials incorporated into the works is to be included in the unit price tendered for its related item.

.6 Sixty percent (60%) of the price for the mobilization and demobilization item shall be considered as relating to mobilization and the balance to demobilization.

.7 The payment for mobilization shall be included in the first Payment Certificate issued for the Contract subject to the Engineer being satisfied that full mobilization has been carried out. If the Engineer is not satisfied, he shall allow a payment which, in their opinion, reflects the degree of mobilization effected to date.

.8 The payment for demobilization shall become due following Preliminary Acceptance of the works and subject to the Engineer being satisfied that full demobilization has been carried out. The Engineer may, in their discretion, allow partial payment for demobilization before full demobilization has been affected.

1.2 SUBMITTALS

.1 Not applicable.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

.1 Not applicable.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE

.1 This section outlines the requirements associated with the following cash allowances:

- Utilities Allowance;
- Soils and Concrete Testing Allowance;
- Building Permit Allowance; and
- Contingency Allowance.

1.2 UTILITIES ALLOWANCES

.1 This cash allowance is to cover all work required to be done, such as the electrical power authority, the natural gas supply, the telephone / fiber utility provider, the internet provider and other utility contractors for the extension of their primary services to the site(s) of permanent works to be installed under this Contract. The Contractor shall coordinate applications, the design and construction of these utilities, as required.

.2 An allowance to cover these costs has been preprinted and extended in the Schedule of Unit Prices. Portions of this amount will only be paid to the Contractor when there is evidence that the Contractor has paid the utility concerned for actual work completed by the utility company. The Contractor will only be paid when the respective utility has been paid and proof has been provided to the Contract Administrator. The Contractor shall not be eligible for any mark up on any invoiced amounts from the utility company. The Contractor shall issue purchase orders or deposits to the utility concerned as required.

.3 This allowance is not intended to cover any costs associated with the Contractor's responsibility to obtain and pay for inspections (i.e., electrical) for other works included in this project. It is not intended to cover any costs associated with the installation of secondary electrical power services from transformers into permanent works installed under this Contract. These costs shall be borne by the Contractor.

.4 The Utilities Allowance is not intended to cover any monthly or usage costs for utilities (i.e., electrical power, natural gas, internet, phone, etc.) during the construction period prior to substantial completion. Utility costs incurred during start-up, commissioning and the performance and reliability run period shall be the responsibility of the Contractor.

1.3 SOILS AND CONCRETE TESTING ALLOWANCE

.1 This cash allowance is intended to cover all third-party soils and materials testing (including concrete and asphalt) as deemed necessary by the Contract Administrator for this project to verify the installation of the works as part of the quality assurance (QA)/quality control (QC) aspects of the works. This will also include the geotechnical consultant’s review of proposed granular materials and asphalt mix designs. This is not intended to cover the Contractor’s own testing purposes for construction purposes.

.2 The Contract Administrator will coordinate all required testing with the geotechnical consultant; however, the Contractor is to provide written notice to the Contract Administrator’s Site Representative at least two (2) business day (48 hours) prior to undertaking any work that will require soils and/or concrete testing to allow the Contract Administrator time to schedule the necessary testing.

.3 The geotechnical consultant will invoice the Contractor, on a monthly basis, for soils and concrete testing that has been completed and approved by the Contract Administrator.

.4 Portions of the allowance listed will only be paid to the Contractor when there is evidence that the Contractor has paid the geotechnical consultant. The Contractor shall not be eligible for any mark-up on any invoiced amounts from the geotechnical consultant.

.5 This section shall be read in conjunction with Section 01450 – Testing Laboratory Services, where compaction and concrete testing results reveal work that is not in accordance with contract requirements, the Contractor shall pay for costs associated with additional testing as required by the Contract Administrator to verify acceptability of work.

1.4 BUILDING PERMIT ALLOWANCE

.1 A Building Permit will be required for this project. The Contractor shall be fully responsible for coordination, application preparation, submission of required documentation, payment of the required application fee required to obtain the Building Permit(s), and coordination of inspections.

.2 The Contractor shall be responsible for payment of application fees and shall recover same through this allowance upon proof of payment to relevant agency. The Contractor shall not be entitled to any mark-up on the invoiced amount.

1.5 CONTINGENCY ALLOWANCE

.1 The purpose of the Contingency Allowance is to cover costs associated with extras due to unforeseen circumstances. Extra work shall not commence until the Contract Administrators agrees to the price for payment and authorizes such work in writing. In the event that none of the Contingency Allowance is used, this amount will be deducted from the Total Tender Price.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

.1 Not applicable.

END OF SECTION

053193_Division 1_01070-Cash Allowances.docx
14/04/2026 10:59 AM

PART 1 GENERAL

1.1 SCOPE

.1 Submittals covered by this specification include, but are not necessarily limited to:

.1 Category 1 Submittals (if specified)

.1 Design documentation requested to be sealed by a Professional Engineer.
.2 Shop drawings.
.3 Product data.
.4 Coordination drawings.
.5 Schedules for construction, demolition and removals.
.6 Staging and sequencing plans.
.7 Summary list of loose items and spare parts.
.8 Samples.
.9 Mock-up.
.10 Other specific submittals as requested in individual specification sections.

.2 Category 2 Submittals (if specified)

.1 Falsework.
.2 Test procedures, test results, reports, installation certificates, photographic documentations, video documentations.
.3 Safety Plan.
.4 As-Built Drawings.
.5 Operations and Maintenance Manuals.
.6 Other specific submittals as requested in individual specification sections.

.2 Alternatives /Substitutions/Equivalents constituting a request for variance from the contract documents are not considered submittals under this specification.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all contract documents for related sections.

1.3 CATEGORIES OF SUMBITTALS

.1 Submittals fall into two Categories:

.1 Category 1 Submittals:

.1 Will be subjected to the submittal review procedure outlined below.
.2 Will be returned after review.
.3 Work associated with or impacted by the submittal shall not proceed until the submittal is returned to the contractor and is marked “Reviewed” or “Reviewed as Noted”.
.4 The Engineer’s review will not relieve the Contractor of the Contractors’ responsibilities under the Contract.

.2 Category 2 Submittals:

.1 Will not be subjected to the submittal review procedure outlined below, including associated timelines.
.2 Will be reviewed for general conformance with the contract documents.
.3 Satisfactory submittals will not be returned.

.4 Deviations will be brought to the attention of the contractor for corrective action.
.5 The Engineer's review will not relieve the Contractor of the Contractors' responsibilities under the Contract.

1.4 CONTRACTOR'S RESPONSIBILTY

.1 Submit to Engineer all submittals specified for review.

.2 Use a Separate transmittal for each specific item, class of material, equipment, and items specified in separate, discrete sections or installation location, for which the submittal is required. Each transmittal shall include date, project title and number, contractor's name and address, subcontractor's/supplier's name and address (if applicable), related specification number, equipment tag or drawings number and revisions number (if applicable). Submittal documents common to more than one piece of equipment to be identified with all the appropriate equipment numbers. Make submittals for various items with a single form when the items taken together constitute a manufacture's package or are so functionally related that expediency indicates checking or review of the group of packages as a whole.

.3 Submit promptly and in orderly sequence to not cause delay in Work. Coordinate submittals with the work so that work will not be delayed. Failure to submit in ample time or co-ordinate submittals is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed. Costs incurred as a result in delay in submission to the consultant of submittals, shall be solely bourne by the contractor.

.4 Coordinate submittals among the subcontractors and suppliers and ensure there is no conflict with other submittals. Notify the Owner in each case where a submittal may affect the work of trades or the Owner. Carry out any relocation of work due to interference at no additional cost to the Owner.

.5 Review submittals prior to submission to Engineer. This review represents that necessary requirements have been determined and verified, or will be and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped by the Contractor, signed, dated, "Marked Approved for Review" (or similar) and identified as to specific project, use, and applicable specification section will be returned without being examined and noted appropriately. Such returned submittal will count as the first submittal.

.6 Present submissions in SI Metric units.

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

.8 All submittals (excluding samples and mock-ups) are to be submitted in PDF electronic format.

.9 Cross out or otherwise obliterate extraneous materials and clearly identify materials proposed.

.10 Verify field measurements and that affected adjacent Work is coordinated. The Contractor is responsible for confirming field dimensions, as part of the shop drawing preparation, for fabrication processes or techniques of construction.

.11 Notify Engineer, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.12 The Engineer's review will not relieve the Contractor of the Contractors' responsibilities under the Contract.

.13 Keep one reviewed copy of each submission on site.

.14 Do not proceed with work affected by submittal until review is completed.

1.5 ENGINEER'S RESPONSIBILTY

.1 The review of submittals and shop drawings by the Engineer is for the sole purpose of ascertaining general conformance with the Contract Documents but does not relieve the Contractor of his responsibility to comply with the Contract Documents.

.2 Review of submittals does not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gauges, or fabrication processes, except where specifically indicated or required by the project requirements or to safety precautions or programs incident thereto. Review of a separate item, as such will not indicate approval of the assembly in which the item functions.

.3 The Engineer will not review submittals that have not been specifically requested or identified in the Contract Documents. Such submittals will not be reviewed and will be returned with an appropriate comment indicating the reason.

.4 The Engineer will not provide digital copies of Contract Drawing files or base plans for submittal/shop drawing preparation, unless otherwise identified in specifications

1.6 SUBMITTAL REVIEW PROCEDURE

.1 This procedure applies only to Category 1 submittals.

.2 Unless otherwise specified, within fifteen (15) business days after receipt of submittal, the Engineer shall review the submittal and return one (1) copy of the submittal bearing the Engineer's Shop Drawing Review stamp. Submittals shall be returned in electronic PDF format. The returned submittal shall indicate one of the following actions:

.1 If the review indicates that the material, equipment or work method complies with the Contract Documents, the submittal will be marked "REVIEWED". In this event, the Contractor may begin to incorporate the material or equipment covered by the submittal into the work.

.2 If the review indicates limited corrections are required, the submittal will be marked "REVIEWED AS NOTED". The Contractor may begin incorporating the material or equipment covered by the submittal in accordance with the noted corrections.

.3 If the review reveals that the submittal is insufficient or contains incorrect data, the submittal will be marked "REVISE AND RE-SUBMIT". The Contractor shall:

.1 Make the required changes to the submittals and re-submit.
.2 Identify all changes on resubmissions and indicate the revision dates. These include any changes that have been made to the submittal that were not previously requested by the Engineer.

.3 The Contractor shall not proceed with the work covered by or impacted by this submittal until the submittal has been revised, resubmitted and returned marked either “REVIEWED” or “REVIEWED AS NOTED”.
.4 The Engineer will review the first two submittal submissions for each piece of equipment/material or plan at the Engineer’s cost. Any subsequent review required beyond the first two submissions will be assessed against the Contractor and the related amount will be deducted from Payment Certificates.

.4 If the review reveals that the submittal does not comply with the contract documents, the submittal will be marked “REJECTED” and an explanation of the reason for the rejection provided on the submittal. The Contractor shall:

.1 Make an alternate submission.
.2 Not proceed with the work covered by or impacted by this submittal until the submittal has been revised, resubmitted and returned marked either “REVIEWED” or “REVIEWED AS NOTED”.
.3 The Engineer will review the first two submittal submissions for each piece of equipment/material or plan at the Engineer’s cost. Any subsequent review required beyond the first two submissions will be assessed against the Contractor and the related amount will be deducted from Payment Certificates.

.3 A mark of “REVIEWED or ‘REVIEWED AS NOTED” shall mean that the Owner has no objection to the Contractor, upon the Contractor’s responsibility, providing the materials or equipment proposed. These submittals are not to be re-submitted to the Engineer. If so received they will be discard without review, unless prior arrangements have been made with the Engineer requiring a re-submission for review due to a change required after the initial review.

.4 Markups and comments made on submittals by the Engineer are not intended to change Contract Price. If adjustments affect value of Work, the Contractor shall state such in writing to Engineer for the Engineer’s consideration, prior to proceeding with Work.

1.7 CATEGORY 1 – SUBMISSION REQUIREMENTS

.1 Submittal sheet size shall provide sufficient space for mark-ups and the Contractor’s and the Engineer’s review stamps.

.2 SHOP DRAWINGS

.1 The term “shop drawings” means detailed project specific construction and fabrication drawings that show the proposed material, shape, size, and assembly of the parts and how the entire unit will be installed and thereby illustrating a portion of the Work.

.2 Drawings are to be prepared by Contractor, Subcontractor, Supplier or Distributor.

.3 Identify details by reference to Drawing sheet and detail numbers shown on Contract Drawings.

.4 Dimension in metric (SI) units.

.5 Maximum sheet size 860 x 1120 mm.

.6 Provide details of appropriate portions of Work as applicable:

.1 Fabrication
.2 Layout, showing dimensions, including identified field dimensions, and clearances

.3 Setting or erection details
.4 Capacities
.5 Performance characteristics
.6 Standards
.7 Operating weight
.8 Wiring diagrams
.9 Single line and schematic diagrams
.10 Relationship to adjacent work.

.3 PRODUCT DATA

.1 The term “product data” means manufacturer's standard schematic drawings, catalogue sheets, diagrams schedules, performance charts, illustrations and other standard descriptive data.

.2 Above will only be accepted if they conform to following:

.1 Clearly identify information which is, or is not applicable to project.
.2 Supplement standard information to provide additional information applicable to project.
.3 Show dimensions in metric (SI) units.
.4 Clearances required.
.5 Show performance characteristics and capacities.
.6 Show wiring diagrams (when requested) and controls.
.7 Standards to which it was designed
.8 Operating weight
.9 Wiring diagrams
.10 Single line and schematic diagrams

.4 COORDINATION DRAWINGS

.1 The term “Coordination Drawings” means detailed project specific drawings that show areas of potential conflict, where interference may be caused by uncoordinated use of available space by the various trades and subcontractors. The drawings shall also show on the same drawing the proposed works of all disciplines, such as process piping, plumbing and drains, air ducts, electrical cable trays and conduits, including valve orientation and access.

.2 Show piping and other services that are to be cast into concrete.

.5 SCHEDULES FOR CONSTRUCTION, DEMOLITION AND REMOVALS

.1 Refer to Specification Section 01007.

.6 STAGING AND SEQUENCING PLANS

.1 The term “Staging and Sequencing Plans” refers to documents or drawings that outline the steps to be taken to construct the works. The Plans shall also identify where interferences exist and how they are to be resolved and where a specific work sequence is required to avoid or minimize operational interruptions of the existing facilities. Tie the Staging and Sequencing Plans to the project schedule. The submission shall be made after discussions with the Engineer and Owner’s operations staff. The Engineer reserves the right to request revisions to either the stages and/or the timing. Do not proceed with the work until the Staging and Sequencing Plans have been reviewed and accepted by the Engineer.

.7 SUMMARY LIST OF LOOSE ITEMS AND SPARE PARTS

.1 Contractor to review all specifications and prepare a list by section, of all loose items and spare parts required to be supplied.

.8 SAMPLES

.1 The term “Samples” refer to physical items submitted to support product data sheets where colour, pattern or texture is an option to be approved by the Engineer/Owner.

.2 Samples shall only be provided after the product data sheet has been marked reviewed or reviewed as noted.

.3 Deliver samples prepaid to site office or location specified by the Engineer.

.4 Label samples with origin and intended use.

.5 The Engineer will confirm in writing the colour, pattern or texture selection to the Contractor, within 15 business days of the sample being received at the site office.

.6 The Contractor shall not proceed to order these materials until the colour, pattern and texture has been confirmed in writing.

.9 MOCK-UPS

.1 Construct mock-ups as requested in respective Sections.

.2 Mock-ups shall only be constructed after associated shop drawings, product data and samples have been reviewed or confirmed.

.3 Mock-ups shall be fabricated at the project site.

.4 The Contractor shall provide advanced notice of 2 working days prior to the mock-ups being completed and available for review.

.5 The Engineer will inspect the mock-up and confirm in writing that the mock-up has been reviewed and indicate whether the contractor may proceed with the work, or alternately identify the changes to be made to the mock up.

.6 The Contractor shall not proceed with the work affected by the mock-up until the Engineer provides the confirmation that he/she may do so.

1.8 CATEGORY 2 – SUBMISSION REQUIREMENTS

.1 Refer to applicable specification sections.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

.1 Not applicable.

END OF SECTION

053193_Division 1_01340-Submittals
4/14/2026 11:13 AM

PART 1 GENERAL

1.1 GENERAL

.1 The General Contractor shall handle and dispose of hazardous waste materials in accordance with the applicable Acts, Regulations, Codes and Standards.

1.2 DEFINITIONS

.1 Dangerous Goods:

.1 Product, substance, or organism that is specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material:

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

.3 Hazardous Waste:

.1 Any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment, or disposal.

.4 Workplace Hazardous Materials Information System (WHMIS 2015):

.1 A Canada-wide system designed to give employers and workers information about hazardous materials used in workplace. Information on hazardous materials is provided on container labels, Safety Data Sheets (SDS), and worker education programs. WHMIS 2015 is put into effect by combination of federal and provincial laws.

1.3 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.4 REFERENCES

.1 The latest edition of the federal *Canadian Environmental Protection Act (CEPA)* including but not limited to the Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149) and all other applicable regulations.

.2 *National Fire Code (NFC)* of Canada (latest edition).

.3 *Technical Standards and Safety Act (TSSA)* (latest edition).

.4 The latest edition of the federal *Transportation of Dangerous Goods (TDG) Act,* including, but not limited to the Transportation of Dangerous Goods Regulations (Latest edition of SOR/2017-253) and all other applicable regulations.

.5 The latest edition of the *Ontario Environmental Protection Act (EPA)* including but not limited to O.Reg. 347 (latest edition) - General - Waste Management and all other applicable regulations.

.6 The latest edition of the federal *Canada Labour Code* Part II and all applicable regulations.

.7 The latest edition of the *Ontario Health and Safety Act* including but not limited to O.Reg. 490 (latest edition) - Designated Substances, O.Reg. 860 (latest edition) - Workplace Hazardous Materials Information Systems (WHMIS) and all other applicable regulations and codes.

1.5 SUBMITTALS

.1 Submit product data in accordance with Section 01340 - Submittal.

.2 Submit to the Contract Administrator current SDS for each hazardous material required prior to bringing hazardous material on site.

.3 Submit hazardous materials management plan to the Contract Administrator that identifies hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

.4 General Contractor's Site-Specific Health & Safety Plan per Section 01545 - Health and Safety.

1.6 DESIGNATED SUBSTANCES

.1 A Hazardous Materials Survey and Designated Substances Survey has been completed for this project and is included in the Reference Documents. An Asbestos Management Plan for the standpipe control building has also been prepared and included in the reference document. The Contractor shall ensure that all work is completed in accordance with the Asbestos Management Plan and ensure that abatement is completed in accordance with the applicable regulations.

.2 If the General Contractor encounters other suspicious materials that may be deemed hazardous, the General Contractor shall follow the appropriate protocols and regulations and immediately notify the Contract Administrator.

1.7 STORAGE AND HANDLING

.1 Co-ordinate storage of hazardous materials with the Contract Administrator and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with current *National Fire Code* of Canada requirements.

.4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use:

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval; and

.2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Contract Administrator.

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Do not transfer flammable and combustible liquids in vicinity of open flames or heat-producing devices.

.7 Do not use flammable liquids having flash point below 38 degrees Celsius, such as naphtha or gasoline as solvents or cleaning agents.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to a minimum.

.9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers;

.2 Label containers of hazardous materials and wastes in accordance with WHMIS;

.3 Store hazardous materials and wastes in containers compatible with that material or waste;

.4 Segregate incompatible materials and wastes;

.5 Ensure that different hazardous materials or hazardous wastes are not mixed;

.6 Store hazardous materials and wastes in secure storage area with controlled access;

.7 Maintain clear egress from storage area;

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment;

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment; and

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 Ensure personnel have been trained in accordance with WHMIS requirements. Report spills or accidents immediately to the Contract Administrator and federal / provincial authority. Submit a written spill report to the Contract Administrator and federal/provincial authority within 24 hours of incident.

1.8 TRANSPORTATION

.1 Transport hazardous materials and wastes in accordance with federal *Transportation of Dangerous Goods Ac*t, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.2 If exporting hazardous waste to another country, ensure compliance with the federal Export and Import of Hazardous Waste Regulations.

.3 If hazardous waste is generated on-site:

.1 Co-ordinate transportation and disposal with the Contract Administrator;

.2 Ensure compliance with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste;

.3 Use licensed carrier authorized by provincial authorities to accept subject material;

.4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material;

.5 Label container(s) with legible, visible safety marks as prescribed by federal and provincial regulations;

.6 Ensure that trained personnel handle, offer for transport, or transport dangerous goods;

.7 Provide photocopy of shipping documents and waste manifests to the Contract Administrator;

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to the Contract Administrator; and

.9 Report discharge, emission, or escape of hazardous materials immediately to the Contract Administrator and appropriate provincial authority. Take reasonable measures to control release.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Only bring on site the quantity of hazardous materials required to perform work.

.2 Maintain SDSs in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

.3 Supply WHMIS binders containing SDS documents / manuals for all materials, chemicals, etc. provided on-site. Supply and install two (2) WHMIS SDS Compliance Center binder holders (Acceptable Product: Uline S-15383). SDS Compliance Center shall be installed at locations designated by the Contract Administrator.

PART 3 EXECUTION

3.1 DISPOSAL

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for the purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm sewers or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in a timely fashion in accordance with applicable provincial regulations.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous wastes recycled in manner constituting disposal;

.2 Hazardous waste burned for energy recovery;

.3 Lead-acid battery recycling; and

.4 Hazardous wastes with economically recoverable precious metals.

.9 Prior to transport, obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and it is licensed to accept this material. Provide this information including a copy of relevant shipping documents and manifests to the Contract Administrator upon request.

PART 4 PAYMENT

.1 There shall be no separate payment to the General Contractor for meeting the requirements of this Section. Include all costs in the item to which it is applicable.

.2 The General Contractor shall be responsible for all costs associated with loading, haulage and disposal including application and/or disposal fees.

END OF SECTION

053193_Division 1_01400-Hazardous Materials.docm
4/14/2026 11:10 AM

PART 1 GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Engineer are specified under various sections.

.2 Testing of the water system shall be the responsibility of the General Contractor.

.3 Testing of the works constructed by the Sub-contractors shall be the responsibility of the respective subcontractor.

1.2 APPOINTMENT AND PAYMENT

.1 Engineer will appoint, and Owner will pay for services of testing laboratory except for the following:

.1 Inspection and testing required by-laws, ordinances, rules, regulations or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing and adjustment of mechanical and electrical equipment and systems.

.4 Tests specified to be carried out by Contractor under the supervision of Engineer.

.5 Additional tests specified in paragraph 1.2.

.2 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspection as Engineer may require verifying acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Furnish labour and facilities to:

.1 Provide access to work to be inspected and tested.

.2 Facilitate inspections and tests.

.3 Make good work disturbed by inspection and test.

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

.2 Notify Engineer sufficiently in advance of operation to allow for assignment of laboratory personnel and scheduling of tests.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Engineer.

1.4 SUBMITTALS

.1 Not applicable.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

.1 Not applicable.

END OF SECTION

053193_Division 1_01410-Testing Laboratory Services.docx
14/04/2026 11:14 AM

PART 1 GENERAL

1.1 ACCESS

.1 Provide and maintain adequate access to project site.

.2 Build and maintain temporary road where directed and provide snow removal during period of work.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of contract and make good damage resulting from Contractor's use of roads.

1.2 SUBMITTALS

.1 Not applicable.

1.3 STORAGE SHEDS

.1 Provide adequate weather tight sheds with raised floors, for storage of materials, tools and equipment which are subject to damage by weather.

1.4 SANITARY FACILITIES

.1 Provide sanitary facilities for work force and Engineer's staff in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.5 POWER

.1 Arrange, pay for and maintain temporary electrical power supply in accordance with governing regulations and ordinances.

.2 Install temporary facilities for power such as pole lines and underground cables to approval of local power supply authority.

.3 Electrical power and lighting systems installed under this contract may be used for construction requirements without prior approval of Engineer provided that guarantees are not affected. Make good damage. Replace lamps which have been used over the duration of the contract.

1.6 WATER SUPPLY

.1 Supply and install temporary water supply for work force and Engineer.

.2 Permanent water supply system installed under this contract may be used for construction requirements with prior approval of Engineer provided that guarantees are not affected. Make good all damages.

1.7 HEATING AND VENTILATING

.1 Pay for costs of temporary heat and ventilation used during construction, including costs of installation, fuel, operation, maintenance and removal of equipment. Use of direct-fired heaters discharging waste products into work areas will not be permitted unless prior approval is given by Engineer.

.2 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of work.

.2 Protect work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

.3 Maintain minimum temperature of 10 degrees C or higher where specified as soon as finishing work is commenced and maintain until acceptance of structure by Engineer.

.4 Ventilating:

.1 Prevent hazardous accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services

.4 Prevent damage to finishes

.5 Vent direct-fired combustion units to outside.

.6 Activate radiation system under direction of Engineer to provide temporary heat, after building is closed in.

.7 Replace filters at time of final acceptance of work.

1.8 SITE SIGNS AND NOTICES

.1 Only Project Identification, Consultant/Contractor, and Funding Agency signboards and notices for safety or instruction are permitted on site.

.2 Costs for manufacturing and installation of the signs shall be borne by the contractor. Submit shop drawings to Engineer for approval.

.3 Format, location and quantity of site signs and notices to be approved by Engineer.

.4 Signs and notices for safety or instruction to be in English language or commonly understood graphic symbols.

.5 Maintain signboards, signs and notices for duration of project. Remove and dispose of signs off site on completion of project.

1.9 SCAFFOLDING

.1 Construct and maintain scaffolding in rigid, secure and safe manner.

.2 Erect scaffolding independent of walls. Remove promptly when no longer required.

1.10 FUEL STORAGE

.1 All fuel storage tanks shall be double walled complete with interstitial space vacuum monitoring.

.2 Storage areas shall not be located within 150 m of any watercourse.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

.1 Remove temporary facilities from site when directed by Engineer.

END OF SECTION

053193_Division 1_01500-Temporary Facilities.docx
14/04/2026 11:15 AM

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Health and safety considerations required to ensure that the Owner shows due diligence towards health and safety on construction sites, and meets the requirements laid out in the Owner's Health & Safety Policy document.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all contract documents for related sections.

1.3 REFERENCES

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

.2 Heath Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.3 Province of Ontario

.1 Occupational Health and Safety Act, R.S.O. (1990 Updated 2005).

1.4 SUBMITTALS

.1 Make submittals in accordance with Section 01340 - Submittals Category 1 Submittals

.1 Submit site-specific Health and Safety Plan: Within ten (10) days after date of Notice to Commence Work and prior to commencement of work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

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

.2 Engineer will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 14 days after receipt of plan. Revise plan as appropriate and resubmit plan to Engineer within seven (7) days after receipt of comments from Engineer.

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

.2 Category 2 Submittals

.1 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Engineer bi-weekly.

.2 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.3 Submit copies of incident and accident reports.

.4 Submit WHMIS SDS – Safety Data Sheets.

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

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

1.5 FILING OF NOTICE

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

1.6 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.7 MEETINGS

.1 Schedule and administer Health and Safety meeting with Engineer prior to commencement of work.

1.8 REGULATORY REQUIREMENTS

.1 Do work in accordance with all applicable Regulatory Requirements.

1.9 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site work and continue to implement, maintain and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Engineer may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.10 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations and ordinances, and with site-specific Health and Safety Plan.

1.11 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O.

.2 Comply with Occupational Health and Safety Regulations, 1996.

.3 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.

.4 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

.5 The Environmental Protection Act and Regulations.

.6 Observe and enforce construction safety measures required by National Building Code 2005 Part 8, CSA S350-M1980 (R2003), Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario, 1990, Chapter 321, Ontario Regulations 213/91, Worker's Compensation Board and municipal statutes and authorities.

.7 In event of conflict between any provisions of above authorities the most stringent provision governs.

.8 Where applicable, the Contractor shall be designated the "Constructor" as defined by the Ontario Act.

1.12 UNFORESEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province having jurisdiction and advise Engineer verbally and in writing.

1.13 HEALTH AND SAFETY CO-ORDINATOR

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

.1 Have site related working experience specific to activities associated with demolition work.

.2 Have working knowledge of occupational safety and health regulations.

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

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

.4 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.14 POSTING OF DOCUMENTS

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

1.15 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non- compliance issues identified by authority having jurisdiction or by Engineer.

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

.3 Engineer may stop Work if non- compliance of health and safety regulations is not corrected.

1.16 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.17 POWDER ACTUATED DEVICES

.1 Use of powder actuated devices is not permitted.

1.18 FIRE SAFETY REQUIREMENTS

.1 Comply with requirements of the standard for Construction Operations FC 301-June 1982, issued by Fire Commissioner for Canada.

.2 This standard may be viewed at Regional Engineer's office and copies may be obtained from:

Fire Protection Services
Labour Program
Human Resources & Social Development Canada
Place du Portage Phase II, Gatineau, Quebec
Mailing address:
Ottawa, ON K1A 0J2

1.19 OVERLOADING

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.20 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003).

1.21 SCAFFOLDING

.1 Design and construct scaffolding in accordance with CAN/CSA S269.2 – M87 (R2003).

1.22 FORMWORK

.1 Design and construct concrete formwork to CAN/CSA S269.3-M92 (R2003).

1.23 EXCAVATIONS

.1 The Contractor/Sub-contractors shall be responsible for adequate fencing of all respective excavations overnight and on holidays and shall provide adequate lights and barricades as may be required in the opinion of the Engineer.

1.24 BARRICADES

.1 Observe all necessary precautions and provide, erect and maintain suitable signs, barricades and lights to protect all persons from injury and all vehicles from damage during the progress of the work, all to the approval of the Consultant or any authority having jurisdiction at this location.

.2 Provide all means necessary to prevent the entrance of unauthorized personnel onto the work site and from using access roads.

.3 Protect the work in conformity with the Contract.

1.25 WORK STOPPAGE

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

1.26 CONFINED SPACES

.1 Proper procedures are to be followed when entering any area deemed to be a confined space. Any personnel entering or forming part of a crew entering a confined space must have proof of confined space entry training.

.2 Contractor to submit their confined space entry procedure to the Engineer.

.3 Engineer's review of Contractor's confined space entry procedure should not be construed as approval and does not reduce the Contractor's overall responsibility.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

.1 Not applicable.

END OF SECTION

053193_Division 1_01545-Health and Safety.docx
14/04/2026 11:16 AM

PART 1 GENERAL

1.1 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all contract documents for related sections.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01340 - Submittals.

.2 Category 1 Submittals

.1 Prior to commencing work activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Engineer. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during work.

.2 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.3 Environmental protection plan to include, as applicable:

.4 Name(s) of person(s) responsible for ensuring adherence to Environmental Protection Plan.

.5 Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from site.

.6 Name(s) and qualifications of person(s) responsible for training site personnel (if required).

.7 Descriptions of environmental protection personnel training program.

.8 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures comply with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.9 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.10 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.11 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.12 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.13 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.14 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.15 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.16 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.17 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.18 Pesticide treatment plan: to be included and updated, as required.

.3 Category 2 Submittals – Not applicable.

1.4 FIRES

.1 Fires and burning of rubbish on site will not be permitted.

1.5 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.6 DRAINAGE AND EROSION CONTROL

.1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures comply with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sedimentations control plan.

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

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

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

.6 Removal of vegetation from sloped approaches to watercourses to be kept to a minimum. Excavate and stabilize temporary channel beds prior to any diversion of flow. Compact, stabilize and rip-rap banks and river beds that have been disturbed or damaged during construction. Provide splash pads where water is discharged into watercourses. Removal of vegetation from slopes to be kept to a minimum.

.7 Prior to commencing topsoil stripping, excavation or site grading operations, erect siltation control fence to prevent disposal run off from carrying suspended materials from disturbed areas of stockpiles leaving the site. Acceptable product Terrafence with prepositional posts or approved equal.

1.7 SITE-CLEARING AND PLANT PROTECTION

.1 Protect all trees and plants that are designated to remain.

.1 All work associated with providing tree hoarding protection (as shown on the Contract Drawings) shall be completed prior to commencement of any other site works. Throughout work the Contractor shall repair this hoarding as required or as directed by the Owner or Consultant at no extra cost to the Contract. The Contractor shall remove and dispose of the tree hoarding protection (off site) at Contract completion.

.2 Do not stockpile material within drip line.

.3 Do not allow traffic, vehicles or equipment to compact soil within drip line. To accomplish this, erect temporary snow fence around affected areas.

.4 Prune interfering branches to OPSS 503.

.5 Do not cut tree roots.

.6 Tunnel under or around roots by hand digging without damaging roots.

.7 Treat all damaged roots over 25 mm in diameter immediately with approved tree paint.

.8 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of two metres.

.9 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.10 Minimize stripping of topsoil and vegetation.

.11 Restrict tree removal to areas indicated or designated by Engineer. If the Contractor plans to remove any tree(s) between April 1 to August 31, the Contractor is required to

notify the Owner and Engineer within 14 days of planned removal to have an ecologist inspect the tree(s) for any nests 48 hours prior to clearing activities.

.12 Raising Grades

.1 When fill is less than 400 mm deep, place clean washed gravel around tree trunk to a minimum radius of 450 mm and approximately 50 mm above finished grade.

.2 Use gravel graded 25 mm to 50 mm in size.

.3 Place gravel before earth fill.

.4 Do not leave earth fill in contact with trunks.

.5 When fill is more than 400 mm deep, remove and replant tree to match finished grade.

.13 Lowering Grades

.1 Provide broad rounded mounds for trees to be preserved and located above finished grade.

.2 Cut all exposed or broken roots greater than 25 mm diameter cleanly and cover with top soil.

.14 Damaged Trees

.1 Replace all trees that have been damaged beyond saving.

.2 Replace trees with similar size and species or as approved by Engineer.

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.5 Refuelling Areas

.1 Review in detail proposed route of construction to plan access routes and fuelling areas. Establish suitable fuelling and maintenance areas and obtain approval from Engineer. Do not refuel or maintain equipment adjacent to or in watercourses. Do not fuel equipment within 30 metres of any watercourse unless non-spill facilities are used. Do not refuel any equipment within 50 metres of the existing water production wells.

.6 Cleaning Equipment

.1 Do not clean equipment in streams or lakes. Clean construction equipment prior to entering roadways. Do not clean equipment in locations where debris can gain access to sewers or watercourses.

.7 Spills

.1 Submit procedures for interception, rapid clean up and disposal of spillage that may occur, for Engineer's review, prior to commencing work. Be prepared at all times to intercept, clean up and dispose of any spillage that may occur whether on land or water. Keep all materials required for clean up of spillages readily accessible on site. Report immediately any spills causing damage to environment to Spills Action Centre of Ministry of Environment and Energy (Tel: (416) 325-3000 or 1-800-268-6060).

.8 Use of Herbicides and Pesticides

.1 Coordinate use of herbicides and pesticides with land owners and occupants and Regional Pesticides Control Office of Ministry of Environment and Energy.

.9 Sensitive Areas

.1 Inform Engineer in writing of particular schedule of each river crossing, channelizing or other work in designated sensitive areas. Avoid encroachment on unique natural areas. Do not disturb habitats of rare or endangered species. Protect wetland sites used as feeding or breeding areas by migratory fowls or as habitats for other animals. Schedule construction in sensitive areas so that there will be minimal interference with water uses including fish migration or spawning, or disruption of incubating period of eggs. Keep removal of vegetation to a minimum. Contain and deposit on land all aquatic plants uprooted or cut prior to or during construction.

.10 Channel Diversions and Stream Crossings

.1 Provide adequate stream flow whenever temporary dams or stream diversions are required to avoid interference with downstream water uses. Restrict number of locations where equipment is allowed to cross a watercourse. Install culverts for temporary stream crossings with minimum possible disturbance to channel. Do not restrict flows. Do not restrict or impede movement of migrating fish. Clean up stream channel upon completion of work. Clean up to include removal of any temporary structures, re-shaping of stream to an approved configuration, protection of stream banks and removal of all construction materials and debris.

.11 Disposal

.1 Do not empty fuel, lubricants or pesticides into sewers or watercourses.

.2 Dispose of all construction debris in an approved location.

1.9 NOISE CONTROL

.1 Establish and maintain site procedures such that noise levels from construction areas are minimized. Abide by all local municipal noise by-laws.

.2 Use vehicles and equipment equipped with efficient muffling devices.

.3 Provide and use devices that will minimize noise level in construction area.

1.10 DUST CONTROL

.1 Prevent dust nuisance resulting from construction operations at all locations on site.

.2 Use water, brine or calcium chloride to control dust. Minimize use of calcium and brine, particularly in proximity to watercourses or agricultural lands. Transport dusty materials in covered haulage vehicles. Public roadways shall be kept clean and free of mud.

.3 Payment for water, calcium chloride or brine to be included with the applicable item for which dust control is required.

1.11 HISTORICAL/ARCHAEOLOGICAL CONTROL

.1 The Contractor shall cease operations if any archaeological resources are encountered. The Consultant and the Ministry of Culture will be notified immediately in this event and appropriate mitigation measures assessed and implemented at that time.

.2 The Contractor shall cease operations if any human remains are discovered. The Consultant, the Ministry of Culture, and the Registrar of Cemeteries Regulation Unit will be notified immediately in this event.

1.12 WILDLIFE

.1 If migratory bird breeding activity is observed in the work area then mitigation measures, such as a prohibition on clearing or establishment appropriate buffers around active nests, will be implemented to avoid any adverse impacts based on consultation with a qualified avian biologist.

1.13 NOTIFICATION

.1 Engineer or Owner will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Engineer and Owner of proposed corrective action and take such action for approval by Engineer.

.3 Engineer or Owner will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 PRODUCTS

.1 Not Applicable

PART 3 EXECUTION

.1 Not Applicable

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

.1 AWWA C-651/23 “AWWA Standard For Disinfecting Watermains”

.2 AWWA C-652/19 “AWWA Standard For Disinfection of Water Storage Facilities”

.3 Ontario Provincial Standard Specification No. 441 “Construction Specification for Watermain Installation in Open Cut”

.4 Ministry of the Environment, Conservation and Parks Environmental Assessment and Permissions Division, Watermain Disinfection Procedure. August 1, 2020.

1.2 SUBMITTALS

.1 Not applicable

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 DISINFECTION

.1 Disinfection is to be completed by one of the following Specialist Companies:

.1 Aquacom Contracting Ltd.

.2 Corix Water Services Inc.

.3 Auazition (2009) Ltd.

.4 Aquone Water Quality

.5 OCWA

.6 Clearford Water Systems Inc.

.7 HYDRATEST

.8 Fer-Pal Construction Ltd.

.2 The Specialist must demonstrate workers have been properly trained and have received the appropriate Ministry of the Environment, Conservation, Parks (MECP) certification under Ontario Regulation 128/04.

.3 The entire tank must be filled with water to complete leakage testing and to disinfect the entire tank. The Specialist must provide temporary pumping equipment to be able to supply enough head to fill the entire tank using water from the municipal water system (the pressure from the existing water distribution system will not enough to fill the new tank which is taller than existing). The Contractor shall provide certification that the pump being utilized is solely for potable water use and has never been in contact with non-potable water. A backflow prevention device shall be utilized for the temporary connection to the water system (refer to Section 01715).

.4 Before new structures and piping systems for potable water can be put into service they must be disinfected in accordance with the relevant AWWA standard above. Observe the following procedures:

.1 Clean and flush to Engineer's approval.

.2 Disinfect as per relevant AWWA and MECP standard above.

.3 Drain chlorinated water and dispose of as specified below.

.4 Flush system and fill with potable water.

.5 Conduct Bacteriological testing in accordance with relevant AWWA and MECP standard.

.6 Coordinate and pay all costs associated with all required bacteriological testing. Testing shall be completed by a CALA accredited laboratory.

.7 When test results indicate that water is of acceptable quality, structures and piping systems may be connected and taken into service.

.5 Discharge of Chlorinated Water

.1 Chlorinated water used for disinfection is toxic to plants and wildlife and fish and shall be dechlorinated prior to discharge.

.2 A calibrated HACH colorimeter or approved equivalent shall be used for measuring concentration chlorine during the disinfection process. The use of litmus paper test strips, or swimming pool testing equipment will not be permitted for use during any aspect of the work.

.3 Chlorinated water must be dechlorinated as per relevant AWWA standard above.

END OF SECTION

053193_Division 1_01564-Disinfection.docx
14/04/2026 11:18 AM

PART 1 GENERAL

1.1 MATERIAL AND EQUIPMENT QUALITY

.1 Unless otherwise noted all equipment installed on this project shall be new.

1.2 MATERIAL STORAGE

.1 Materials stored on site shall be located in an area approved by the Contract Administrator.

1.3 MATERIALS AND EQUIPMENT PROTECTION FROM DAMAGE

.1 The Contractor shall make every effort to protect materials and equipment from damage due to environmental stresses or construction activities.

.2 Should material or equipment become damaged to a level that impacts the longevity, appearance, or function, the Contractor shall provide a written remediation plan for acceptance by the Contract Administrator.

.3 In the event the Contract Administrator agrees the damage is such that the material or equipment can be repaired, the Contractor will make all repairs and replacements necessary to the approval of the Contract Administrator and at no additional cost to the Owner.

.4 Either repair and/or replacement shall be carried out by the Contractor to the approval of the Contract Administrator and at no additional cost to the Owner.

1.4 SUBMITTALS

.1 Submit shop drawings for material and equipment in accordance with Section 01340 – Submittals.

PART 2 PRODUCTS

.1 Products, materials, equipment and articles incorporated into the Works shall be new, not damaged or defective and of the best quality compatible with the relevant Specifications for the purpose intended.

.2 Defective products will be rejected regardless of previous inspections. Remove and replace defective products. The Contractor shall be responsible for delays and expenses caused by rejection of defective products.

.3 In the event of a dispute regarding the quality or fitness of the products, the decision shall solely rest with the Contract Administrator based on the requirements of the Contract.

.4 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations except where required for operating instructions or when located in mechanical or electrical rooms.

.5 Unless noted otherwise in the Contract Documents, maintain uniformity of manufacturer for any particular item or like item throughout the Works.

.6 The Contractor shall be responsible for reviewing product delivery schedules and shall anticipate foreseeable supply delays for any item. If product delay is foreseeable, notify the Contract Administrator in order that substitutions or other remedial action may be authorized in ample time to prevent delay in the performance of work.

2.2 FASTENINGS

.1 Each trade, except where contract is for supply only, shall be responsible for all fastening required to complete work of that particular trade.

.1 Supply all fastenings, anchors and accessories and adhesives required for fabrication and erection of the work.

.2 Exposed metal fastenings and accessories shall be of same texture, colour and finish as base metal on which they occur.

.3 Metal flashings shall be for the same material as the metal which will not set up an electrolytic action which would cause damage to the fastening or metal component under moist conditions. In general, exterior anchors for windows, roofing sheet metal and anchors occurring on or an in an exterior wall or slab wall be non-corrosive or hot dip galvanized steel.

.4 Anchoring and fastening devices or adhesive shall be of appropriate type and shall be used in sufficient quantity in such a manner as to provide positive permanent anchorage of the unit to be anchored in position. Install anchors at spacing to provide for required load carrying capacity.

.5 Exposed fastenings will not be permitted without approval by the Engineer prior to use.

.6 Supply adequate instructions and templates and, if necessary, supervise installation where fastenings or accessories are required to be built into work of other trades.

.7 Fastenings which cause spalling or cracking of material to which anchorage is being made are not permitted.

.8 Do not use power actuated fastening devices which are stressed in withdrawal on any part of this work without written approval from the Engineer. Take stringent safety precautions when using powder actuated fastenings. Only low velocity plunger-type devices are permitted.

PART 3 EXECUTION

3.1 MANUFACTURERS INSTRUCTIONS

.1 Notify the Contract Administrator, in writing, of conflicts between the Specifications and the manufacturer’s instructions.

.2 Improper use of, installation or erection of products due to failure in complying with the manufacturer’s instructions shall be removed and reinstalled or reapplied at the Contractor’s expense.

3.2 WORKMANSHIP

.1 The Contractor shall ensure that only workers (including all subcontractors) experienced and skilled in the respective duties for which they are employed to obtain workmanship of the best quality.

.2 The Contractor shall be responsible for rectifying substandard workmanship at the Contractor's sole expense.

.3 Substandard workmanship, as identified by the Owner and/or Contract Administrator, shall be corrected immediately.

3.3 PROTECTION

.1 In the event of damage, each sub-trade will make all repairs and replacements necessary to the approval of the Contract Administrator and at no additional cost to the Owner. In particular, each Trade shall take the necessary precautions to minimize water penetration and/or damage during construction.

3.4 QUANTITIES

.1 Where quantities of materials are identified in the Schedule of Unit Prices or shown on the Contract Drawings, they are not guaranteed to be accurate and shall be checked by the Contractor.

PART 4 PAYMENT

.1 There shall be no separate payment for meeting the requirements of this Section. Include all costs in the appropriate item to which this Section applies.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE

.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

.2 Store volatile wastes in covered metal containers and remove from premises daily.

.3 Prevent accumulation of wastes which create hazardous conditions.

.4 Provide adequate ventilation during use of volatile or noxious substances.

1.2 SUBMITTALS

.1 Not applicable.

PART 2 PRODUCTS

.1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.1 CLEANING DURING CONSTRUCTION

.1 Maintain project site free from accumulations of waste materials and rubbish.

.2 Provide on-site containers for collection of waste materials and rubbish.

.3 Remove waste materials and rubbish from site.

.4 Vacuum clean interior building areas when ready to receive finish painting.

.5 Schedule cleaning operations so that resulting dust and other contaminants will not fall on wet, newly painted surfaces.

3.2 FINAL CLEANING

.1 In preparation for substantial completion or occupancy, conduct inspection of sight-exposed interior and exterior surfaces.

.2 Remove grease, dust, dirt, stains, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces including glass and other polished surfaces.

.3 Broom clean paved surfaces; rake clean other surfaces of grounds.

.4 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.5 Remove snow and ice from access to building.

.6 Replace heating and ventilation filters if units were operated during construction.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE

.1 This section outlines the requirements of leakage and pressure testing of all tanks, structures, pipes and appurtenances, designed to hold liquids.

.2 This Section is supplemented by the leakage/hydrostatic testing of watermain, water services, forcemain, etc. as listed in the specifications where applicable, including but not limited to

.1 Section 02238 – Watermain

.2 Section 01725 – Equipment/System Startup, Commissioning and Performance and Reliability Run.

.3 This Section outlines the requirements for testing of tracer wire installed on buried piping.

.4 This Section does not include the testing requirements related to components such as heating, ventilation and air-conditioning (HVAC) systems, Instrumentation and Control and general electrical equipment. Refer to relevant specification Sections for testing requirements.

1.2 REFERENCE STANDARDS

.1 Relevant Ontario Provincial Standards Specifications (OPSS)

.2 Relevant American Water Works Association (AWWA) Standards.

1.3 RELATED SECTIONS

.1 The General Contractor is responsible for review of all contract documents for related sections.

1.4 SUBMITTALS

.1 Not applicable.

1.5 WATER FOR TESTING PURPOSES

.1 In pipes and liquid retaining structures designed to hold water or sewage the Contractor shall use potable water from the existing system for testing purposes.

.2 Water required for initial testing and filling shall be provided by the Owner directly from the municipal supply at no cost to the Contractor. The time and rate of supply shall be convenient to the Owner.

.3 Water necessary for subsequent fillings required as a result of unsuccessful tests shall be charged to the Contractor at the normal Municipal rate at the time of tender.

.4 The Contractor shall supply all necessary labour, pumps, valves, gauges, caps, flanges, pipework and other apparatus necessary to complete the test. The Contractor must supply and utilize backflow prevention device(s) (reduced pressure principle backflow preventer certified to CSA B64.4) for the temporary connection to the water system.

.5 The temporary connection to the existing water system including pipework and backflow preventer must have a minimum size of 100 mm in order to supply the required flow to fill the tank in a reasonable time.

.6 For the purposes of this contract, the rate of water available to be supplied from the municipal water distribution system shall be assumed to be 30-40 L/s. The flow rate shall be controlled with valves and the pumps.

.7 The Contractor will be required to utilize temporary pumping to fill the standpipe to the maximum operating level during testing. The level must then be reduced to the initial high water level as shown in the drawings (368.0 masl) for commissioning. Refer to Section 01715 regarding these pumps.

.8 The new standpipe will be taller than the existing tank to allow for an increase of the high water level from 368.0 masl (existing) to 373.5 masl (future). The leakage testing and tank disinfection shall be completed for the full tank height, up to the overflow elevation. However, the tank will initially be operated at the existing high water level following construction (368.0 masl). Additional upgrades to the distribution system must be completed outside the scope of this project before the tank is providing service above 368.0 masl to the distribution system to prevent overpressurization in areas throughout the system. Therefore, following testing, **when the isolation valve in the existing control building is opened and the standpipe is providing backpressure to the distribution system during/following start-up and commissioning, the water level in the standpipe shall not exceed 368.0 masl**.

.9 The Contractor shall be responsible for disposing of test water as detailed elsewhere in these specifications. Water shall be dechlorinated before disposal.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 INSPECTION

.1 All tests shall be carried out in the presence of the Contract Administrator. Unless specified otherwise, the Contract Administrator shall be notified of all tests a minimum of 2 business days (48 hours) in advance when on-site full-time and one (1) business week (i.e. five (5) business days) in advance when providing part-time construction review services. The Contract Administrator shall be present when tests are being conducted.

.2 Failure to notify and otherwise make arrangements with the Contract Administrator to attend testing will require the test to be performed again.

.3 At the discretion of the Contract Administrator, the Contract Administrator may choose not to attend a test if they feel there will be ample opportunity during start-up and commissioning to observe the satisfactory operation of equipment/systems.

3.2 LIQUID RETAINING STRUCTURES

.1 Liquid retaining structures shall be tested for water tightness before the application of interior waterproofing materials (if applicable) and upon construction completion of the entire structure being tested. Structures cannot be tested until all concrete has cured

sufficiently and all structural related components (roof assemblies, supports, grout, tie rods, anchoring systems, etc.) are installed to the satisfaction of the Engineer.

.2 Where liquid retaining structures are divided into compartments, each compartment shall be tested individually.

.3 Tanks may be backfilled, but this shall not relieve the Contractor of the cost of re-excavation for necessary repairs.

.4 Liquid retaining structures shall be filled to their maximum level over a 24-hour period. The tank shall then be topped up and checked over the next 24 hours for water tightness. Permissible leakage over this 24-hour period shall be 10 mm. Any leakage in excess of this quantity or any leak which is visible shall be repaired at the Contractors' expense until the test is satisfactory.

.5 Any visible leaks shall be repaired at the General Contractor's expense using a method/material approved by the Engineer. It is intended that all liquid-containing concrete structures shall be free from visible leaks. Repairs shall be made to visible leaks regardless of any amount the total measured loss may have been below the specified maximum allowable loss during the tightness test. Damp spots on exterior wall surfaces will be considered visible leaks if water can be picked up on a facial tissue. Damp spots on wall footings will be permitted. Each leak which is discovered during the correction period shall be located and repaired to the satisfaction of Owner by and at the expense of General Contractor's.

.6 Exposed concrete surfaces of the tank, including the floor, shall be cleaned of all foreign material and debris prior to the test. Standing water in or outside the tank that would interfere with the observation of the exposed concrete surfaces of the tank shall be removed. The concrete surfaces and concrete joints shall be thoroughly inspected for potential leakage points. Areas of potential leakage shall be repaired prior to filling the tank with water.

3.3 PRECAST CONCRETE STRUCTURES

.1 All precast concrete structures shall be watertight. No visible leakage into or out of the structure will be permitted.

3.4 PVC, DUCTILE IRON, AND STAINLESS STEEL PIPE (PRESSURE PIPE)

.1 These pressurized pipe materials shall be tested in accordance with OPSS 441 and the specified test pressure shall be 1035 kPa or maximum pipe rated working pressure - whichever is less.

3.5 PVC PIPE (NON-PRESSURIZED)

.1 These pipe materials shall be tested in accordance with OPSS 410 and shall be subject to leakage testing.

3.6 TRACER WIRE

.1 The General Contractor shall perform a continuity test of all tracer wire using an industry standard pipe and cable locator kit, following backfilling activities and test station installation.

.2 Tracer wire shall be tested at all locations where wire has been extended to surface unless directed otherwise by the Contract Administrator.

.3 The General Contractor shall ensure that Owner's Operators are present during the testing process.

.4 The General Contractor shall provide evidence that continuity testing has been performed. This includes providing the testing results to the Contract Administrator as a shop drawing submission within no more than a week (i.e. five (5) business days) after the tests were conducted.

.5 Failure of tracer wire testing will result in the excavation and replacement of the tracer wire in the area in question, by the General Contractor at no additional cost to the Owner.

.6 Refer to relevant piping Sections regarding tracer wire installation requirements.

Part 4 PAYMENT

.1 Unless a specific item is listed in the Schedule of Unit Prices for leakage and pressure testing, payment for meeting the requirements of this Section shall be included in the unit or lump sum price bid for the item where leakage and pressure testing is required.

.2 Where a specific item has not been identified in the Schedule of Unit Prices for testing, include all costs in the Total Tender Price.

.3 Testing of tracer wire shall be included in the unit price bid for the supply and installation of the respective piping installed under this Contract.

END OF SECTION

053193_Division 1_01715-Testing.docx
14/04/2026 11:21 AM

PART 1 GENERAL

1.1 AS-BUILT DRAWINGS

.1 As work progresses, neatly record significant deviations from the Contract Drawings using fine, red marker on full size white prints.

.2 Neatly print lettering and numbers in size to match original. Lines may be drawn free hand but shall be neat and accurate. Add at each drawing title block note: "As-Built Drawings". Also circle on List of Drawings each title and number of drawings marked with "As-Built Drawings".

.3 Record following significant deviations:

.1 Depths of various elements of foundation.

.2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement and geodetic elevation.

.3 Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.

.4 Field changes of dimensions.

.5 Other significant deviations which are concealed in construction and cannot be identified by visual inspection.

.4 Turn one set of As-Built Drawings over to Engineer within two weeks following Substantial Completion.

.5 If project is completed without significant deviations from Contract Drawings, declare this in writing and submit it to Engineer in lieu of As-Built Drawings.

1.2 SUBMITTALS

.1 Provide As-Built Drawings in accordance with Section 01340 – Submittals.

.2 As-Built Drawings are considered a Category 2 submittal.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

.1 Not applicable.

END OF SECTION

053193_Division 1_01720-As-Built Drawings.docx
14/04/2026 11:22 AM

PART 1 GENERAL

1.1 SCOPE

.1 This section outlines the requirements for equipment/system(s) Start-up, Commissioning and Performance and Reliability Run, and Training of the new works. It also includes participation requirements for equipment/system(s) Manufacturer's Authorized Representatives.

The works will not be turned over to the Owner for operation until the Performance and Reliability Run period has been completed to the satisfaction of the Contract Administrator.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.3 DEFINITIONS

.1 **Start-up** is the demonstration to the Contract Administrator's representative of the proper installation and functionality of the various systems individually and as a whole involving equipment/system(s) producing a functional overall operating system(s). Start-up relates to those activities and tests that are required to advance the newly installed equipment/system(s), control systems and facility processes to an operational readiness level. Start-up does not include the Commissioning Phase.

.2 **Commissioning** is the demonstration to the Contract Administrator, once Start-up has been completed, of the proper functioning of the various systems individually and as a whole involving inter-related equipment/system(s) producing a functional overall operating system(s). The equipment/system(s) will be tested and operated in full SCADA, remote, local, and manual modes. Commissioning relates to those activities and tests that are required to advance the equipment/system(s) which have successfully completed Start-up, to a performance and reliability readiness level. Commissioning does not include the Performance and Reliability Run Phase.

.3 **Training** is the process of providing instructions to the operational staff on the equipment/system(s), once equipment/system(s) have been commissioned. It is to be completed by a Manufacturer's Authorized Representative for the equipment/system. The Manufacturer's Authorized Representative shall be factory trained and have a minimum of 2-years of experience with the equipment/system for which they are providing training.

.4 **Performance and Reliability Run Phase** is the Phase following successful Commissioning of all systems during which the entire facility will be operated by the Operator, with the support of the General Contractor, for a minimum specified time Phase without failure to meet the contract requirements. It is the act of demonstration to the Contract Administrator that the facility is capable of meeting the contract requirements. Substantial Performance will not be granted until the Performance and Reliability Run Phase has been completed to the satisfaction of the Contract Administrator.

1.4 START-UP AND COMMISSIONING FORMS

.1 Appended to the end of this specification section are a number of forms that will be completed by the General Contractor during Start-up and Commissioning, while the General Contractor demonstrates equipment/system(s).

.2 As a minimum, the following forms are to be completed:

FORM NO.	**ITEM**	
VALVES		
SCF 0201	Manual Valves	
STANDPIPE STRUCTURE		
SCF 0405	Standpipe	
YARD PIPING/SITE		
SCF 1001	Storm Sewer Systems	
SCF 1003	Watermains	
SCF 1006	Siteworks	

.3 The Start-up and Commissioning forms attached are not intended to replace the Manufacturer's Authorized Representative forms that they use for the Start-up and/or Commissioning Phase(s). Rather, the Manufacturer's Authorized Representative forms are to be provided to the Contract Administrator's site representative upon completion by the Manufacturer's Authorized Representative following Start-up and/or Commissioning. Copies of the Manufacturer's Authorized Representative forms are to be stapled to the relevant Start-up and Commissioning forms.

.4 Signature and related date spaces on each form are to be signed in the following order:

.1 Manufacturer

.2 General Contractor

.3 Contract Administrator's Site Representative

.4 Owner (if applicable)

1.5 ELECTRICITY/NATURAL GAS/FUEL CONSUMED DURING START-UP, COMMISSIONING AND THE PERFORMANCE AND RELIABILITY RUN PHASE

.1 The Contractor shall bear the cost of all hydro electricity, natural gas and other fuels required to construct the upgraded, expanded, or new facilities (i.e. "new works") including the successful Start-up and Commissioning of new equipment/system(s) (pumps, generators, heating systems, etc.). These costs shall continue to be borne by the Contractor until the successful completion of the Performance and Reliability Run Phase.

.2 For the purpose of assessing additional cost for "new works" for hydro electricity, natural gas and other fuels attributable to upgrades or expansions to existing facilities, the Engineer will use two methods to assess costs to be borne by the Contractor.

.1 Where these costs can be assessed based on separate metering readings, this method shall be used; otherwise.

.2 Where separate metering has not been provided for, assessing of additional cost will be by comparing monthly hydro, natural gas and other fuel usage billings with those of the previous years, for Phases of similar flow and weather conditions.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 CHRISTMAS BREAK

.1 There shall be no Start-up, Commissioning, Training or Performance and Reliability Run activities scheduled between December 15 and January 15.

3.2 GENERAL CONTRACTOR ATTENDANCE AT MEETINGS DURING START-UP, COMMISSIONING AND PERFORMANCE AND RELIABILITY RUN PHASES

.1 The General Contractor is to arrange for attendance of his Commissioning Foreman. The General Contractor is to allow for 2 such meetings.

.2 The meetings dates and times will be as specified by the Contract Administrator, and will occur during the course of the Start-up, Commissioning and Performance and Reliability Run Phases.

.3 These meetings are separate from other regularly scheduled site meetings and in addition to the Pre-Startup Workshop/Verification Plan meeting, held prior to the Start-up Phase.

.4 Should additional meetings be required, due to issues associated with failures of the equipment/systems or the contractor being unprepared during the Start-up, Commissioning and Performance and Reliability Run Phases, the costs associated with these additional meetings shall be deducted from payments to the General Contractor. These costs include, but are not limited to, additional fees charged by the Engineering for attending meetings and preparing minutes.

3.3 CALENDARS/SCHEDULE FOR START-UP/COMMISSIONING AND TRAINING

.1 Calendars or Schedules for Start-up, Commissioning and Training are considered to be a “road map” towards achieving Substantial Performance. All schedule updates shall be provided in calendar format complete with a revision number and date.

.2 All Calendar updates shall include dates/events for the following activities:

.1 Date for submission of As Built Drawings.

.2 Dates for submission of draft and final Operation and Maintenance Manuals.

.3 Dates for submission of draft and final Process Control Narratives.

.4 Date(s) for Software Factory Acceptance Test (FAT).

.5 Dates for submission of Equipment Checklists.

.6 Date for submission of Red Lined Single Line Drawing.

.7 Date for submission of Final Unconditional ESA Inspection Certificate.

.8 Date for submission of TSSA required certificates (natural gas, diesel fuel, etc) (if applicable).

.9 Date for submission of municipal Occupancy Permit (if applicable).

.10 Date for submission of municipal Building Permit Official Closeout (if applicable).

.11 Date(s) for major tests.

.12 Date(s) for major events.

.13 All dates when equipment manufacturer's representatives will be on site to provide start-up, commissioning or training activities.

.14 Date(s) when controls systems integrator will be on site.

.15 Date(s) for calibration of instruments by manufacturer's representatives and completion of calibration forms/checklists.

.16 Date(s) for completion of point to point I/O checks by the Electrical Subcontractor/General Contractor and the Controls System Integrator.

.17 Submission date for instrumentation calibration forms and I/O checklists to the Contract Administrator.

.18 Date(s) for point to point I/O checks to be completed by the Electrical Subcontractor/General Contractor and Controls Systems Integrator witnessed in the presence of the Contract Administrator and Electrical Engineer.

.19 Date(s) for Software Site Acceptance Test (SAT).

.20 Dates when the Contract Administrator's office engineering staff is required on site to witness start-up or commissioning activities (i.e. Electrical Engineer required to witness I/O checks or Process and Electrical Engineers to witness Software SAT).

.21 Date(s) for Operator Training.

.22 Date outlining commencement and completion of the Performance and Reliability Run Period.

3.4 PRIOR TO COMMENCEMENT OF START-UP PHASE

.1 The General Contractor is to notify Contract Administrator four months in advance of intended date for Start-up.

.2 The General Contractor is to review Start-up requirements in this Specification.

.3 Approximately two months in advance of Start-up, the Contract Administrator to arrange a Pre Start-up Workshop, to be attended by the Contractor and their Start-up, Commissioning, and Performance and Reliability Run team members, the Owner and the Owners Operators to discuss Start-up, Commissioning, Performance and Reliability Run and Training requirements, and to develop a Verification Plan. The workshop will be a total of 1 day

.4 The Contractor shall arrange for attendance at the workshop of their Start-up, Commissioning, and Performance and Reliability Run team. The team members shall consist of:

.1 The General Contractor's staff person, directly responsible for overseeing and successful completion of the Start-up, Commissioning and Performance and Reliability Run Phases. This staff Person is hereafter referred to as the Commissioning Foreman;

.2 Any Manufactures Authorized Representatives that will be integral in systems requiring a high level of system Start-up/Commissioning/Performance and Reliability Run expertise, during any or all of these Phases. As a minimum, the Manufacturer's Authorized Representatives are required to attend the workshop, as listed in individual specifications or as listed in Table 1, whichever is more stringent.

.5 The intent of the Verification Plan is to:

.1 Outline the requirements for sampling (frequency/parameters) and tests required during Start-up, Commissioning, and during the Performance and Reliability Run Phase, as well as Training requirements, all as defined in the contract documents.

.2 Identify operational constraints that may/will be present during Start-up, Commissioning and Performance and Reliability Run Phases, and to develop approaches to complete the required activities under the identified operational constraints.

.3 The Plan will take into consideration the sequence of construction and the necessity to sequentially Start-up and Commission certain equipment/system(s) and place them into operation prior to completion of other equipment/system(s).

.4 The Plan will include I/O checklists and tests required to prove control narrative descriptions, interlocks and failure modes.

.5 The Plan execution status will be revisited at the regular scheduled site meetings and/or other meetings held to review the Start-up, Commissioning, Training, and Performance and Reliability Run activities, underway and planned. The Plan will be updated as necessary following the meetings and the revised plan appended to the minutes of the meeting.

.6 The General Contractor shall provide the Contract Administrator with one draft copy of the Operating and Maintenance Manual in pdf. format for review at least four weeks prior to the intended date of Start-up.

.7 The General Contractor is to ensure that all identification labels and tags, complying to the Municipal standard or as identified in the contract documents, are in place prior to Start-up. The General Contractor is to verify that all equipment/system(s), that are undergoing Start-up, are capable of being operated. The Contractor is to verify that the control and instrumentation equipment/system(s) is installed and checked by the Manufacturer's Authorized Representative and is ready for start-up.

.8 Prior to Start-up, the General Contractor to ensure that all equipment/system(s), piping, conduits, etc. are properly cleaned and all debris and foreign matter removed. The General Contractor shall clean, brush, flush with water to provide clean work. The General Contractor shall vacuum clean building interior areas and continue cleaning on an as-needed basis until substantial performance or occupancy, whichever occurs first.

.9 A minimum of 2 weeks prior to the intended Start-up date, the General Contractor shall provide written notification to the Contract Administrator stating that all equipment/system(s) is at an operational readiness level. The Owner and Contract Administrator shall establish a date for Start-up upon receipt of this notice.

.10 A minimum of 4 weeks prior to the intended Start-up date the General Contractor shall provide a schedule (in calendar format) listing dates/times equipment/system(s) Start-up for review by the Contract Administrator. The General Contractor shall confirm related communication, I/O, calibration ranges and fine tuning.

3.5 WORKSHOP PARTICIPATION, AND FIELD CERTIFICATIONS/ATTENDANCE BY MANUFACTURER'S AUTHORIZED REPRESENTATIVES

.1 For the equipment/system(s) listed below, a Manufacturer's Authorized Representative shall be present for the Workshop(s) Prior to Start-up, Start-up, Commissioning, Training and Warranty Periods, as listed in individual specifications or as listed in this section, whichever is more stringent. Note, each day is deemed to represent an 8-hour day (on-site).

.2 Individual specifications and other sections of this document outline Start-up and Commissioning requirements for various pieces of equipment/system(s). Included in these other sections are the number of days and time that the supplier is to include in the quoted price for on-site set up, Start-up, equipment/system(s) Commissioning and Training, by a Manufacturer's Authorized Representative. The Contractor is required to coordinate and pay for the site attendance services of those listed and shall take these quoted prices into account and shall "cover" the difference to obtain the minimum Start-up, Commissioning, Training and Warranty Period Manufacturer's Authorized Representative attendance, as specified in individual specifications or as listed in Table 1, whichever is more stringent. The Contractor is to ensure that respective sub-contractors and suppliers are aware of these requirements at time of tender. No extra payment will be made due to the Contractor's unfamiliarity with these requirements.

Table 1: Requirements for Field Certification/Attendance by Manufacturer's Authorized Representatives

Equipment	Workshop Prior to Start-up No. of Days	Start-up No. of Days	Commissioning No. of Days	Training No. of Days	Warranty Period No. of Days	Remarks
Obstruction Lighting System		1.0	0.5	0.5		
Standpipe Mixing System		1.0	0.5	0.5		
Control Systems Programmer/Integrator		1.0	2.0	1.0	1.0	*As necessary to meet the requirements of this specification section and Division 16. Refer to Division 16 and requirements associated with other equipment/system(s) included in this table

.3 The Contractor shall co-ordinate the equipment/system(s) supplier Start-up and Commissioning visits such that no more than one Manufacturer's Authorized Representative are on site during the same day.

.4 The Manufacturer's Authorized Representative shall provide certification reports to the Engineer for both Start-up and Commissioning Phases, where attendance is specified in individual specifications or as listed in Table 1, whichever is more stringent. The certification reports shall state that the Manufacturer's Authorized Representative has found the installation and operation to be to their satisfaction and shall indicate the tests performed, the results of those tests, and any remedial actions required. When the Manufacturer's Authorized Representative verifies the installation and operation of their equipment/system(s) during the Start-up Phase, a copy of their certification report shall be provided to the Engineer prior to equipment/system(s) commissioning occurring. When the Manufacturer's Authorized Representative verifies the installation and operation of their equipment/system(s) during the Commissioning Phase, a copy of their report shall be provided to the Engineer prior to the Performance and Reliability Run Phase commencing. A copy of the Manufacturer's Authorized Representative field certification reports shall be included in the Contractor's final version of the Operation and Maintenance Manuals.

.5 The Manufacturer's Authorized Representative shall sign the equipment and systems forms specified in Section 1.5 at each site visit.

.6 During Start-up and Commissioning Phases the Manufacturer's Authorized Representative shall provide basic operating instructions and identify hazards and safety procedures for the equipment/system(s) to the Engineers site representative, the Contractor, and the Owner's operators.

.7 Training by the Manufacturer's Authorized Representative shall meet the duration requirements listed in individual specifications or as listed in Table 1, whichever is more stringent, and shall comply with Section 3.7.

.8 Warranty support by the Manufacturer's Authorized Representative shall meet the duration requirements as listed in individual specifications or as listed in Table 1, whichever is more stringent. Warranty Period visits will be scheduled by the Contractor only upon request by the Engineer.

3.6 START-UP PHASE

.1 The roles and responsibilities during Start-up are defined as follows.

.1 General Contractor

.1 Start-up shall take place in the presence of the Contract Administrator's site representative and the General Contractor. The operating authority may attend.
.2 The General Contractor shall ensure that all respective equipment/system(s) are installed as shown in the Contract Documents and as specified prior to scheduling the Start-up.
.3 The General Contractor shall make all arrangements for testing, coordinate all personnel, Sub-contractors and suppliers involved, issue all required notifications, perform and/or coordinate all manufacturers' equipment/system(s) tests, record results, make all necessary adjustments and retest as necessary until equipment and systems perform as intended.

.4 As part of the Start-up Phase, the General Contractor shall record input from the Contract Administrator's site representative in the completion of the forms appended, and upon completion of each, the General Contractor shall sign the form.
.5 The General Contractor shall not proceed to Commissioning until the Start-up has been completed to the satisfaction of the Contract Administrator.
.6 Additional site visits by the Owner's Representative and the Contract Administrator's site representative and associated costs resulting from General Contractor being unprepared for the Start-up shall be at the full expense of the General Contractor.

.2 Contract Administrator

.1 The Contract Administrator's site representative will witness Start-up and work with the General Contractor to complete the Start-up requirements. The Contract Administrator will review the completed Start-up sections of the Start-up and Commissioning forms and advise the General Contractor of any deficiencies or corrections to be made.
.2 The Contract Administrator will review the draft Operation and Maintenance Manual submitted by the General Contractor and advise the General Contractor of any deficiencies or corrections to be made.

.3 Owner/Operating Authority

.1 The Owner/Operating Authority will inform required regulatory agencies of the scheduled Start-up.
.2 The Owner/Operating Authority will assign relevant staff to witness Start-up where necessary and will arrange to operate all existing equipment/system(s), valves and systems as required.
.3 The Owner/Operating Authority shall be present during the Start-up Phase to assist in their understanding of the operation of various equipment/system(s).

.2 Before starting up any equipment/system(s), the General Contractor shall provide 48 hours' notice to the Contract Administrator and shall coordinate with the Operating Authority and ensure that isolating valves etc., are properly adjusted to prevent inadvertent and/or improper operation or adverse impact on the existing system. General Contractor to employ proper precautions to avoid creating excessive surges, water hammer, overflows, starting/stopping, vibrations and any other event to the detriment of the works or environment.

.3 Start-up of water conveyance, pumping, treatment, and storage systems shall be undertaken using potable water as the process fluid. Potable water shall be provided from the local municipal water system and water supplied for the initial start-up shall be supplied at no cost to the General Contractor. The time and rate of supply shall be convenient to the municipality. Potable water necessary for subsequent start-ups as a result of unsuccessful tests shall be charged to the General Contractor at the normal municipal rate. At the time of tender, the General Contractor is to confirm the unit rate for municipal water.

.4 The General Contractor shall provide pumps and any equipment/system(s) or supplies required for Start-up of the equipment/system(s) and install temporary connections, bulkheads and make other provisions to re-circulate process fluids or otherwise simulate anticipated operating conditions as required. The General Contractor shall provide all instruments and test devices necessary to record operating parameters where they are not part of the works.

.5 Test results shall be within the tolerances set forth in the detailed specifications sections. If tolerances have not been specified, test results shall conform to tolerances established by recognized industry practice or those identified by the Manufacturer's Authorized Representative, whichever is more stringent.

.6 During Start-up, the Contract Administrator's site representative will advise the General Contractor of any deficiencies or corrections to be made. The General Contractor shall employ whatever means are necessary to correct these deficiencies as quickly as possible. Once the Contract Administrator is satisfied that all equipment/system(s) has completed Start-up adequately, individually and as a whole, and all noted deficiencies corrected, the Contract Administrator together with the General Contractor and Owner shall establish a date for commencement of the Commissioning Phase.

.7 Where the General Contractor fails to ensure that all respective equipment/system(s) are installed and operating as specified, in advance of the Start-up, additional site visits by the Contract Administrator's site representative will be required.

.8 The associated costs resulting from additional site visits by the Contract Administrator's site representative, as a result of the General Contractor being unprepared, shall be at the full expense of the General Contractor.

.9 A minimum of 2 weeks prior to the intended start of Commissioning the General Contractor shall provide an updated schedule (in calendar format) listing dates/times for each individual equipment/system(s) to be commissioned, for review by the Contract Administrator.

3.7 COMMISSIONING PHASE

.1 The role and responsibilities during Commissioning are defined as follows.

.1 General Contractor

.1 Additional site visits by the Owner's Representative and the Contract Administrator and associated costs resulting from General Contractor being unprepared for the Commissioning shall be at the full expense of the General Contractor.
.2 Commissioning shall take place in the presence of the Contract Administrator or Contract Administrator's representative and the Contractor. The operating authority may attend.
.3 The General Contractor shall ensure that all respective equipment/system(s) are installed as shown in the contract documents and as specified prior to scheduling the Commissioning.
.4 General Contractor shall make all arrangements for testing, coordinate all personnel, Sub-contractors and suppliers involved, issue all required notifications, perform and/or coordinate all manufacturers equipment/system(s) tests, record results, make all necessary adjustments and retest as necessary until equipment/system(s) perform as intended.
.5 As part of the Commissioning Phase, the General Contractor shall record input from the Contract Administrator's site representative in the completion of the forms appended, and upon completion of each, the General Contractor shall sign the form.
.6 The General Contractor shall not proceed to Performance and Reliability Run until the Commissioning section of the forms has been completed to the satisfaction of the Contract Administrator.

.7 Additional site visits by the Owner's Representative and the Contract Administrator and associated costs resulting from General Contractor being unprepared for Commissioning shall be at the full expense of the General Contractor.

.2 Contract Administrator

.1 The Contract Administrator and/or the Contract Administrator's site representative will witness Commissioning and work with the General Contractor to complete Commissioning requirements. The Contract Administrator will review the completed Commissioning sections of the Start-up and Commissioning forms and advise the General Contractor of any deficiencies or corrections to be made.

.2 During the Commissioning Phase the Contract Administrator shall instruct the General Contractor's Commissioning Foreman to perform operational adjustments that will simulate various test parameters.

.3 Owner/Operating Authority

.1 Owner/Operating Authority will inform required regulatory agencies of the scheduled Commissioning.

.2 Owner/Operating Authority will assign relevant staff to witness all tests and will arrange to operate all existing equipment/system(s), valves and systems as required.

.3 Owner/Operating Authority shall be present during the Commissioning Phase to assist in their understanding of the operation of various equipment/system(s). Where possible, the operator(s) shall participate in the testing and verification with the equipment/system(s) Manufacturer's Authorized Representative and/or General Contractor to ensure that the equipment/system(s) is operating properly.

.2 The Commissioning Phase includes, but is not limited to, the following:

.1 Run equipment/system(s) as intended sufficiently to make all necessary adjustments and balancing to obtain necessary test readings;

.2 Provide all equipment/system(s) and instruments to perform tests and obtain all necessary readings;

.3 Check all related instruments and control devices and perform all necessary adjustments and calibrations;

.4 Confirm and test all control points;

.5 Confirm operation under normal operating conditions; by-pass conditions; emergency conditions and under power failure, PLC control systems failure, communications failure and key equipment/system(s) failure;

.6 Confirm operation of all protective devices;

.7 Permit System Programmer/Integrator to perform all necessary tests on control systems;

.8 Arrange for all temporary diversions of flow and other utilities necessary to complete Commissioning of individual systems;

.9 Arrange for disposal of all wastes resulting from the Commissioning of the works;

.10 Tests as identified on the start-up and commissioning forms;

.11 Tests required by the Manufacturer's Authorized Representative.

.12 And any other testing considered necessary by the Engineer to prevent possible delays during the Performance and Reliability Run.

.3 Before Commissioning any equipment/system(s), the General Contractor shall provide 48 hours' notice to the Contract Administrator and shall coordinate with the Operating Authority and ensure that isolating valves etc., are properly adjusted to prevent inadvertent and/or improper operation or adverse impact on the existing system. General Contractor to employ proper precautions to avoid creating excessive surges, water hammer, overflows, starting/stopping, vibrations and any other event to the detriment of the works or environment.

.4 Commissioning of water conveyance, pumping, treatment, and storage systems will require potable water to produce required process fluid flow quantities. Potable water shall be provided from the local municipal water system and water supplied for the initial commissioning shall be supplied at no cost to the General Contractor. The time and rate of supply shall be convenient to the municipality. Potable water necessary for subsequent commissioning sessions as a result of unsuccessful tests shall be charged to the General Contractor at the normal municipal rate. At the time of tender, the General Contractor is to confirm the unit rate for municipal water.

.5 Commissioning of chemical systems is to be undertaken using the specified chemical the system is designed to deliver.

.6 The General Contractor shall provide pumps and any equipment/system(s) or supplies required for Commissioning of the equipment/system(s) and install temporary connections, bulkheads and make other provisions to re-circulate process fluids or otherwise simulate anticipated operating conditions as required. The General Contractor shall provide all instruments and test devices necessary to record operating parameters where they are not part of the works.

.7 Test results shall be within the tolerances set forth in the detailed specifications sections. If tolerances have not been specified, test results shall conform to tolerances established by recognized industry practice or those identified by the Manufacturer's Authorized Representative, whichever is more stringent.

.8 During Commissioning, the Contract Administrator or the Contract Administrator's site representative will advise the General Contractor of any deficiencies or corrections to be made. The General Contractor shall employ whatever means are necessary to correct these deficiencies as quickly as possible. Once the Contract Administrator is satisfied that all equipment/system(s) has been commissioned adequately, individually and as a whole, and all noted deficiencies corrected, the Contract Administrator together with the General Contractor and Owner shall establish a date for commencement of the Performance and Reliability Run phase.

.9 The General Contractor shall update the draft copy of the Operating and Maintenance Manual and provide a pdf. copy to the Contract Administrator for review at least one week prior to the commencement of the Performance and Reliability Run phase.

.10 The General Contractor shall meet with the Contract Administrator and Owner to discuss and finalize the procedure for the Performance and Reliability Run phase.

.11 Where the General Contractor fails to ensure that all respective equipment/system(s) are installed and operating as specified, in advance of the Commissioning, additional site visits by the Contract Administrator will be required.

.12 The associated costs resulting from additional site visits by the Contract Administrator as a result of the General Contractor being unprepared, shall be at the full expense of the General Contractor.

.13 A minimum of 2 weeks prior to the intended start of Performance and Reliability Run the General Contractor shall provide a schedule for review by the Contract Administrator.

3.8 TRAINING OF FACILITY OPERATORS

.1 The Owner's operator(s) shall receive Training regarding the operation and maintenance of all equipment/system(s) listed in individual specifications or as listed in Table1, whichever is more stringent. A minimum of eight-hours must be set aside and solely devoted to instructing the operator(s) on each piece of equipment/system(s). Training on different equipment/system(s) shall not be done concurrently. Training shall not coincide with equipment/system(s) Start-up or Commissioning. It shall be given following the successful completion of Commissioning but prior to the commencement of the Performance and Reliability Run Phase.

.2 The General Contractor shall provide the Training. The Training sessions shall be conducted by a Manufacturer's Authorized Representative, from the various equipment/system(s) manufacturers. Training shall include instructions to operating personnel in equipment/system(s) operation and preventative maintenance and normal maintenance up to major repair and shall make Owner's operator(s) aware of safety requirements associated with operation and maintenance of the equipment/system(s).

.3 The General Contractor shall co-ordinate all Training sessions and shall provide a draft schedule to the Contract Administrator at least two weeks in advance of the first Training session. Concurrent Training sessions will not be allowed in the Training schedule. Normal operational duties at other facilities may prevent all operators from attending one Training session. To permit operators to attend Training sessions, the General Contractor shall provide for multiple Training sessions throughout the specified Training Phase (i.e., one session in the morning and another session in the afternoon). Training sessions shall be scheduled to suit the operator's schedules.

3.9 PERFORMANCE AND RELIABILITY RUN PHASE

.1 The roles and responsibilities during the Performance and Reliability Run phase are defined as follows:

.1 Contractor

.1 The Contractor will place all systems on-line ready for continuous operation and complete all cleaning, disinfection and preparatory works to permit the works to be operated as intended, prior to initiating the Performance and Reliability Run.
.2 Performance and Reliability Run shall take place in the presence of the General Contractor's Commissioning Foreman and the operating authority.
.3 For seven sequential days, starting from the initiation of the Performance and Reliability Run, the Contractor shall arrange for site attendance of the following individuals:

.1 Commissioning Foreman
.2 Systems Programmer/Integrator
.3 Electrical Foreman
.4 Mechanical/Process Piping Foreman

.4 The Contractor will provide the above and any additional personnel, tradesmen, etc. where necessary to ensure and maintain proper operation for the duration of the Performance and Reliability Run.
.5 The Contractor is to support the Owner's operations staff in maintaining the works in full time operation.
.6 The Contractor agrees to accept the Owner or agents of the Owner as the operating authority for the Performance and Reliability Run. The Owner will provide the qualifications of staff or agents appointed to conduct tests to the Contractor upon request.

.2 Contract Administrator

.1 The Contract Administrator's site representative, with the Owner's Operator(s), will monitor the Performance and Reliability Run on behalf of the Owner. The Contract Administrator will assess whether any abnormalities affect the integrity of the test during the Performance and Reliability Run. The Contract Administrator will assess the results of the Performance and Reliability Run and determine whether the Performance and Reliability Run must be continued.

.3 Owner/Operating Authority

.1 Owner/Operating Authority will inform required regulatory agencies of the scheduled Performance and Reliability Run.
.2 The Owner's Operator(s) will operate the works to ensure compliance with Regulatory Requirements.
.3 The Owner's Operator(s) will record events and parameters.
.4 The Owner's Operator will operate all equipment/system(s), valves and systems in all modes. They will report any abnormalities to the Contract Administrator at least daily, throughout the Performance and Reliability Run Phase.

.2 The Performance and Reliability Run includes, but is not limited to, the following:

.1 Run facility under normal operating conditions and simulate by-pass conditions; emergency conditions and under power failure, PLC control systems failure, communications failure and key equipment/system(s) failure.

.2 Monitoring and recording facility operation.

.3 Providing immediate assistance in case of failure of any portion of the equipment/system(s) being operated.

.4 Investigate the cause of all abnormalities such as vibration, overloading, overheating, unexpected operating results and provide reports as necessary to the Contract Administrator to demonstrate that the abnormalities have been resolved and eliminated.

.3 Additional site visits required by the Contract Administrator or Contract Administrator's site representative and the Owner/Operating Authority representative(s) to successfully complete the Performance and Reliability Run, as a result of the General Contractor being unprepared, shall be at the expense of the General Contractor.

.4 Before commencing the Performance and Reliability Run, the General Contractor shall provide 48-hours' notice to the Contract Administrator and shall coordinate with the Operating Authority and ensure that isolating valves etc., are properly adjusted to prevent inadvertent and/or improper operation or adverse impact on the existing system. General Contractor to employ proper precautions to avoid creating excessive surges, water

hammer, overflows, starting/stopping, vibrations and any other event to the detriment of the works.

.5 After successful Commissioning of all related systems, the overall facility will be operated by the operator with the support of the General Contractor for a minimum duration of 14 days continuous days without failure. If the system fails to perform as specified, the General Contractor shall take appropriate measures to correct the problem(s). On completion of the remedial work, the Performance and Reliability Phase shall recommence and extend for another 14 continuous days. This procedure will be repeated until the system operates in accordance with the specified requirements.

.6 The Performance and Reliability Run Periods will commence on a Monday or Tuesday unless otherwise approved by the Contract Administrator.

.7 Regardless of the degree of completeness of the works, the Performance and Reliability Run Phase shall not be concurrent with equipment/system(s) Commissioning. All deficiencies previously noted by the Contract Administrator must be corrected prior to the commencement of the Performance and Reliability Run Phase.

.8 The General Contractor recognizes and agrees that the Final Performance and Reliability Run is for the purpose of establishing that the works can be operated as intended and that it shall be successfully completed to the satisfaction of the Contract Administrator prior to Substantial Performance being granted.

END OF SECTION

053193_Division 1_01725-Commissioning.docx
14/04/2026 11:25 AM

START-UP AND COMMISSIONING FORM

SCF0201 Manual Valves

Project Name:		**Project No:**	
Equipment Details:	**Type:**		
	Location:		
	Tag No.:		
	Make and Model No.:		
	Serial No.:		
	Primary Materials:		
	Size:		
	Service:		
Applicable Shop Drawing No(s):			
Applicable Specification(s):			
Applicable Contract Drawing No(s):			
Applicable Client Start-up and Commissioning Forms (Attached)			

START-UP

(Start-up section is to be completed by owner's inspector, and all demonstrations are to be completed by contractor. Inspector to submit all completed forms to Engineer/Designer prior to setting commissioning start date)

Item	Reviewed for Completeness	Date	Status/ Comments
Matches Shop Drawing			
Matches Specification			
Matches Contract Drawing			
Start-up report from authorized technician available and attached.			
Normally open or normally closed?			
Labels and tags			
Pressure test			
Operator provided (crank, handwheel, operating key)			

with direction to open/closed indicated			
Installed proper orientation			
Operational			
Certificate of Site acceptance by Manufacturer's Representative (if applicable)			
Has all required client forms for start-up of this equipment/system been completed and attached			

Comments:

Start-up Sign-off
(to be signed on-site)

Supplier Date

Contractor Date

Inspector Date

Client Date

Approved by: Engineer/Designer
(Approval granted to proceed)

COMMISSIONING

(Commissioning to only proceed when all equipment in contract has received start-up approval from Engineer/Designer)

Item	Reviewed for Completeness	Date	Status/ Comments
Have all outstanding items in Start-up Section been			

addressed. If so, go back and initial, date and note as "addressed". If not, list outstanding items in box at end of section.			
Have all required client forms for commissioning of this equipment/system been completed and attached?			

Comments:

Commissioning Sign-off
(to be signed on-site)

Supplier	Date
Contractor	Date
Engineer/Designer	Date
Client	Date

START-UP AND COMMISSIONING FORM

SCF0405 Standpipe

Project Name:		**Project No:**	
Equipment Details:	**Type:**		
	Location:		
	Tag No.:		
	Make and Model No.:		
	Serial No.:		
Applicable Shop Drawing No(s):			
Applicable Specification(s):			
Applicable Contract Drawing No(s):			
Applicable Client Start-up and Commissioning Forms (Attached)			

START-UP

(Start-up section is to be completed by owner's inspector, and all demonstrations are to be completed by contractor. Inspector to submit all completed forms to Engineer/Designer prior to setting commissioning start date)

Item	Reviewed for Completeness	Date	Status/ Comments
Matches Shop Drawing			
Matches Specification			
Matches Contract Drawing			
Start-up report from authorized technician available and attached.			
Demonstrations			
Water level accurately displayed locally and at PLC			
All chlorine residual levels confirmed			

Reports			
Acceptable Bacteriological test results			
Hydrostatic leak testing of piping - Duration - Allowable Leakage - Measured Leakage			
Welding inspection reports submitted			
Other			
Reservoir and fitting disinfection			
All hatches confirmed tight and stable			
Mixer operation confirmed			
Obstruction light operation confirmed			
Waterproofing applied			
Confirmation that all miscellaneous metal, railings, gratings, ladders are installed			
Verify any other required functionality as per Control Narrative and/or Shop Drawings and/or Specifications.			
Does equipment/system meet minimum and maximum design capacity/treatment requirements, as per specifications?			
Has all required client forms for start-up of this equipment/system been completed and attached			

Comments:

Start-up Sign-off
(to be signed on-site)

Supplier	Date	Approved by: Engineer/Designer (Approval granted to proceed)
Contractor	Date	
Inspector	Date	
Client	Date	

COMMISSIONING

(Commissioning to only proceed when all equipment in contract has received start-up approval from Engineer/Designer)

Item	Reviewed for Completeness	Date	Status/ Comments
Have all outstanding items in Start-up Section been addressed. If so, go back and initial, date and note as "addressed". If not, list outstanding items in box at end of section.			
Have all required client forms for commissioning of this equipment/system been completed and attached?			

Comments:

Commissioning Sign-off
(to be signed on-site)

Supplier	Date
Contractor	Date
Engineer/Designer	Date
Client	Date

START-UP AND COMMISSIONING FORM

SCF1001 Storm Sewer Systems

Project Name:		**Project No:**	
Equipment Details:	**Type:**		
	Location:		
	Tag No.:		
	Make and Model No.:		
	Serial No.:		
Applicable Shop Drawing No(s):			
Applicable Specification(s):			
Applicable Contract Drawing No(s):			
Applicable Client Start-up and Commissioning Forms (Attached)			

START-UP

(Start-up section is to be completed by owner's inspector, and all demonstrations are to be completed by contractor. Inspector to submit all completed forms to Engineer/Designer prior to setting commissioning start date)

Item	Reviewed for Completeness	Date	Status/ Comments
Matches Shop Drawing			
Matches Specification			
Matches Contract Drawing			
Hydrostatic leak testing of piping - Test Pressure - Duration - Allowable Leakage - Measured Leakage			
Labels and tags			
Piping adequately supported/secured			
Does equipment/system meet minimum and maximum design capacity requirements, as per specifications?			
Has all required client forms			

for start-up of this equipment/system been completed and attached			

Comments:

Start-up Sign-off
(to be signed on-site)

Supplier Date

Contractor Date

Inspector Date

Client Date

Approved by: Engineer/Designer
(Approval granted to proceed)

COMMISSIONING

(Commissioning to only proceed when all equipment in contract has received start-up approval from Engineer/Designer)

Item	Reviewed for Completeness	Date	Status/ Comments
Have all outstanding items in Start-up Section been addressed. If so, go back and initial, date and note as "addressed". If not, list outstanding items in box at end of section.			
Have all required client forms for commissioning of this equipment/system been completed and attached?			

Comments:

Commissioning Sign-off
(to be signed on-site)

Supplier	Date
Contractor	Date
Engineer/Designer	Date
Client	Date

START-UP AND COMMISSIONING FORM

SCF1003 Watermains

Project Name:		**Project No:**	
Equipment Details:	**Type:**		
	Location:		
	Tag No.:		
	Make and Model No.:		
	Serial No.:		
Applicable Shop Drawing No(s):			
Applicable Specification(s):			
Applicable Contract Drawing No(s):			
Applicable Client Start-up and Commissioning Forms (Attached)			

START-UP

(Start-up section is to be completed by owner's inspector, and all demonstrations are to be completed by contractor. Inspector to submit all completed forms to Engineer/Designer prior to setting commissioning start date)

Item	Reviewed for Completeness	Date	Status/ Comments
Matches Shop Drawing			
Matches Specification			
Matches Contract Drawing			
Hydrostatic leak testing of piping - Test Pressure - Duration - Allowable Leakage - Measured Leakage			
Labels and tags			
Acceptable Bacteriological test results received			
Flushed and disinfected			
Swabbing completed			
Piping adequately supported/secured			
Minimum cover and/or insulation provided			

Does equipment/system meet minimum and maximum design capacity requirements, as per specifications?			
Has all required client forms for start-up of this equipment/system been completed and attached			

Comments:

Start-up Sign-off
(to be signed on-site)

Supplier Date

Contractor Date

Inspector Date

Client Date

Approved by: Engineer/Designer
(Approval granted to proceed)

COMMISSIONING

(Commissioning to only proceed when all equipment in contract has received start-up approval from Engineer/Designer)

Item	Reviewed for Completeness	Date	Status/ Comments
Have all outstanding items in Start-up Section been addressed. If so, go back and initial, date and note as "addressed". If not, list outstanding items in box at			

end of section.			
Have all required client forms for commissioning of this equipment/system been completed and attached?			

Comments:

Commissioning Sign-off
(to be signed on-site)

Supplier	Date
Contractor	Date
Engineer/Designer	Date
Client	Date

START-UP AND COMMISSIONING FORM

SCF1006 Siteworks

Project Name:		**Project No:**	
Equipment Details:	**Type:**		
	Location:		
	Tag No.:		
	Make and Model No.:		
	Serial No.:		
Applicable Shop Drawing No(s):			
Applicable Specification(s):			
Applicable Contract Drawing No(s):			
Applicable Client Start-up and Commissioning Forms (Attached)			

START-UP

(Start-up section is to be completed by owner's inspector, and all demonstrations are to be completed by contractor. Inspector to submit all completed forms to Engineer/Designer prior to setting commissioning start date)

Item	Reviewed for Completeness	Date	Status/ Comments
Matches Shop Drawing			
Matches Specification			
Matches Contract Drawing			
Silt fence			
Driveways			
Site grading			
Topsoil/seed			
Has all required client forms for start-up of related equipment/system been completed and attached			

Comments:

Start-up Sign-off
(to be signed on-site)

Supplier Date

Contractor Date

Inspector Date

Client Date

Approved by: Engineer/Designer
(Approval granted to proceed)

COMMISSIONING

(Commissioning to only proceed when all equipment in contract has received start-up approval from Engineer/Designer)

Item	Reviewed for Completeness	Date	Status/ Comments
Have all outstanding items in Start-up Section been addressed. If so, go back and initial, date and note as "addressed". If not, list outstanding items in box at end of section.			
Have all required client forms for commissioning of related equipment/system been completed and attached?			

Comments:

Commissioning Sign-off
(to be signed on-site)

Supplier	Date
Contractor	Date
Engineer/Designer	Date
Client	Date

PART 1 GENERAL

1.1 SCOPE

.1 This section outlines the requirements of operational and maintenance data to be provided for this project.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for the review of all Contract Documents for related sections.

1.3 SUBMITTALS

.1 Provide Operating and Maintenance Data Manuals in accordance with Section 01340 – Submittals

.2 Operating Maintenance and Data Manuals are considered a Category 2 Submittal.

PART 2 PRODUCTS

.1 Prior to Trial Run/Performance Run specified in Section 01725, the Contractor shall submit a draft pdf. copy of the Operation and Maintenance Manual to the Engineer.

.2 On completion of project, Contractor shall submit to Engineer 2 final copies of Operating and Maintenance Data in English made up as follows:

.1 Bind data in six vinyl hard covered, 3 ring loose leaf binder for 215 x 280 mm size paper.

.2 Enclose title sheet, labelled "Operating and Maintenance Data Manual", project name, date and list of contents.

.3 Organize contents into applicable sections of work to parallel project specification break-down. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.

.4 In addition to the hard copies, on completion of the project the Contractor shall provide a complete copy of the Operating and Maintenance Manual and a complete set of shop drawings in PDF electronic format.

.3 Include following information plus data specified.

.1 Maintenance instruction for finished surface and materials.

.2 Copy of hardware and paint schedules.

.3 Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list. Indicate nameplate information such as make, size, capacity, serial number.

.4 Names, addresses and phone numbers of sub-contractors and suppliers.

.5 Guarantees, warranties and bonds showing:

.1 Name and address of projects.
.2 Guarantee commencement date (date of Final Certificate of Completion).
.3 Duration of guarantee.

.4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
.5 Signature and seal of appropriate Sub-contractor.

.6 Additional material used in project listed under various sections.

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

.5 Include one complete set of reviewed shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

.6 Include a list of all manufacturer's recommended spare parts, lubricants and operation and maintenance equipment. List to be a combined list including information obtained for all equipment, neatly typed and organized by section with a detailed table of contents.

.7 Where supply of maintenance materials are specified, deliver to site as follows:

.1 Use unbroken cartons, or if not supplied in cartons, they shall be strongly packaged.

.2 Clearly mark as to content.

.3 If applicable give area where material used.

.4 Materials to be supplied for three months after preliminary acceptance.

PART 3 EXECUTION

.1 Not applicable.

END OF SECTION

053193_Division 1_01730-Operating and Maintenance Data.docx
14/04/2026 11:26 AM

PART 1 GENERAL

1.1 SCOPE

.1 This section outlines the requirements for the proposed construction sequence and measures to be taken to ensure that the potable water system is maintained until the new systems are "put online". (Performance and Reliability Run Period completed).

.2 The Contractor shall co-ordinate this work with the Contract Administrator and the Operating Authority. Work shall be completed and staged to accommodate the Owner/Operating Authorities use of the respective premises during construction.

.3 The Contractor shall make arrangements with the Owner/Operating Authority who will operate (open/close) any valves to permit connections, or to isolate sections of process piping from one another to allow work to proceed.

.4 The Contractor shall be responsible for draining all pipes that they must connect to. The Contractor shall supply all pumps, pipes, valves, hoses, labour, material and equipment necessary to complete this task.

.5 The Contractor shall provide all labour, material and equipment necessary to expel all air from existing pipes before they are placed back into operation.

1.2 EXISTING CONDITIONS

.1 The General Contractor shall familiarize themselves with the existing water supply system. As constructed information of the existing infrastructure are available in the Reference Documents, however the locations of existing buried piping etc. as shown should be considered as approximate only. The General Contractor will be responsible for locating all buried piping in advance of construction activities.

1.3 BRIEF DESCRIPTION OF THE EXISTING WATER SYSTEM

.1 The existing Wingham Drinking Water System (DWS# 220001502) is owned by the Township and operated by Veolia Water Canada Inc. The system is classified as a Large Municipal Residential system under Ontario Regulation (O.Reg.) 170/03.

.2 The existing wells are expected to be able to provide sufficient capacity to meet the existing peak hour demand of the system. As such, the Contractor will not be required to provide a temporary water supply or storage system, during the duration of the project.

.3 Existing Wells:

.1 Well No. 3:

.1 Maximum permitted pumping rate: 4,540 L/min (75.7 L/s).
.2 Well Record #3002721.
.3 Bedrock well drilled in 1973 to a depth of 102.1 m and diameter of 323 mm.
.4 Submersible well pump rated for 74 L/s at 91.4 m total dynamic head (TDH) and pumps the water through the pumphouse and to the distribution system.
.5 Pumphouse located at 200 Arthur St, Wingham ON.

.2 Well No. 4:

.1 Maximum permitted pumping rate: 3,660 L/min (61.0 L/s).
.2 Well Record #3005985.
.3 Bedrock well drilled in 1996 to a depth of 98.7 m and diameter of 356 mm.

.4 Submersible well pump rated for 61 L/s at 26 m TDH and pumps water to a below grade reservoir at the pumphouse.
.5 Pumphouse located at 23 Albert St W, Wingham ON.

.4 Existing Standpipe:

.1 The existing standpipe was constructed in 1974 by the Canada Gunite Company Ltd. The tank has an internal diameter of 8.53 (28') and a sidewall height of approximately 31 m (102'). The cast-in-place concrete cylinder has 200 mm (8") thick walls and is conventionally reinforced. The inner concrete cylinder is also externally reinforced using prestressed strands around the perimeter of the tank set in a 19 mm (3/4") layer of shotcrete. The existing standpipe has a layer of rigid insulation and corrugated steel cladding on the outside of the tank. There is some communication equipment on top of the existing tank that is no longer in use.

.2 The existing standpipe has a total volume of approximately 1,660 m3. However, since the tank is located in the distribution system and is used to maintain pressures in the system, the operating level is typically maintained between 25 to 29 m above the tank floor.

.5 Existing Control Building:

.1 There is a small control building (~9.6 m^2) at the standpipe site which houses electrical and control equipment. Additionally, the control building has a valve chamber below for the standpipe's inlet / outlet pipe and has a gate valve to isolate the tank. There is also a pressure transducer connected to the inlet / outlet pipe which is used for tank level measurement. The building has an internet connection for communications between the standpipe and the rest of the water system through the Supervisory Controls and Data Acquisition (SCADA) system. The building is heated with electric baseboard heaters.

.6 Designated Substances and Hazardous Materials Survey

.1 A Designated Substances and Hazardous Materials Survey (DSHMS) of the existing standpipe and control building was completed in 2023 and is provided as a Reference Document for review. The structures were inspected to determine if any of the 11 designated substances, as identified by the Occupational Health and Safety Act (OSHA), were present or potentially present. The inspection included other items that may also require special handling during renovations or demolition. An Asbestos Management Plan is also included in the reference documents.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 GENERAL

.1 Refer to the Contract Drawings for further information regarding existing conditions and removals.

.2 All activities shall be coordinated with the Owner's Operating Authority. The General Contractor shall ensure that the Contract Administrator remains informed of the General Contractor's activities and schedule regarding the requirements listed under this Section.

.3 The General Contractor can expect to encounter existing infrastructure and services when undertaking the Work. They shall ensure that existing infrastructure is properly located and protected from damage as required.

3.2 STORAGE OF EQUIPMENT AND MATERIALS

.1 Further to Section 01007 – General Instructions and as shown on the Contract Drawings; the General Contractor shall be responsible for adhering to restrictions for use of the existing parking lot adjacent to the project site for staging, storing of equipment, materials and temporary facilities, etc.

.1 Stage 1 and Stage 2 areas are provided on the Contract Drawings identifying the accepted limits of use.

.2 Stage 2 limits shall be implemented following initial construction works, as soon as feasible and shall be implemented no later than November 1, 2026.

.3 The General Contractor shall seek approval for any additional areas required for staging, storing of equipment, materials and temporary facilities, etc. at no additional cost to the Owner.

.4 All areas shall be restored to existing or better condition.

3.3 EMPTYING STANDPIPE

.1 All water drained from the existing and new standpipe during construction and testing shall be dechlorinated prior to discharging to the environment. The contractor shall monitor the downstream storm sewer system to ensure the capacity is not exceeded while discharging to storm sewers.

3.4 STANDPIPE WATER LEVELS

.1 The new standpipe will be taller than the existing tank to allow for an increase of the high water level from 368.0 masl (existing) to 373.5 masl (future). The leakage testing and tank disinfection shall be completed for the full tank height, up to the overflow elevation. However, the tank will initially be operated at the existing high water level following construction (368.0 masl). Additional upgrades to the distribution system must be completed outside the scope of this project before the tank is providing service above 368.0 masl to the distribution system to prevent overpressurization in areas throughout the system. Therefore, following testing, **when the isolation valve in the existing control building is opened and the standpipe is providing backpressure to the distribution system during/following start-up and commissioning, the water level in the standpipe shall not exceed 368.0 masl**. Refer to the drawings for the proposed initial water levels.

PART 4 BASIS OF PAYMENT

.1 There shall be no separate payment for meeting the requirements of this Section. Include all associated costs in the Total Tender Price.

END OF SECTION

053193_Division 1_01735-Construction Sequencing.docm
4/14/2026 11:27 AM

PART 1 GENERAL

1.1 SCOPE

.1 Removals work includes, but is not limited, to the following:

.1 Demolition and disposal of the standpipe and associated components and all other demolition and disposal work as shown on the Contract Drawings, specifications and engineered demolition plan.

.2 Protection of existing infrastructure designated to remain and adjacent private properties. In the event of damage to such items, immediately replace or make repairs to approval of Owner and at no cost to Owner.

.3 Provision of all labour, materials, and equipment to perform the demolition in a safe and controlled manner.

.4 Obtain all necessary demolition permits required.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.3 SUBMITTALS

.1 The subcontractor responsible for demolition shall provide a detailed reference list, confirming five (5) standpipe projects of similar material, height, and complexity, completed in Ontario, Canada.

.2 Design and furnish an engineered demolition plan, for the dismantling, demolition and disposal offsite of the standpipe and associated components in accordance with Section 01340, Submittals, also including:

.1 Crane hoisting plan, logistics plans and permits to be provided as required to perform the scope of work.

.1 Provide geotechnical confirmation of ground stability to withstand mobile crane operations.

.2 Site And Task Specific Job Hazard Analysis Plan (JHA).

.3 Site Specific Site Emergency Plan.

.4 Site Specific Traffic Control Plan.

.3 Furnish a Minister of Environment Waste Audit at the conclusion of the demolition work.

.4 This information is considered a Category 1 submittal.

.5 Stamped demolition plan by a Professional Engineer in the Province of Ontario.

1.4 QUALIFICATIONS

.1 The subcontractor responsible for demolition must:

.2 Have relevant experience with a minimum of five (5) projects of similar standpipe material, height, and complexity, completed in Ontario, Canada.

.1 Have dedicated service crews regularly engaged in the inspection, maintenance, and repair of demolition equipment, so as not to impeded the demolition schedule.

.2 Be a member of the Ontario Association of Demolition Contractors.

.3 Be a participant of the Certificate of Recognition (COR) Program, per the Canadian Federation of Construction Safety Associations (CFCSA) and shall provide a valid certificate upon request.

1.5 QUALTIY ASSURANCE

.1 Follow relevant sections of the latest edition of the Ontario Building Code and associated regulations.

.2 Follow relevant sections of the Ministry of Labour and the latest edition of the Occupational Health and Safety Act and all applicable regulations and codes.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 GENERAL

.1 Prepare and submit the engineered demolition plan, before commencing any Work.

.2 Prepare a detailed list of equipment, piping and appurtenances to be removed and obtain approval from the Owner before commencing the removals Work.

.3 Grant the Owner the first right of refusal of items removed. **Before proceeding with the removals Work, remove equipment and materials including but not limited to electronic equipment, antenna, and antenna cable.** Reasonable care shall be taken to maintain existing condition of the items. Store the equipment and material in a manner and location satisfactory to the Engineer until it is turned over to the Owner.

.4 Remove and dispose of remaining loose items off site, in accordance with regulatory requirements.

.5 Locate existing utility lines and determine requirements for temporary supports, disconnecting and capping.

.1 Provide capping and sealing of pipes. Securely plug to form watertight seal.

.6 Locate existing active utility lines on site and determine requirements for protection.

.7 Do not pump waste or water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.8 Control disposal or runoff of water containing suspended materials into watercourses, storm or sanitary sewers.

.9 Stockpile any topsoil for final grading and landscaping. If additional material remains, it is to be removed at Contractor’s expense.

.10 Disconnection of Utilities:

.1 Before starting removals, disconnect or arrange for the disconnection of all utility services designated to be removed, performing such Work in accordance with the requirements of the utility company or agency involved and the Occupational Health and Safety Act (OHSA).

.11 Protection of Utilities:

.1 Preserve in operational condition active utilities traversing the site that are designated to remain in operation until the new facilities have been constructed and commissioned.

.2 Provide support structures for the existing utilities, as required, for the duration of the construction.

3.2 REMOVAL OF DEBRIS

.1 Remove and dispose of debris from the site and leave the site in a neat and orderly condition, to the satisfaction of the Engineer and in accordance with prevailing regulations, and related Sections of this document.

.2 Classify and dispose of wastes in accordance with applicable regulations, including Ontario Regulation 347 under the Environmental Protection Act.

.3 Do not burn debris on project site.

END OF SECTION

053193_Division 2_02050-Removals and Demolition.docx
4/14/2026 11:50 AM

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

.1 In general site preparation shall include the following:

.1 Clearing and grubbing.

.2 Topsoil stripping and stockpiling.

.3 Leveling of existing areas.

.4 Rough grading.

.2 Clearing consists of cutting of trees and brush/vegetative growth and disposing of felled trees, previously uprooted trees, stumps and surface debris.

.3 Grubbing consists of excavation and disposal of stumps and roots, boulders and rock fragments.

.4 The General Contractor's attention is drawn to Section 01560 – Environmental Protection and Procedures for information pertaining to restrictions for clearing activities.

.5 In general site grading including clearing and grubbing and topsoil stripping and stockpiling shall be completed in accordance with OPSS No's 201, 206 and as supplemented by this section.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for reviewing all Contract Documents for related sections.

1.3 SUBMITTALS

.1 Not applicable.

1.4 SITE CONDITIONS

.1 The location of underground utilities as shown on the Contract Drawings is approximate only and the Contractor shall be responsible for obtaining and verifying locates.

1.5 PROTECTION

.1 Prevent damage to landscaping, existing pavement, surface, or underground utility lines which are to remain and repair and damage to equal or better condition.

.2 The provisions of the Provincial "Guidelines on Erosion and Sediment Control for Urban Construction Sites" shall apply to this Contract. Necessary measures shall include, but not be limited to, the supply and installation of silt fence in disturbed areas made vulnerable to sediment transport.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Excavated or graded material that will be used as backfill material shall be approved by the Contract Administrator prior to use as fill for grading work. Protect such approved material from contamination.

.2 Backfill material shall not contain brush, roots, peat, topsoil or other perishable or unsuitable material.

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

.1 The cutting and removal of all trees that need to be cleared for all work under this Contract is the responsibility of the Contractor. The Contractor shall also be responsible for grubbing of tree stumps, bushes, debris, obstructions, etc.

3.2 REMOVAL OF TOPSOIL

.1 Topsoil shall be stripped from areas where excavation or filling is to be done. Care shall be taken in removing topsoil to avoid mixing it with the underlying clay, gravel, or other material.

.2 Topsoil approved by the Contract Administrator for re-use shall be stockpiled on the site of the work, as directed by the Contract Administrator. Unsuitable surface material or topsoil shall be removed from the siteand disposed of at a location selected by General Contractor and approved by the Contract Administrator.

.3 Strip topsoil when dry enough to prevent contamination of subgrade material.

.4 Ensure proper drainage is provided at stockpile locations.

.5 Stockpile topsoil on site where directed in a neat and orderly manner acceptable to the Contract Administrator.

3.3 GRADING

.1 Rough grade to levels, profiles and contours allowing for surface treatment as indicated.

.2 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Moisture content of fill and existing surface to be approximately the same to facilitate bonding.

.3 Compact filled and disturbed areas to Standard Proctor density to ASTM D698-78 as follows:

.1 95% under landscape areas.

.2 100% under structures, gravel, paved and walk areas.

.4 The Contractor shall be required to trim or build slopes at site boundaries to a grade not steeper than 3H:1V.

3.4 IMPORTED FILL

.1 The contractor shall provide a Soil Characterization Report as outlined in the Rules for Soil Management and Excess Soil Quality Standards (Rules) as referenced in Ontario Regulation 406/19 Onsite and Excess Soil Management, to the Owner for each source of imported fill. The Soil Characterization report must demonstrate that the imported soil meets the Table 2.1 Parkland Excess Soil Quality Standards.

.2 Any imported fill shall be from a pit with an aggregate licence or be pre-approved by the Owner.

.3 The imported fill must also:

.1 Not contain putrescible materials

.2 Not contain Contaminants (meaning any solid, liquid, gas, odour, radiation or combination of any of them resulting directly or indirectly from human activities that causes or may cause an Adverse Effect)

.3 Be free of termites, pests and Invasive Species including the eggs and seeds of such species

.4 Be geotechnically suitable for the purposes for which it is intended to be used.

.4 No imported fill shall be delivered to the site until the Contract Administrator has reviewed and approved the Soils Characterization Report.

3.5 TESTING

.1 Inspection and testing of soil compaction will be carried out by designated testing laboratory.

.2 Costs of compaction testing will be paid by the cash allownance.

3.6 SURPLUS

.1 Surplus or unsuitable fill is to be disposed of by the Contractor. The contractor is responsible for retaining a Qualified Person and managing all excess soil in accordance with Ontario Regulation 406/19 including the Rules for Soil Management and Excess Soil Quality Standards adopted by reference. All required sampling is to be paid for by the Contractor.

.2 The contractor should assume:

.1 Assume the volume of soil will be less than the threshold requiring registration with the Resource Productivity and Recovery Authority (RPRA).

.2 Assume the soil quality will meet the soil quality Standards outlined in Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use as outlined in *Rules for Soil Management and Excess Soil Quality Standards* except for EC and SAR that may be elevated due to the local application of deicing salts.

.3 Assume the management and disposal of any poorer quality soil and/or contaminated soil will be considered an additional scope of work.

END OF SECTION

053193_Division 2_02210-Site Preparation.docx
4/14/2026 11:51 AM

PART 1 GENERAL

1.1 GENERAL

.1 General excavation, dewatering and backfilling shall be completed in accordance with OPSS No.'s 902, 501, 511, 514, 515, 517, 538, 1004, 1010 and as supplemented by this Section.

.2 Trenches and other excavations under this Contract shall conform to the requirements of the Occupational Health and Safety Act and Regulations for Construction Projects, Regulations 213/91 and 714/82 and Revised Statutes of Ontario, 1980 Chapter 321. If rock excavation is required it is the Contractor's responsibility to do all required blasting, disposal and backfilling. There will be no extras entertained for overblasting or extra backfill as a result of over blasting.

.3 This project will require excess earth to be removed and disposed of off-site. The offsite location will be selected by the Contractor but approved by the Engineer. Associated work shall be completed in accordance with Ontario Regulation 406/19. For bidding purposes, the Bidder shall assume the excess soil to be removed from site will meet the soil quality criteria outlined in Table 2.1, Agricultural or Other Property Use as outlined in the Rules for Soil Management and Excess Soil Quality Standards, MECP, 2019.

.1 Excess soils not meeting these requirements shall be disposed of at an appropriate hazardous waste facility with compensation under the Contingency Allowance.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.3 PROTECTION

.1 Prior to undertaking any excavation operations, the General Contractor shall coordinate the location of all existing utilities and buried piping. Damages to existing utilities or buried piping shall be repaired at the General Contractor’s expense. The General Contractor shall refer to the relevant Clauses in Section 01007 – General Instructions pertaining to the location of existing utilities and buried piping.

1.4 SUBMITTALS

.1 Category 1 Submittals

.1 Not applicable.

.2 Category 2 Submittals

.1 Not applicable.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 TOPSOIL

.1 Topsoil shall be stripped from areas where excavation or filling is to be done. Care shall be taken in removing topsoil to avoid mixing it with the underlying clay, gravel, or other material.

.2 Topsoil approved by the Engineer for re-use shall be stockpiled on the site of the work, as directed by the Engineer. Unsuitable surface material or topsoil shall be disposed of as provided herein.

3.2 EXCESSS SOILS

.1 The Contractor shall dispose of excess material off-site in an area(s) approved by the Owner. If excess soil must be removed from site, complete all work and provide documentation as required by On-Site and Excess Soil Management Regulation 406/19. Copies of all transportation and disposal site receipt documentation is to be provided to the Owner. Submit a Waste Quantity Report (Form OPSF 1805) for all Solid Non-Hazardous Waste as per the requirements of OPSS 180.

.2 The Contractor shall provide a signed Release Form (OPSF 1803) from any private disposal site owner and shall comply with the requirements of OPSS 180, Submit to Engineer Waste Quantity Report Form (OPSF 1805) for all Non-Hazardous Waste.

.3 The Contractor shall assume the excess soil to be removed from site will meet the soil quality criteria outlined in Table 2.1, Agricultural or Other Property Use as outlined in the Rules for Soil Management and Excess Soil Quality Standards, MECP, 2019.

.4 The management and disposal of any poorer quality or contaminated soil will be compensated under the Contingency Allowance.

3.3 CUT TO FILL BALANCE

.1 The Contractor shall perform their own calculations to determine the cut to fill deficit/excess. The use of excess soil as backfill must be conducted in accordance with Ontario Regulation 406/19. Soil quality documentation is to be provided to the Owner. If a deficit exists, the Contractor shall import suitable granular backfill material necessary to balance the earthwork. Copies of all transportation and disposal documentation shall be provided to the Owner.

3.4 OPEN EXCAVATION PROTECTION

.1 Whenever it is necessary to have excavation left open for any period while the construction crew is not working in the immediate area, or a watchman is not posted, the excavation shall be pumped out immediately after every storm, inspected twice daily for accumulation of water, and adequately barricaded with snow fences or approved equal, completely around the excavation, equipped with sufficient warning lights, as required by the Engineer. Costs for the above shall be the Contractor’s responsibility.

3.5 EXCAVATION OPEN FOR A PROLONGED TIME

.1 If the work is stopped as a whole or during any part of an excavation and the same is left open for what is, in the opinion of the Engineer, an unreasonable length of time, because of non-delivery of material, tests or for any other reasons, the Contractor shall, when so

directed by the Engineer, refill such excavation or part thereof until they are ready to proceed with construction.

.2 If the Contractor refuses, neglects or fails to completely refill such excavation within 48 hours after the receipt of a notice in writing to do so, the Engineer shall be entitled to refill the excavation and all the cost and expense thereof shall be charged to the Contractor, and the Owner may retain the amount of such cost and expense out of any monies due or to become due the Contractor. Any re-excavation costs made necessary by the above will be borne by the Contractor.

3.6 SUPPORT OF EXCAVATIONS

.1 Material for sheet piling, sheeting and bracing shall be furnished and driven or set in place by the Contractor where necessary or wherever ordered by the Engineer.

.2 The Contractor shall sheet and brace an excavation in Accordance to the Occupational Health and Safety Act and Regulations for Construction Projects, Regulation 213/91 and 714/82 where necessary to prevent injury to workmen, damage to gas pipes, water pipes, sewers, service pipes, or other structures and to prevent movement which could in any way disturb or weaken the supporting material below or beside the works.

.3 Lumber in foundations and sheeting and shoring on the work shall be driven or placed and moved by personnel especially skilled in such work.

.4 Shoring Methods:

.1 Shoring shall be installed in such a manner as to prevent movement of the soil adjacent to the excavation and adjacent property.

.2 Sheeting, shoring and bracing shall be withdrawn and removed as the excavation is backfilled except where and to such extent as removal will injure or cause settlement of the works and adjacent structures, pavement or property.

.3 Where it may be withdrawn from an excavation, all shoring and sheeting shall be so arranged that it may be withdrawn as the excavation is backfilled, without injury to or settlement of the works and adjacent structures, pavements and property.

.4 Sheeting against which concrete is placed shall not be removed. Such sheeting will not be paid extra. Sheeting may be cut off above concrete.

.5 When sheeting is left in place, all cavities behind such sheeting shall be solidly filled as directed.

.6 Shoring systems are to be designed by a Professional Engineer registered in the Province of Ontario.

.5 Sheeting Materials:

.1 All planks used for sheeting or sheet piling, all timber used for braces, shore and stringers or walings shall be sound, straight and of dimensions satisfactory to the Engineer throughout. Planks shall be tongued and grooved if so required by the Engineer. Where, in the opinion of the Engineer, infiltration into the excavation or other conditions warrant, special sheeting and shoring or steel sheeting and other materials shall be used.

.6 Foundation Timber:

.1 Cedar, Georgia Pine, Hemlock, or other approved timber shall be furnished, and laid in foundations where required; all timber shall be sound, straight, free from cracks or shakes or large or loose knots and squared to the dimensions required throughout its entire length.

.2 When, in the opinion of the Engineer, it is necessary to lay a timber platform for foundations, the planks used shall be of a kind and quality above described and cut and laid in the manner designated. They shall be firmly spiked, nailed or bolted to the sills in the manner and to the extent required by the Engineer.

3.7 DEWATERING

.1 The Contractor shall remove such water as may be necessary to properly do the work and shall receive no extra payment for this measure.

.2 The Contractor shall keep any excavation and ground adjacent to excavation if necessary, free from water during construction progress. They shall build dams and do other work necessary for this purpose and provide and keep in operation necessary pumps of sufficient capacity to keep the bottom of the excavation dry and free from water at all times. They shall provide for the disposal of the water removed from the excavation in such a manner to ensure that it shall not be injurious to health, property, any portion of the work completed or under construction either by them or by any other contractor. Water removed from the excavation shall be discharged such that it shall not be a nuisance to the public traversing the street.

3.8 ASPHALT AND CONCRETE REMOVAL

.1 Any asphalt and concrete removed as a result of construction operations shall be disposed of off site at a suitable location chosen by the Contractor and approved by the Engineer.

3.9 SLIDES & CAVE-INS

.1 Slides and cave-ins shall be rectified at the cost of the Contractor; he shall refill all such with suitable materials.

3.10 BOULDERS

.1 The Contractor may encounter boulders and cobbles of varying size during excavation operations. The costs associated with the removal and disposal of boulders shall be included in the price bid for applicable excavation.

.2 Boulders shall be disposed of off-site at a location chosen by the Contractor and approved by the Engineer.

3.11 RIP-RAP

.1 Rip-rap shall be quarried rock of sizes averaging 200 mm with a maximum size of 300 mm and a maximum proportion of 10% by weight smaller stones and spalls less than 150 mm maximum dimension intermixed.

.2 The quality of stone shall be approved by the Engineer. Weathered stone subject to excess deterioration will not be acceptable.

.3 Stones shall be hand placed in such a manner as to minimize the volume of voids and also to present a uniform appearance. To prevent washing of the underlying

material. Terrafix 270 R geotextile or approved equal shall be placed between the stone and underlying material.

3.12 OPEN EXCAVATION PROTECTION

.1 Trenches shall be excavated to the required alignment and depth and only reasonably far in advance of pipe laying, so to prevent unnecessary exposure.

.2 Material spoils removed from trenches to be piled neatly along the side of the trench or in an alternative location that is in reasonable proximity, in order to minimize interference with construction vehicles and other areas of ongoing construction. Double handling of material will not be considered by the Contract Administrator as an additional work claim. The General Contractor shall plan all open excavation works in consideration of the overall project schedule and respecting other trades in proximity to work area.

.3 Width of trench shall be sufficient to permit proper laying and joining of the pipe and shall not be less than 400 mm on either side of the pipe. Where sheeting or shoring is used, the width shall be measured between interior faces of the sheeting or between the walling if the same are below the top of the pipe.

.4 Whenever it is necessary to have excavation left open for any period while the construction crew is not working in the immediate area, or a watchman is not posted, the excavation shall be pumped out immediately after every storm, inspected twice daily for accumulation of water, and adequately barricaded with snow fences or approved equal, completely around the excavation, equipped with sufficient warning lights, as required by the Engineer. Costs for the above shall be the Contractor's responsibility.

3.13 EXCAVATION OPEN FOR A PROLONGED TIME

.1 If the work is stopped in the whole or any part of an excavation and the same is left open for what is, in the opinion of the Contract Administrator, an unreasonable length of time, because of non-delivery of material, tests or for any other reasons, the General Contractor shall, when so directed by the Contract Administrator, refill such excavation or part thereof until they are ready to proceed with construction.

.2 If the General Contractor refuses, neglects or fails to completely refill such excavation within 48 hours after the receipt of a notice in writing to do so, the Contract Administrator shall be entitled to refill the excavation and all the cost and expense thereof shall be charged to the General Contractor, and the Owner may retain the amount of such cost and expense out of any monies due or to become due the General Contractor. Any re-excavation costs made necessary by the above will be borne by the General Contractor.

3.14 TUNNELING (IF APPLICABLE)

.1 Tunneling not shown on the Drawings will not be allowed without the approval of the Engineer. The method of tunneling and the location of all shaft, portals, and mechanical plant used in the tunneling operations shall also be subject to the approval of the Engineer.

3.15 SUPPORT OF EXCAVATIONS

.1 Material for sheet piling, sheeting and bracing shall be furnished and driven or set in place by the Contractor where necessary or wherever ordered by the Engineer.

.2 The Contractor shall sheet and brace an excavation in Accordance to the Occupational Health and Safety Act and Regulations for Construction Projects, Regulation 213/91 and 714/82 where necessary to prevent injury to workmen, damage to gas pipes, water pipes, sewers, service pipes, or other structures and to prevent movement which could in any way disturb or weaken the supporting material below or beside the works.

3.16 QUALIFIED PERSONNEL

.1 Lumber in foundations and sheeting and shoring on the work shall be driven or placed and moved by personnel especially skilled in such work.

3.17 SHORING METHODS

.1 Shoring shall be installed in such a manner as to prevent movement of the soil adjacent to the excavation and adjacent property.

.2 Sheeting, shoring and bracing shall be withdrawn and removed as the excavation is backfilled except where and to such extent as removal will injure or cause settlement of the works and adjacent structures, pavement or property.

.3 Where it may be withdrawn from an excavation, all shoring and sheeting shall be so arranged that it may be withdrawn as the excavation is backfilled, without injury to or settlement of the works and adjacent structures, pavements and property.

.4 Sheeting against which concrete is placed shall not be removed. Such sheeting will not be paid extra. Sheeting may be cut off above concrete.

.5 When sheeting is left in place, all cavities behind such sheeting shall be solidly filled as directed.

3.18 SHEETING MATERIALS

.1 All planks used for sheeting or sheet piling, all timber used for braces, shore and stringers or walings shall be sound, straight and of dimensions satisfactory to the Engineer throughout. Planks shall be tongued and grooved if so required by the Engineer. Where, in the opinion of the Engineer, infiltration into the excavation or other conditions warrant, special sheeting and shoring or steel sheeting and other materials shall be used.

3.19 FOUNDATION TIMBER

.1 Cedar, Georgia Pine, Hemlock, or other approved timber shall be furnished, and laid in foundations where required; all timber shall be sound, straight, free from cracks or shakes or large or loose knots and squared to the dimensions required throughout its entire length.

.2 When, in the opinion of the Contract Administrator, it is necessary to lay a timber platform for foundations, the planks used shall be of a kind and quality above described and cut and laid in the manner designated. They shall be firmly spiked,

nailed or bolted to the sills in the manner and to the extent required by the Contract Administrator.

3.20 BACKFILLING GENERAL

.1 Backfilling comprises providing acceptable excavated materials approved by the Engineer, or fill materials procured from approved sources, transporting them to the required location, placing, spreading, compacting and grading them to the levels and profiles shown on the drawings or designated by the Engineer. The Contractor shall dry out all materials of suitable gradation before backfilling to obtain specified Proctor Density.

3.21 FILL MATERIALS

.1 Materials shall be free from large or frozen lumps, wood or other extraneous materials.

.2 Selected fill will consist of excavated materials free from stones having a maximum dimension no greater than 150 mm.

.3 Existing fill on site will consist of approved suitable excavated materials.

.4 Granular Fill will consist of materials conforming to OPS. Specification - No. 1010 for Granular 'A', or for Granular 'B'

3.22 COMPACTING

.1 Backfill shall be compacted to achieve a density of not less than 95% Standard Proctor Density unless otherwise specified or as directed by the Engineer, or as detailed on the Contract Drawings.

.2 Bedding material around the pipe and backfill material immediately over the pipe shall be placed carefully so as not to damage the pipe and shall be compacted using approved mechanical compaction equipment satisfactory for this application.

.3 The following mechanical compaction equipment shall be used with corresponding lifts of backfill. Backhoes, loaders, dozers, etc. shall not be used for compacting.

NORMAL COMPACTED THICKNESS OF LIFTS

EQUIPMENT TYPE	COHESIVE SOIL	NON-COHESIVE SOIL
Vibratory Sheepsfoot Packer	300 mm	300 mm
Sheepsfoot Packer	200 mm	--
Pneumatic Roller	200 mm	200 mm
Vibratory Roller (work width less than 760 mm)	150 mm	300 mm
Vibratory Roller (work width greater than 760 mm) Double vibrating drums with transverse 25 mm cleats every 100 mm the circumference of one drum	150 mm	300 mm

Pneumatic Tamper Driven by Compressor	100 mm	100 mm
Mechanical Tamper (diesel or gas) (Jumping Jack)	150 mm	150 mm

3.23 COMPACTION TESTS

.1 The cost of compaction tests will be borne by the Owner, but where re-testing is required due to unsatisfactory results such re-testing shall be paid for by the Contractor.

3.24 UNSHRINKABLE FILL

.1 Scope:

.1 The work included in this specification is the supply of all material, labour and equipment necessary for the production and placing of a Portland cement stabilized granular backfill known as Unshrinkable Fill in all underground service and utility trenches, and around in-ground structures where specifically shown on the Contract Drawings.

.2 Materials:

.1 All materials shall conform to OPSS No. 1359 providing a maximum 28-day compressive strength of 0.7 MPa:

.2 Admixtures shall conform to OPSS No. 1303. Calcium chloride or pozzolanic mineral admixtures shall not be used. Air entraining admixtures may be added if desired by the Contractor.

.3 Mix Proportions:

.1 Mix proportions shall be selected in accordance with the latest revision of Section 14 of C.S.A. specification CAN 3-A23.1-M77 where applicable.

.2 Prior to the production of unshrinkable fill for use, the Contractor shall provide to the Engineer, a certificate from an Independent Testing Company stating that the Unshrinkable Fill to be supplied conforms with the above requirements.

.4 Placing:

.1 The unshrinkable fill material shall be placed at a slump between 150 and 200 mm. The material shall flow into the excavation so that it fills the entire space. Care shall be taken to ensure that no air is entrapped beneath horizontal projections or in other locations within the excavation. Where bracing, shoring and/or sheeting is used to support the sides of the excavation or to prevent movements that could damage other services or adjacent pavements, this support system shall be removed as backfilling proceeds.

.2 If the excavation is within the travelled portion of the roadway, it shall be covered for at least 24 hours with steel plate of sufficient strength to support traffic during this period. Where road traffic is not to be accommodated, the backfilled excavation shall be covered with wooden planking or other protection for users of the road allowance until the Unshrinkable Fill will support the weight of an adult person.

END OF SECTION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

.1 In general, excavating and backfilling around structures shall be completed in accordance with OPSS No.'s 902,501,517,1010 and as supplemented by this Section.

.2 Conform to Sections of Division 1 as applicable.

1.2 SCOPE OF WORK

.1 This section applies to the excavation and backfilling of structures.

1.3 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.4 SUBMITTALS

.1 Not applicable.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 STOCKPILING

.1 Material removed from excavations for structures shall be stockpiled or disposed of as directed by the Engineer.

3.2 EXCAVATION AND BACKFILLING AROUND STRUCTURES

.1 In general, excavation and backfilling around structures shall be completed in accordance with Section 02220 - General Excavation, Dewatering and Backfilling with the following exceptions.

.2 Sand shall be used to fill an area within 600 mm in any direction of any structure, including manholes and catchbasins, unless shown otherwise on the Drawings. Selected fill shall be used for the remainder of the area to be filled.

.3 The fill adjacent to the structures shall first be placed so that its sides have a natural slope and the sand fill placed over those slopes.

.4 Backfilling around structures shall not commence until all interconnected structural components such as roof systems are completed or until approved by the Engineer.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE OF WORK

.1 In general, excavation and backfilling in trenches shall be completed in accordance with OPSS No.'s 405,410,412,415,416,421,501,514,515,517,538,701 and as supplemented by this Section.

.2 This section applies to the excavation and backfilling of excavations for pipes, valves, hydrants and chambers, etc.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.3 SUBMITTALS

.1 Not applicable.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 ALIGNMENT

.1 Trenches shall be dug to the alignment and depth required and only so far in advance of pipe laying as the Engineer will permit or instruct.

3.2 STOCKPILING

.1 Material removed from a trench shall be piled neatly along the side of the trench in a manner which will not interfere with traffic, access to buildings or other premises, and the setting up of sight rails.

3.3 WIDTH OF TRENCHES

.1 The width of the trench shall be sufficient to permit proper laying and jointing of the pipe. Every trench shall have a minimum width 300 mm greater than the external diameter of the pipe barrel.

.2 Where sheeting or shoring is used, the width shall be measured between the interior faces of sheeting as driven or between the walings, if same are below the top of the pipe.

3.4 PREPARATION OF TRENCH BOTTOM

.1 The pipe trench shall be shaped to give even bearing for the full length of the pipe. Pipe bedding shall be a minimum depth of 200 mm A Gravel compacted to 100% SPMDD or as noted on the Contract Drawings.

.2 If it is the opinion of the Engineer that the trench bottom (subgrade) is too soft to support the pipe, additional measures may be required, such as additional excavation and replacement with graded crushed stone.

3.5 BACKFILLING IN TRENCH

.1 Backfilling shall commence only after the Engineer has inspected and approved the pipe and bedding. Backfilling to 300 mm above the top of the pipe shall be completed with sand compacted to 100% Standard Proctor Density. Trenches shall be backfilled with granular material and selected fill in accordance with and to the limits as shown on the Contract Drawings and then with suitable existing material up to the applicable subgrade compacted to 95% standard Proctor Density. Backfilling is to be completed in lifts from 100 mm to 300 mm as specified under Section 02220.

.2 Backfilling operations in trenches shall proceed immediately after pipe laying and shall also proceed in a manner to allow not more than 30 metres length of open excavation unless permitted or instructed otherwise by the Engineer.

.3 At the end of every day, the Contractor shall ensure that the pipe is blocked with a bulkhead and that backfilling is completed to within 600 mm of the end of the pipe.

.4 Any pipe located beneath a building/structure base slab shall be bedded and backfilled to the underside of the structure with 15MPa concrete.

END OF SECTION

053193_Division 2_02224-Excavation and Backfilling in Trench.docx
4/14/2026 12:06 PM

PART 1 GENERAL

1.1 SCOPE

.1 This section outlines the requirements for aggregates to be used on this project.

1.2 REFERENCE STANDARDS

.1 OPSS No. 1010

.2 Conform to Sections of Division 1 as applicable.

1.3 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.4 SUBMITTALS

.1 Not applicable.

PART 2 PRODUCTS

2.1 GENERAL

.1 To OPSS No. 1010

PART 3 EXECUTION

3.1 GENERAL

.1 To OPSS No. 1010

3.2 MEASUREMENT FOR PAYMENT

.1 To be included in applicable work for which aggregates are required

END OF SECTION

053193_Division 2_02225-Aggregates.docx
4/14/2026 12:07 PM

PART 1 GENERAL

1.1 SCOPE OF WORK

.1 In general, restoration shall be completed in accordance with OPSS Nos. 310, 314, 353.

.2 The work under this Section is comprised of the permanent restoration of roadways, shoulders, lanes, footpaths, driveways, ditches, catchbasins, and any other areas or existing facilities disturbed or damaged during construction along and in the general vicinity of the works.

.3 Surfaces shall be restored to their original condition using materials of a similar type and quality as, and corresponding to, the original surface but shall meet the minimum requirements defined in subsequent sub-sections of this Specification.

.4 Restoration shall be to neat straight lines.

.5 Paved roads are defined in this Specification as being those roads having either hot-mixed asphalt surfaces or asphalt-treated surfaces.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.3 SUBMITTALS

.1 Not applicable.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 PAVED SURFACES

.1 Prior to the replacement of paved surfaces, the broken edges of the original surface shall be cut back to a trim, even, straight, vertical face and treated with a bonding agent conforming to OPSS No. 310 to ensure water tightness and smooth riding qualities.

.2 Unless otherwise shown on the Contract Drawings, paved roads having hot-mixed asphalt surfaces and constructed with granular sub-courses shall have a minimum restoration consisting of 450 mm of Granular 'B', 150 mm of Granular 'A', both compacted to 100% Standard Proctor Density, and 75 mm of hot-mixed asphalt consisting of 50 mm of HL8 and 25 mm of HL3.

.3 Paved roads having hot-mixed asphalt surfaces and constructed with a concrete base course shall have a minimum restoration consisting of 450 mm of Granular 'B', compacted to 100% Standard Proctor Density, 225 mm of 20 MPa concrete, reinforced by welded steel mesh made of 10 gauge wire at 150 mm centres placed 115 mm above the subgrade, and 40 mm of hot mixed asphalt HL3.

.4 Paved roads having asphalt-treated surfaces shall have a minimum restoration consisting of 450 mm of Granular ‘B’, 150 mm Granular ‘A’ both compacted to 100% Standard Proctor Density, bituminous priming material, M.T.O. primer or R.C. 30 liquid asphalt,

applied at the rate of 1.8 L/m^2 sand seal, M.T.C. Specification 302.02 applied at the rate of 8 to 10 kg/m^2 bituminous binder material, applied at the rate of 1.8 L/m2 and mineral aggregate applied at the rate of 12 - 16 kg/m^2.

3.2 UNTREATED GRAVEL SURFACES

.1 Unless otherwise shown on the Contract Drawings, minimum restoration of untreated gravel surfaces shall consist of a 300 mm layer of Granular 'A' compacted to 100% Standard Proctor Density.

3.3 TREATED GRAVEL SURFACES (PRIME & DOUBLE)

.1 Prime and double surface treatment shall be as per OPSS No. 304.

3.4 GRAVEL SHOULDERS

.1 Unless otherwise shown on the Contract Drawings, minimum restoration of gravel shoulders shall consist of 100 mm of Granular 'A' compacted to 100% Standard Proctor Density.

3.5 DRIVEWAYS AND SIDEWALKS

.1 Unless otherwise shown on the Contract Drawings,

.1 Minimum restoration of concrete driveways and sidewalks shall consist of 300 mm layer of Granular 'A' base course compacted to 100% Standard Proctor Density followed by 100 mm of 30 MPa air entrained concrete.

.2 Minimum restoration of asphalt paved driveways and sidewalks shall consist of a 300 mm layer of Granular 'A' base course compacted to 100% Standard Proctor Density followed by 50 mm of hot-mixed asphalt HL3.

.3 Minimum restoration of gravel driveways shall consist of 300 mm layer of Granular 'A' compacted to 100% Standard Proctor Density.

3.6 OPEN AREAS

.1 Unless otherwise shown on the Contract Drawings, open areas shall be restored with a 100 mm layer of topsoil, free from weeds, roots, and debris. All open areas shall be seeded conforming to the requirements of Section 02232. Areas to be sodded will be noted on the drawings.

3.7 CATCHBASINS

.1 Restored catchbasins shall be constructed of poured in place concrete or shall be single unit precast concrete, with frames and gratings conforming to OPSS No. 407

END OF SECTION

PART 1 GENERAL

1.1 SCOPE OF WORK

.1 In general, landscaping shall be completed in accordance with OPSS Nos. 206, 501, 511, 565, 570, 571, 572 and as supplemented by this Section.

.2 The work in this section comprises supply of equipment and materials for tree protection, rough grading to within 12 cm of finished surface, placement of topsoil, fine grading, seeding, mulching, sodding, planting and maintenance until accepted for use by the Owner.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.3 SUBMTTALS

.1 Not applicable

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 EXISTING TREE PROTECTION

.1 All existing trees which are to remain, shall be fully protected with hoarding, i.e. snow fencing, erected beyond their "drip line" prior to construction to the satisfaction of the Engineer. Groups of trees and other existing plantings to be protected, shall be done in a like manner with hoarding around the entire clump(s). Areas within the protective fencing shall remain undisturbed and shall not be used for the storage of building materials or equipment.

.2 Where limbs or portions of trees are removed to accommodate construction work, they will be removed carefully in accordance with accepted arboricultural practice.

.3 Where root systems of protected trees are exposed directly adjacent to or damaged by construction work, they shall be trimmed neatly, and the area backfilled with appropriate material to prevent desiccation.

.4 The Contractor shall be aware that during the course of construction should the root system of any tree sustain damage which results in the decay of the tree within the maintenance period, the contractor will be required to remove this tree and re-establish tree(s) to the satisfaction of the Owner and the Engineer.

.5 Trees affected by construction shall be supplemented by a fertilization program during the construction period.

3.2 ROUGH GRADING

.1 The Contractor shall do all rough grading and filling where required to establish the sub-grade under all landscape areas to a depth sufficient to allow the placing of topsoil to the specified depth. All soft and unstable areas below sub-grade shall be excavated and filled with approved soil material.

.1 The sub-grade shall be established parallel to the finished grades indicated on drawings unless shown otherwise and shall be shaped in such a manner so as to permit draining of water in event of heavy rain. Unless shown otherwise, areas shall be given uniform slopes between points for which finished grades are indicated on the drawings or between such points and existing grades. At the top and toe of slopes and banks grades shall be smoothly rounded.

.2 The sub-grade under hard landscaped areas such as roads and paths shall be compacted to 95% Standard Proctor Density unless specified otherwise in the Contract Documents.

3.3 PLACEMENT OF TOPSOIL AND FINE GRADING

.1 The sub-grade shall be scarified to a minimum depth of 7 cm to produce an even, loose textured surface, free of all stones, roots, branches, etc., larger than 7 cm in diameter, and live weeds. The finished sub-grade shall be approved by the Engineer prior to placing topsoil. Where the sub-grade has been established by others, it shall be the Contractor's responsibility to verify such sub-grade and if required, make necessary adjustments to the sub-grade, and prepare such sub-grade in the manner described above. Where specified the topsoil mixture under all sodded areas shall be spread evenly over the approved sub-grade to the specified depth and compacted to 80-85% SPD. The minimum depth of topsoil under sodded and seeded areas shall be 10 cm.

.2 The specified fertilizer shall be applied to and well worked into the topsoil by discing, raking or harrowing at the rates specified. This shall be done within 48 hours before laying sod. The finished surface shall be smooth, firm against footprints, with a fine, loose texture before sod is placed or seed spread.

.3 Topsoil, where supplied by the Contractor, shall be a fertile, friable natural loam containing not less than 4% of organic matter for clay loams and not less than 2% for sandy loams with an acidity value ranging from pH 6.0 to pH 7.5 and capable of sustaining vigorous plant growth. It shall be free of any admixture of subsoil, clay lumps and free of stones and roots over 5 cm in diameter and other extraneous matter. The topsoil supplied by the contractor shall be tested as necessary for N., P., K., Mg. soluble salt contents, organic matter content and pH value.

.4 Where topsoil is supplied by the Contractor, the quantities of fertilizers required shall be based on the following minimum rates and shall be considered as being included in the contract sum:

10 - 20 - 10 @ 9 kg/100 m^2
0 - 20 - 10 @ 5 kg/100 m^2
Superphosphate @ 11 kg/100 m^2

3.4 TERRASEEDING

.1 Seed:

.1 Seed supplied shall be approved by the Contract Administrator prior to use. Seed supplied either singly or as a seed mix shall meet the requirements of the Seeds Act for Canada, No. 1 Seed.

.2 Seed analysis certificate:

.1 A legible, valid seed analysis certificate from a seed testing laboratory approved by the Canadian Food Inspection Agency for all single seed species and all seed

mixtures shall be provided to the Contract Administrator 7 days prior to any seeding operations.

.2 The Seed Analysis Report shall stipulate the seed supplier's lot designation numbers, the purity and germination for each species and the seed mix composition by mass for each species. Test results shall meet or exceed the value specified by the Contract Administrator.

.3 Only seeds harvested in the preceding growing season will be accepted.

.4 Substitutions must be accepted in writing from the Contract Administrator.

.5 Nurse Crop to be Annual Oats (Avena sativa).

.6 Water: potable water, free of impurities that would inhibit germination and good growth.

.7 Sediment Control: Filtrexx tubular sediment control products or approved equal.

.8 Composted topsoil: composted topsoil shall be premixed with 60% minimum compost material. Concrete sand can be added to improve soil structure and peat loam can be added to adjust pH. 100% of the applied material must be able to pass through a 25 mm sieve.

.9 Compost: compost shall be Type A compost from sites certified to meet the Ontario Ministry of the Environment's Compost Regulation 101. Compost shall meet the Ontario Ministry of the Environment's Interim Guidelines for the Production and use of Aerobic Compost in Ontario.

.1 Concrete Sand: concrete sand pH range shall range from 7.7 to 8.0 with a mid range of 7.8 and shall be graded in accordance with OPSS standards.

.2 Peat Loam: horticultural grade peat loam shall have equal proportions of silt, sand and clay with a minimum of 50% organic matter with no pieces larger than 16mm.

.10 Soil amendments & Fertilizer: per soil test results.

.11 Preparation of surfaces:

.1 Cultivate areas to be seeded to a minimum 50 mm depth. Fine grade seeding bed to be free of humps and hollows, stones larger than 25 mm diameter, weeds, trash and deleterious material. Prepared soil surface to be friable and loose. The surface to be seeded shall be prepared not more than seven calendar days before the seeding operation.

.2 Obtain Contract Administrator approval of topsoil grade, depth and condition of areas to be seeded before starting seeding.

.3 Install sediment control measures at the bottom edge of slopes and in all areas where sediment control and erosion prevention is necessary. Filtrexx tubular sediment control products to be utilized in accordance with manufacturer specifications

.4 Seeding must take place on frost free soil if scheduled prior to May 20. Seeding should preferably take place between August 15 and October 15.

.5 The Contractor must ensure that the growing medium's seed content will not affect the new seeding. The contractor can prepare a stale seed bed by allowing seeds in the growing medium to germinate and grow for a three week period. Remove new growth by mechanical means and repeat this process as necessary.

.6 Apply lime to bring the pH value of the soil within a level of 5.5 to 7.5 if necessary. Mix lime evenly into the top 50mm layer of soil by means of a cultivator.

.12 Terraseeding:

.1 Do not terraseed if winds are 10km/hr or above or if heavy rainfall is forecasted. Seeding must not be done in areas of standing water or where soil is covered by snow or ice.

.2 Obtain Contract Administrator approval prior to terraseeding.

.3 Ensure all areas to be terraseeded are watered to a depth of 150 mm before seeding.

.4 Nurse Crop:

.1 Annual Oats (Avena sativa) to be terraseeded at a rate of 60kg per hectare.

.5 Depth of composted topsoil to be the following depths depending on site slopes:

.1 0-5% slope: 10-15 mm depth
.2 5-10% slope: 15-20 mm depth
.3 10-25% slope: 20-25 mm depth
.4 25-35% slope: 25-40 mm depth
.5 35-45% slope: 40-50 mm depth

.6 Composted topsoil shall be applied uniformly at a rate greater than 0.25 cubic metres per minute. Overlap adjoining groundcover by 300 mm.

.13 Protection:

.1 The Contractor is responsible for protection of seeded areas until final acceptance. Erect and maintain protective barriers and post signs using a method approved by the Contract Administrator. Remove barriers and signage after acceptance.

.14 Maintenance:

.1 Follow maintenance instructions supplied by the seed supplier. Terraseeded areas to be maintained until final acceptance by Contract Administrator.

.2 Water seeded areas to ensure optimal germination and plant growth. Keep soil moist during germination period. Control watering to prevent erosion and washouts.

.3 Reseed bare spots where germination has failed at two week intervals to ensure full cover.

.4 Do not apply herbicides to terraseeded areas. Remove undesirable weeds from terraseeded areas by mechanical means only.

.15 Final Acceptance:

.1 Criteria for acceptance:

.1 Seeded areas are sufficiently established with an evenly dispersed uniform cover that is representative of the permanent seed mix.
.2 98% free of weeds.
.3 Free of eroded, bare or dead spots
.4 No surface soil is visible when plant material is 100 mm high.

.2 Areas terraseeded in the Fall will be accepted two months after the start of the next growing season if the criteria are met.

.3 If after one full growing season the seeding does not meet the criteria for acceptance, additional seeding shall be required to the satisfaction of the Contract Administrator.

.16 Workmanship:

.1 No seeding or composted topsoil to come into contact with water bodies, plant foliage, planting beds and any other area where terraseeding is not proposed.

.2 Promptly clean any soil or debris spilled onto pavements. Clean water shall be used to immediately wash any seed or composted topsoil that has been applied to foliage.

3.5 SODDING (PROVISIONAL)

.1 Sod shall be a certified No. 1 cultivated turf grass sod of 50% Merion and 50% Kentucky bluegrass, grown and sold in accordance with the classification of the Nursery Sod Growers Association of Ontario. At time of sale, it shall have a strong, fibrous root system and shall be free from stones and burned or bare spots.

.2 Sod shall be laid as soon as possible after delivery to prevent deterioration. Sod shall be laid closely knit together in such a manner that no open joints are visible, or pieces are overlapping. Sod shall be laid smooth and flush with adjoining grass areas, pavement and top surface of curbs unless shown otherwise on the drawings. On any slopes of 3:1 to 2:1, sod shall be laid perpendicular to the slope, and every row shall be pegged with wooden pegs at intervals of not more than 0.6 m. Pegs shall be driven flush with sod. On slopes of 2:1 and steeper, sod shall be laid perpendicular to the slopes on wire mesh and pegged. Wire mesh shall be a #9 gauge galvanized wire woven farm fencing or approved equal. Cedar posts minimum 8 cm diameter shall be sunk firmly 1 m into ground at intervals of 5 m along the pitch of the slope. Posts shall be placed horizontally to the slope direction at intervals equal to the width of the wire mesh minus 15 cm.

.3 After installation of sod, the area shall be watered immediately with sufficient amounts to saturate the sod and upper 10 cm of soil.

.4 After sod and soil have dried sufficiently to prevent damage, the area shall be rolled with a roller providing 1500 lbs. pressure per square foot, to ensure a good bond between sod and soil and to remove minor depressions and irregularities. All sodded areas shall be protected with warning signs until acceptance, and at the Contractor's expense unless specified otherwise.

.5 All sodded areas shall be guaranteed until issuance of the Final Acceptance Certificate. Any sod which, during the Guarantee Period, shows deterioration, bare spots or damage resulting from faulty materials and/or workmanship, shall be replaced at the Contractor's expense.

.6 All sodded areas shall be under maintenance until a good growth of grass has been established, all die back areas have been replaced, the grass has received a first cut and has been inspected and approved by the Engineer.

.7 Wooden pegs, to be used for pegging sod or steep slopes, shall be hardwood pegs, 25 cm long minimum and approximately 2 centimetres square, or approved equal. Pegs shall be of sufficient length to ensure satisfactory anchorage of the sod.

.8 Any sodded areas that fail to grow shall be re-sodded (and retopsoiled if required) as directed by the Engineer at the Contractor's expense.

.9 No sod shall be placed outside of its normal growing season.

3.6 PLANTING

.1 Plant Materials (trees) shall be in accordance with the latest edition of the Canadian Nursery Trades Association Metric Guide Specifications for Nursery Stock; "Collected Plants" not permitted unless approved in writing by the Contract Administrator.

.2 Trees shall be a perennial evergreen species local to the area and shall have a minimum 1.0 m height upon planting.

.3 Provide trees true to type and structurally sound, well-branched, healthy and vigorous and free of disease, insect infestations, rodent damage, sun scald, frost cracks and other abrasions or scars to the bark, densely foliated when in leaf and having a healthy, well developed root system. Pruning wounds shall show vigorous bark on all edges and all parts shall be moist and show live, green cambium tissue when cut. Plant materials shall conform to the measurements specified in the Plant List; plants larger than specified may be used if approved by the Contract Administrator and do not increase the contract price. Measure plants when branches are in normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to root base or from branch tip to branch tip.

.4 Wrapping of tree trunks: first quality burlap, at least 200 gm/m^2 in weight and not less than 150 mm nor more than 250 mm in width, or a heavy waterproof crepe paper 100 or 150 mm wide.

.5 Tree Installation:

.1 Locate planting pits and have approved by the Contract Administrator prior to excavation. Plant during periods suitable with respect to weather conditions and locally accepted practice. Set plants plumb in the centre of the pits and at same relation to grade as originally grown, after settlement has taken place. Face trees and other plant materials to give the best appearance or relationship to adjacent structures, and to approval of the Contract Administrator;

.2 Set plants in partly filled pits or beds or prepared soil mixture at which time all burlap, ropes, wires, etc. shall be pulled away from the top of the ball. Place layer of loose unfrozen soil mixture at least 150 mm deep under plants. Place bare root plants so that roots lie in natural position. Backfill soil mixture shall be in layers not exceeding 150 mm in depth. Firmly tramp each layer in place so that plant retains vertical position. Ensure that no air pockets remain under or around roots. Thoroughly water soil mixture when hole is half full and again when full;

.3 Provide an earth saucer at base of individual plants, diameter as large as the excavated area to retain water around roots of plant;

.4 Provide suitable and well-founded tree support for all trees installed under this contract; and

.5 Prune plants after planting. Prune to remove dead or injured branches and to compensate for loss of roots from transplanting operations. Preserve the natural character of the plants. Do not remove leaders. Use only clean, sharp tools. Leave no stubs. Remove cuts, bruises or scars on bark by tracing back to living tissue. Shape affected areas so as not to retain water. Paint treated areas with approved tree paint.

.6 Maintenance:

.1 Maintain plant materials after planting and continue until date of Substantial Performance. Maintain plant materials during Warranty Period.

3.7 ACCEPTANCE OF WORK

.1 Sod shall be accepted for Substantial Performance when grass roots have secured to topsoil and grass has been mown once to a depth of 5 cm.

.2 Grass seed shall be accepted for Substantial Performance after development of a green sward of grass and after two grass mowings to a depth of 5 cm, a minimum of eight weeks following seeding operation.

.3 Plant materials shall be accepted for Substantial Performance upon completion of planting, staking and mulching.

.4 All grass and plants shall be guaranteed for one year following Substantial Performance. Any replacements made during the guarantee period shall be further guaranteed for one year following the replacement date.

END OF SECTION

053193_Division 2_02232-Landscaping.docx
4/14/2026 12:11 PM

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 The work in this Section includes the following:

.1 Supply and installation of a catch basin, storm sewer, maintenance hole and connection to the existing storm infrastructure.

.2 Furnish labour, materials, services, equipment, and other necessary items required for meeting the requirements of this Section.

.3 Set lines, elevations, and grades for new sewers and control system for duration of Work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

.4 For clarification, the term sewers shall apply to all gravity piping installed on this project including but not limited to storm sewers and associated infrastructure.

1.2 RELATED REQUIREMENTS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.3 SUBMITTALS

.1 Shop Drawings are to be submitted in accordance with Section 01340 - Submittals.

.2 Sewer Pipe Materials:

.1 Product Data: Provide catalogue materials indicating pipe, pipe accessories, and fittings including precast concrete maintenance hole. Do not perform Work until required Shop Drawings have been accepted by the Owner.

.2 Manufacturer's Installation Instructions: Indicate special procedures required to install product specified.

.3 Manufacturer's Certificate: Certifies that product meets or exceeds ASTM designations.

.3 Precast Concrete Chambers:

.1 Shop drawings shall include method and materials proposed for insulating and waterproofing structures before structures are shipped to site.

.2 Shop drawings for the chambers and all related structural appurtenances shall be designed by and bear the seal and signature of a Professional Engineer licensed in the province of the Work.

.3 Shop drawings shall, as a minimum, show the information listed in PEO Guideline “Structural Engineering Design Services for Buildings Guideline” revised June 2017, Part B, Design and Construction, Phase 2, Final Plans and Specifications, including but not limited to: 5) General Items, plus applicable information from, 6) Foundation plans and 7) Framing plans, as well as meeting the requirements for shop drawings given in the latest versions of CSA-A23.1and CSA-A23.4, including but not limited to the following:

.4 Design Codes and Standards;

.5 Fabrication / Construction Standards & Certifications / Qualifications;

.6 Dimensions, elevations and openings;

.7 Material designations, grades, sizes, strengths, etc.;

.8 Hydrostatic uplift calculations for all maintenance holes and chambers; and

.9 Submit complete set of design calculations if requested by the Contract Administrator.

.10 Shop drawings will first be reviewed for fulfillment of the requirements of Section 01340 - Submittals and Item 1.6.43 above. Should the submission be found deficient in any respect with regard to these requirements, they will be returned for correction without further review. Each review, whether or not it is limited to a review for compliance with Section 01340 - Submittals and Item 1.6.43 above, will count towards the number of submissions outlined in Section 01340 - Submittals, Item 1.5.

PART 2 PRODUCTS

2.1 GENERAL

.1 All sewers and appurtenances shall be supplied in the size and type indicated on the Contract Drawings.

.2 The General Contractor is responsible for all utility locates including the location of existing buried piping. There shall be no additional payment to the General Contractor to correct damage to existing utilities or buried piping due to the General Contractor's negligence.

2.2 SEWER PIPE MATERIALS

.1 The type of sewer pipe material shall be as specified on Contract Drawings and shall conform to the relevant pipe specifications listed herein.

.2 Polyvinyl Chloride (PVC) Storm Sewer:

.1 Pipe and fittings shall comply with ASTM D 3034, rated SDR 35 certified to CSA-B182.1 unless otherwise shown otherwise on the Drawings. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.

.2 Pipe joints shall be integrally molded bell ends per ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.

.3 Corrugated polyvinyl chloride sewer pipe and fittings shall comply with ASTM F 949. Pipe must be marked with manufacturers name, pipe size, cell classification and ASTM F 949 Classification. Pipe must be installed per the manufacturer's installation requirements.

2.3 PIPE ACCESSORIES

.1 Pipe joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.

.2 Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

.3 At the downstream end of all sewers, install a watertight bulkhead at the extreme lower end of the line. Periodic checks shall be made by the General Contractor during the construction to ensure that this bulkhead is in place and has not become damaged. The bulkhead is to be removed at the completion of Work.

.4 Removal is to be carried out upon completion of roadwork.

2.4 INSULATION SHEETING OVER PIPE

.1 The General Contractor shall place inverted “U” insulation over piping that is installed without the minimum cover specified on the Contract Drawings and only as directed by the Contract Administrator.

.2 Insulation shall not be placed without authorization from the Contract Administrator. Insulation placed without the Contract Administrator’s approval shall not be paid.

.3 Insulation material shall be high density rigid board extruded polystyrene sheeting conforming to the following:

.1 Insulation shall be prepared as an inverted “U” with each insulation sheet having a 50 mm thickness;

.2 Vertical ‘side’ insulation boards shall be placed against the sidewalls of the trench and shall be 600 mm high unless noted otherwise on the Contract Drawings. The horizontal ‘top’ sheet of insulation shall extend to 150 mm beyond each vertical side sheet and shall be placed directly on top of side sheets;

.3 Insulation boards shall meet CAN/ULC S701; and

.4 Acceptable product: “Foamular 400” high density extruded polystyrene rigid (XPS) insulation by Owens Corning Canada or approved equal.

2.5 PRECAST CONCRETE CATCH BASINS

.1 Precast units shall be according to OPSS 1351 and as specified in the Contract Documents.

.2 Frames with covers or grates shall be according to OPSS 1850 and as specified in the Contract Documents.

2.6 PRECAST CONCRETE CHAMBERS

.1 Precast Concrete:

.1 Manufacturer to be certified to CSA-A23.4-05 for structural precast concrete. See Structural Drawings for minimum concrete exposure classifications;

.2 General Design: to the more stringent requirements of the *Ontario Building Code* 2012, or latest version, CAN/CSA-S6-06, *Canadian Highway Bridge Design Code*, utilizing Limit States Design;

.3 Design roof for the greater effect of a uniform Live Load of 12.0 kPa, a concentrated Live Load of 54 kN over an area of 750 mm x 750 mm, or the CAN/CSA-S6-06, CL-625 ONT truck load, including impact;

.4 Design roof for earth, landscaping or pavement dead loads as determined from the drawings;

.5 Design walls below grade for the lateral load from surcharge loads in the amount of the Live Loads shown in 2.1.3 above, plus earth pressure, utilizing an “At Rest” lateral pressure coefficient, ko, not less than 0.5; and

.6 Design walls and base slab for hydrostatic pressure with ground water table at the top of the roof slab, unless shown otherwise on the drawings. Utilize a ULS load factor of 1.5 for component design.

.2 Design overall structure for hydrostatic uplift as follows:

.1 With ground water table at grade or at the top of the roof slab, whichever is higher, unless shown otherwise on the Drawings. Utilize a ULS load factor for hydrostatic uplift of 1.25 where calculations are based on ground water table at or above the top of the roof.

.2 Where ground water table is shown on the drawings to be below the top of the roof slab, utilize a ULS load factor for hydrostatic uplift of 1.5. Overall factored hydrostatic uplift need not exceed the value calculated in Item 2.2.1; and

.3 Soil vertically above any base slab toe projection may be utilized, together with the mass of the structure to counteract the hydrostatic uplift. The submerged unit weight of the soil shall be utilized. Live loads shall not be included in these calculations. A ULS load factor of 0.9 shall be applied to loads counteracting hydrostatic uplift. Soil friction shall not be assumed to contribute to hydrostatic uplift resistance.

.3 Design Concrete Structures to CSA-A23.3-04.

.4 Reinforcing Steel: to CSA-A23.4-05.

.5 Precast Maintenance Hole Sections: to OPS 407 and 1351 and as shown on the drawings (and/or local Authority Standards).

.6 Frames with covers or grates shall be according to OPSS 1850 and as specified in the Contract Documents.

.7 Steps shall be according to OPSS 1351 and as specified in the Contract Documents.

.8 Precast concrete adjustment units shall be according to OPSS 1351.

.9 Provide hydrophilic waterstop, Sika Hydrotite (NSF 61 certified) sealant on concrete joints. For rough surfaces of construction joints, apply a bead of Sikaflex-1a (NSF 61 certified) sealant on concrete immediately prior to applying waterstop to concrete surface.

.10 Provide Kor-N-Seal flexible water tight seal for all pipe connections.

PART 3 EXECUTION

3.1 LAYOUT

.1 The General Contractor shall be responsible for appropriate methods to ensure that pipe and appurtenances are installed to the geodetic elevations shown on the Contract Drawings. The General Contractor shall ‘interpret’ the proposed geodetic elevation of the pipe based on the profile drawings.

.2 Refer to the relevant Clause in Section 01007 - General Instructions for requirements pertaining to setting out of the work including locates regarding existing buried piping and utilities.

3.2 TRENCH

.1 The General Contractor shall refer to Section 02224 - Excavation and Backfilling in Trench for supplemental information pertaining to trench requirements and backfilling.

.2 Conditions in the pipe trench shall be such that pipe jointing can be accomplished without getting mud, silt, gravel or other foreign material into the joint. In general, this means that the trench shall be adequately dewatered with a firm trench base free of mud.

3.3 FOUNDATION AND BEDDING

.1 Place granular pipe bedding material in uniform layers to a minimum compacted depth of 200 mm below the bottom of the pipe and maintenance holes and chambers.

.2 Shape bed true to grade to provide continuous uniform bearing surface for pipe.

.3 Pipe bedding materials shall conform to Section 02225 - Aggregates.

.4 Refer to Section 02220 - General Excavation and Backfilling for compaction requirements regarding foundation and pipe bedding material.

3.4 COVER MATERIAL OVER PIPING

.1 Place cover material to a minimum thickness of 300 mm above the top (obvert) of the pipe.

.2 Cover material shall conform to Section 02225 - Aggregates.

.3 Refer to Section 02220 – General Excavation and Backfilling for compaction requirements regarding cover material.

3.5 ALIGNMENT AND GRADE

.1 The piping shall be laid to the grades and elevations shown on the drawings. No piping shall be laid without at least three (3) sight rails in place.

.2 Care shall be taken to align the pipe properly before joints are forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by a hand sling or crane as required to minimize lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Once the joint has been made, deflection of the joint shall be held to an absolute minimum.

.3 The General Contractor shall carry out explorations where necessary to establish or discover the location of existing pipe, conduits, or other buried objects.

3.6 LOWERING AND LAYING PIPE

.1 Pipe and fittings shall be carefully lowered into the trench with proper equipment. Before lowering and while suspended, the pipe shall be inspected for defects. Bell and spigot pipe shall be laid with the bell ends facing upgrade.

.2 Foreign matter shall be removed from the inside of the pipe and fittings. The trench shall be kept dry and free from water, no pipe being laid in water except by permission of the Contract Administrator. No water shall be allowed to run through installation during construction. No pipe shall be laid until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.

.3 Install pipe, fittings, and accessories in accordance with ASTM C12, ASTM C14 and/or manufacturer's instructions and state or local requirements.

.4 Install pipe on bedding in accordance with Specifications for Work in this Section.

.5 Refer to Specifications for trenching requirements. Do not displace or damage pipe when compacting.

.6 The General Contractor shall use bedding materials in accordance with the Specifications when installing sewer.

.7 In wet conditions, basic dewatering and additional granular bedding materials shall be provided at no additional cost.

.8 Use of clear stone shall not be permitted unless wrapped with a filter fabric to perform as a separator between the stone and the native soil and between the stone and other bedding materials. Where the invert of the sewer is underlain by non-engineered fill or other unsuitable materials, these materials are to be excavated and the General Contractor shall install a well-graded granular material, as approved by the Contract Administrator.

.9 The General Contractor shall provide removal and disposal of surplus trench spoils generated from trench excavation.

.10 Where trench support is required, the General Contractor is responsible for design (stamped by a Professional Engineer licensed in the province of Ontario with at least five (5) years of relevant experience). Submit stamped design drawings to the Contract Administrator.

.11 Installation shall be kept thoroughly clean throughout, during the progress of the work and until the completion and final acceptance thereof.

.12 All pipe connections at manholes shall be watertight.

3.7 PULL UP PRESSURE

.1 Sufficient pressure shall be applied in making the joint to assure that the joint is "home" as defined in the Standard Installation Instructions provided by the pipe manufacturer.

.2 Sufficient restraint shall be applied to the line to assure that joints, once "home" are held so by tamping fill material under and alongside the pipe, or otherwise.

.3 At the end of the day's work, the last pipe shall be blocked in such a manner as may be required to prevent creep during "down time".

3.8 MANUFACTURER'S INSTRUCTIONS

.1 Pipe and fittings shall be installed strictly in accordance with the Manufacturer's instructions.

.2 A copy of the Manufacturer's Manual of Instructions shall be kept on the job site.

3.9 PRECAST CONCRETE CATCH BASINS

.1 Install catch basins as per OPSS.MUNI 407.

3.10 PRECAST CONCRETE CHAMBERS

.1 CONCRETE WORK

.1 Fabricate precast concrete according to the latest version of CSA-A23.4.

.2 INSTALLATION

.1 Construct pre-cast structures and appurtenances at locations as shown on the Contact Drawings.

.2 Provide firm foundation for precast structures.

.3 All base slabs or ballast slabs shall be placed on a mud slab as specified on the Contract Drawings.

.4 Plug lifting holes with mortar. Cut and remove to below top of concrete all hoisting cables, parging holes.

.5 Repair all visible leaks.

.3 MAINTENANCE HOLE CHIMNEY

.1 Construct maintenance hole chimney with adjustment units to bring cover of maintenance hold to final grade.

.2 Lay grade rings level and plumb in a full bed of mortar with all joints completely filled. Stagger vertical joints. All joints to be 10 mm wide maximum.

.3 Plaster and trowel smooth outside face of all grade rings with 12 mm thick mortar.

.4 Set the first layer of pre-cast interlocking adjustment rings in a full bed of mortar and join successive sections with sealant recommended by manufacturer.

.4 STEPS AND LADDERS

.1 Where shown install steps as per OPSD 405.010.

.5 FRAMES, COVERS AND HATCHES

.1 Install frames and covers in accordance with OPSD 401.030.

.2 Access Hatch Frames to be cast-in-place at prefabricator’s facility.

.3 Where applicable lids shall have cast identification labels.

.6 BENCHING

.1 Bench invert of maintenance holes as detailed or according to OPSD 1004.01 (or local Authority Standards).

.2 Set inlet and outlet pipe securely in concrete base and walls so that maintenance hole is watertight.

.3 Make benching smooth and flush with adjacent pipe inverts with no pipe protruding into maintenance hole.

.4 Benching to have wood float finish.

.5 Channeling to have steel trowel finish.

.6 Bench existing maintenance holes to accommodate any new pipe installed into them.

.7 Pre-benched precast sections may be used when approved by the Contract Administrator.

.7 BALLAST RINGS AND SLABS

.1 Reinforced concrete ballasts shall be designed and supplied by the General Contractor's precast concrete supplier.

.2 Reinforced concrete ballasts shall be designed as per the requirements detailed in this Section regarding hydrostatic uplift.

3.11 FINISH GRADING

.1 The General Contractor will be required to reinstate the area(s) affected by utility installation/ removal to original or better conditions. The General Contractor shall provide all labour, Construction Equipment, and materials to complete the Work including, but not limited to, granular road base materials, asphalt, concrete, topsoil, sod, and any other item required to make good.

.2 Any existing landscaping features, whether inside or beyond the construction limits, unless slated for removal and replacement, if damaged by construction operations will be replaced at the General Contractor's expense. The General Contractor will be fully responsible for all protection of existing landscaping features.

3.12 CLOSED CIRCUIT TELEVISION INSPECTION (IF APPLICABLE)

.1 The purpose of the closed-circuit television (CCTV) inspection is to verify that all required pipe and maintenance holes specified under this Contract have been properly completed to the Contract Administrator's satisfaction. The CCTV inspection shall provide a full record of the condition of the pipe and maintenance holes along the sections installed under this Contract.

.2 CCTV inspection, if included in the Contract, shall be performed following completion of installation of all pipe and maintenance holes (post cleaning and flushing).

.3 CCTV inspection shall be performed by a qualified company with a minimum of 5 years of relevant experience. Prior to undertaking the CCTV inspection, the General Contractor shall provide information to the Contract Administrator demonstrating that the CCTV inspection company meets this qualification.

.4 CCTV inspection equipment shall consist of a monitoring unit and self-contained camera unit with pan, tilt and zoom capability capable of providing a clear digital recording of the sewers. Camera shall be mounted on a crawler or adjustable skids and have a height adjustment to facilitate the inspection of different pipe sizes. Note the following:

.1 The travelling speed of the camera in the pipeline shall be a maximum of 0.15 m/sec for pipelines ranging from 200 mm to 300 mm in diameter and 0.20 m/sec for pipelines greater than 300 mm in diameter;

.2 The camera lens shall be positioned centrally in the pipeline with a positioning tolerance of ±ten percent (+10%) off the vertical centerline axis of the pipe;

.3 The camera lighting system shall be capable of producing effective illumination for all pipe sizes and shall light the entire periphery of the pipe;

.4 The camera operator shall pan the camera to focus on laterals including observable leaks or faults that are located off-center to the direction of camera travel. Pan and tilt into each lateral;

.5 This work shall only be completed upon cleaning and flushing of sewers and maintenance holes. There shall be no additional payment for the supply of water for the CCTV inspection; and

.6 The General Contractor shall prepare an inspection report verifying the successful installation of the pipe and maintenance holes. Where present, the report shall identify pipe leaks or faults discovered during the inspection. Inspection report to include the following information:

.1 The reference point for distance measurements shall be the centerline of the maintenance hole (Station 0+000). The station shall be reset to 0+000 at each maintenance hole prior to continuing with the video inspection of the next section of piping;

.2 The maintenance hole number, type of pipe, length between maintenance hole to maintenance hole section, direction of flow, pipe diameter, depth to pipe inverts in manhole, inspection date, name(s) of the inspection technician and video identification references;

.3 The location and diameter of all service connections (laterals) with a comment as to whether or not the respective service connection are subject to infiltration and obstruction;

.4 Photographs of all sewer defects (leaks and faults as noted above) shall be included. Photographs shall be identified with reference numbers corresponding to the written evaluation in the report. All photographs shall be in colour;

.5 A visual assessment of each manhole shall be conducted noting any defects or damages;

.6 A digital video in MPEG format shall accompany the report. Digital media shall be numbered and cross-referenced to the written inspection report. Video footage shall indicate the size of the pipe including the manhole to manhole segment being inspected.

Note: a sample digital data file and corresponding inspection report shall be submitted to Neegan Burnside for review prior to commencing work

.7 Three hard copies and an electronic copy, in portable document format (PDF) of the final CCTV report with corresponding video shall be provided to the Contract Administrator no later than two (2) weeks following the completion of the inspection. Report and video shall become the property of the Owner.

3.13 TRANSPORTATION

.1 Off-site materials shall be transported to the Project using well maintained and operating vehicles. Once on the job site, all transporting vehicles shall stay on designated haul roads and shall at no time endanger any of the improvements by rutting, overloading or pumping the haul road.

3.14 FIELD QUALITY CONTROL

.1 Compaction testing will be performed in accordance with ANSI/ASTM D698, ASTM D2922 or ASTM D3017.

.2 Test sewer pipe system in accordance with the following procedures when required by the Contract Administrator:

.1 The General Contractor shall notify the Contract Administrator at least 48 hours (2 business days) prior to starting the testing process.

.2 The General Contractor shall perform the testing of manhole construction, pipe materials, joints and / or other materials incorporated into the construction of the sewer system to determine leakage and water tightness. System shall be tested according to OPSS 410. Refer to Section 01715 - Testing.

.3 General Contractor's Liability:

.1 The General Contractor is responsible for the correction of all damage to property, persons etc. caused by, or as a result of, the testing process.
.2 The General Contractor shall be responsible for remedial work necessary to rectify any defects revealed in the pipeline or related appurtenances.

PART 4 PAYMENT

.1 Payment for the supply, installation and testing of sewers, catch basins, precast concrete chambers and related appurtenances shall be on a unit or lump sum price basis as specified in the Schedule of Unit Prices.

.2 The unit price or lump sum price for sewers, catch basins, precast concrete chambers and related appurtenances shall include all costs associated with clearing, grubbing, excavation, dewatering, bedding, cover material, backfilling and compaction as required for installation of pipe and related appurtenances including site reinstatement to original or better condition.

.3 Unless a specific item is listed in the Schedule of Unit Prices, there shall be no separate payment for clearing & grubbing or site reinstatement. At the Contract Administrator's discretion, ten percent (10%) of the bid price for the item to which site reinstatement is applicable shall be withheld until completion of all site restoration as approved by the Contract Administrator.

.4 Payment for the supply and installation of Inverted 'U' insulation over the pipe shall be based on the total length of 50 mm thick rigid board insulation properly placed, including side boards as shown on the Contract Drawings or as directed by the Contract Administrator.

.5 There shall be no additional payment for the supply of water for flushing and exfiltration testing of the sewers and chambers. Include all costs in the lump sum price bid for testing of sewers.

.6 The General Contractor is responsible for all utility locates including the location of existing buried piping. There shall be no additional payment to the General Contractor to correct damage to existing utilities or buried piping due to the General Contractor's negligence.

.7 Payment for the CCTV inspections and reports for sewer systems, if included in the Contract, shall be on a unit price basis for the length of sewers inspected as approved by the Contract Administrator. The unit price bid shall include all costs associated with meeting the requirements of this Section. There shall be no separate payment for the visual inspection of maintenance holes – include all costs in the unit price bid. Twenty

five percent (25%) of the total bid price for the CCTV Inspections item shall be withheld until the final inspection report and videos are accepted by the Contract Administrator.

END OF SECTION

053193_Division 2_02236-Sewer Systems.docm
4/14/2026 12:12 PM

PART 1 GENERAL

1.1 SCOPE OF WORK

.1 In general, watermains shall be supplied and installed in accordance with OPSS No. 441 and as supplemented by this Section.

.2 The supply and installation of all watermains and appurtenances shall be as detailed by these specifications and shown on the Contract Drawings.

.3 The complete supply and installation of watermains, services, and hydrants shall include necessary fittings, bends, tees, restrained flexible couplings/joints, pipe adapters, thrust blocks, any necessary cutting, tracer wire, bedding, sand cover, insulation sheeting, backfill, flushing, pressure testing and disinfection of the pipe after installation.

.4 All fittings and all pipe joints shall be mechanically restrained.

1.2 RELATED SECTIONS

.1 The General Contractor is responsible for the review of all Contract Documents for related sections.

1.3 SUBMITTALS

.1 Refer to Section 01340 – Submittals.

.2 Unless otherwise specified, all submittal as Category 1 Submittal as identified in Section 01340 – Submittals.

.3 The General Contractor shall be required to submit to the Contract Administrator for their approval shop drawings for all piping details including the following:

.1 Jointing methods;

.2 Adaptors;

.3 Bends, tees and other fittings;

.4 Restraints at terminal points and bends; and

.5 Restrained Flexible Couplings.

.4 Category 2 Submittal:

.1 Provide operating and maintenance data in English for incorporation into the maintenance manual for all items specified in this Section in accordance with Section 01730 – Operating and Maintenance Data.

PART 2 PRODUCTS

2.1 GENERAL

.1 All watermains and appurtenances shall be supplied in the size and type as shown on the Contract Drawings.

.2 The Engineer may order tests of any materials delivered to the site and may reject materials pending the result of the tests. Costs of all tests and inspections after delivery to the site will be borne by the Contractor only if material is faulty. Pipe shall bear the date of manufacture clearly stenciled or impressed on each pipe.

.3 The Contractor is warned that any pipe or fittings found to be defective in manufacture, or damaged before or after acceptance from the carrier, will be rejected by the Engineer and the Contractor shall promptly remove such defective material from the site.

.4 The Contractor shall notify the Engineer a minimum of ten days before pipe is delivered to the site of the work giving the following information:

.1 Name of the firm, which will be supplying the pipe.

.2 The locations of the pipe plant.

.5 The Engineer may choose a number of pipes from each size of pipe that is proposed to be supplied for the Contract and visually inspect and gauge the pipe and record dimensions of the pipe ends. A sufficient number of pipes will be accurately measured so that the Engineer may satisfy himself as to the adequacy or otherwise of the pipes being offered. In the event the results of gauging and visual inspection indicate the pipe may not conform to the requirements of this specification, the Engineer may require differential load and hydrostatic tests.

2.2 WATERMAIN SYSTEMS

.1 The following applies to all Watermain Systems and other products listed herein:

.1 All nuts and bolts on fittings, valves, restrained flexible couplings, joint restraints, on all watermain systems to be T-304 Stainless Steel.

.2 All pipe and fittings to conform to the requirements of the latest version of ANSI/AWWA standards and NSF 61.

.3 Watermain pipe shall be ULC listed and labelled.

.4 All fitting, valves, couplings, and adapters that are not otherwise restrained by design, are to be restrained by mechanical means.

.5 All pipe joints are to be mechanically restrained as per the Contract Drawings.

.6 Unless otherwise specified, the watermain piping systems shall be designed for a minimum 1,035 kPa (150 pounds per square inch) test pressure. Greater test pressures may be required, as identified in the drawings or herein.

.7 Pipe to be designed for height of cover indicated on drawings, full H-20 Traffic Load and embankment loading conditions.

.8 At bolt connection points and all other metal to metal connection points where dissimilar metals are joined, install insulating/isolation (dielectric) couplings/sleeves.

.9 All watermains and appurtenances shall be supplied in the size and type as shown on the contract drawings or as otherwise identified herein.

.10 Warning tape shall be placed above all piping prior to backfilling.

.11 All materials contacting potable water to be NSF/ANSI 61 and all lubricants / chemicals to be NSF/ANSI 60 approved.

.12 Watermain material shall be as specified on the Contract Drawings.

2.3 POLYVINYL CHLORIDE WATERMAIN PIPE

.1 Pipe - CSA-B137.3, AWWA C900, DR18, and supplied from a plant approved by an organization accredited by the Standards Council of Canada.

.2 The pipe shall be CSA certified and ULC labelled and shall contain ingredients that are approved by the National Sanitation Foundation (NSF).

.3 Pipe Joints – Unless otherwise shown on the drawings to be mechanically restrained bell and spigot joints with flexible elastomeric seals to ASTM D 3139.

.4 Fittings:

.1 Ductile iron

.2 All fittings to be CSA certified and ULC labelled.

.3 Denso tape and paste to be applied to all ferrous fittings, including joint restraints.

.5 Supply and install tracer wire as specified elsewhere in this Section.

.6 Joint Restraints - To ASTM F1674, STD DWG 1-3-3A, installed with thrust blocks. Joint Restraints are to be provided on all joints and are to withstand the pipe test design pressure without the use of concrete or other thrust blocking systems.

.7 Thrust blocks as per relevant OPSS and OPSD's.

.8 Approved Pipe Manufacturer and Product - Westlake Pipe & Fittings (C900/RJIB Certa-Lok), IPEX (Blue Brute) or National Pipe (Dura Blue), or Next Polymers (Aqualoc), or Diamond Plastics Corp. (PR 235), or Rotay Pipe Systems (C900 High Pressure), or approved alternate.

.9 Approved Joint Restraint Manufacturer and Product - Preferred products, EBBA Iron Sales Inc. (Megalug Series 1500,1600,2000,2600), or Sigma Corp (PV-Lok series PVM, PVP and PVPF, One-Lok SLC).

2.4 TRACER WIRE

.1 Tracer wire for piping installed be as specified as drawings. Supply and install two (2) tracer wires (one redundant). Tracer wire color shall follow APWA standards for utility identification. Coordinate spool size as necessary with supplier.

.2 Provide 0.45 kg magnesium grounding anode complete with HDPE cap and a minimum of 3.5 m of factory installed tracer wire polyethylene insulation. Anodes shall be installed at all test stations and locations in accordance with tracer wire manufacturer's recommendations.

.3 Tracer wire spliced connections to be minimized. Where splicing is necessary, use suitable splice connectors and install in accordance with manufacturers recommendations, being completely waterproof to prohibit corrosion and loss of conductivity.

.4 Tracer wire shall be extended to the surface within a 25 mm polyethylene conduit (and test station) at distances not exceeding 500 meters and at all valve boxes, air release chambers and terminations. When tracer wire is terminated inside a facility, it shall be installed inside ridged PVC conduit installed through the floors and attached to an inside wall, terminated inside a Termination Test Station that is labelled appropriately with a lamacoid indicating which pipe the tracer wire is marking. Each tracer wire test station shall come with grounding in accordance with the manufacturer's requirements, separate from other grounding systems.

.5 Termination Test Station – where tracer wire is terminated on the exterior of structures, provide coloured tamper resistant termination box mounted to interior of wall. Exact locations to be confirmed with the Contractor. Box color shall follow APWA standards for utility identification.

.6 Where tracer wire is extended to the surface at valve boxes, install wiring inside the valve box and extend wire to underside of cap.

.7 There shall be no separate payment for the supply and installation of tracer wire and associated components. Include all costs in the unit price bid for watermain.

2.5 COUPLINGS

.1 Use where identified on the Contract Drawings or required and approved by the Contract Administrator.

.2 Centre sleeves and end rings shall be shop coated.

.3 Furnish with 304-T stainless steel nuts and bolts.

.4 All watermain pipe couplings to be self - restrained type or installed with approved restrainers.

.5 The following are specifications for coupling and unions which may appear on the drawings.

.6 Watermain System Couplings:

.1 Applicable for DI and PVC, 300 mm and less;

.2 Use only where product is designed for use by the manufacturers for use with DI/PVC;

.3 Use only where product is designed for potable water applications with NSF 61 certification; and

.4 Approved Manufacturers and Products - Georg Fisher (Restrained Multi-Joint), or Romac Industries Inc. (Alpha Restrained).

.5 Alternative products upon approval from the Contract Administrator: Victaulic Co. of Canada Ltd. (80 - 300 mm: Style W77 with grade “M” gasket), or Tadco Manufacturing (Straub Metal Grip), or approved alternate.

.7 Flanged Couplings:

.1 Applicable for DI and PVC, 300 mm and less;

.2 Use only where product is designed for use by the manufacturers for use with DI/PVC;

.3 Use only where product is designed for potable water applications with NSF 61 certification; and

.4 Approved Manufacturers and Products: Georg Fisher (Restrained Multi-Joint). Ore, or Romac Industries Inc. (Alpha Restrained).

.5 Alternative products upon approval from the Contract Administrator: Victaulic Co. of Canada Ltd. (No. 341.2 with ductile housing with grade “M” gasket), or approved alternative.

.8 Insulating / Isolating (Dielectric) Couplings:

.1 Applicable for DI and PVC, 300 mm and less.

.2 Use only where product is designed for use by the manufacturers for use with DI/PVC.

.3 Use only where product is designed for potable water applications with NSF 61 certification.

.4 Install with approved joint restraining method.

.5 Approved Manufacturers and Products - Smith Blair Inc. (Model 416), or Robar Industries (Model 1406 complete with insulating boot), or approved alternate.

2.6 GATE VALVES

.1 Gate valves to be resilient seated conforming to the latest revision of AWWA C509, mechanical joint ends, fusion bonded epoxy (FBE) coated and shall be suitable for buried applications.

.2 Open to the left (counterclockwise) and have a standard 50 mm square operating nut with non-rising stem.

.3 Gate valves shall be suitable for potable water systems shall be ULC listed and labelled.

.4 Approved Products: Mueller or approved equal.

2.7 VALVE BOXES

.1 Valve boxes shall be a two-piece sliding box equipped with a bituminous coated cast iron upper sleeve and PVC lower sleeve.

.2 Valve box to be provided with guide plates and removable stone catcher flange.

.3 Valve cover plate shall be insulated below cover.

.4 6 mm predrilled round hole with grommet for tracer wire in lower section.

.5 Valve operating extension spindle shall be 25 mm x 25 mm square c/w 50 mm x 50 mm square valve operating nut at bottom of spindle suitable for the valve installed.

.6 Valve box to extend to 150 mm above grade in installations where there will be no traffic. In traffic areas, valve box shall be installed 150 mm below grade in accordance with the Contract Drawings unless directed otherwise by the Contract Administrator.

.7 The General Contractor shall ensure that the depth of the valve box and spindle corresponds to the depth of the watermain installed. There shall be no additional payment associated with the extra depth of the valve box and spindle if the watermain is not installed in accordance with the Contract Drawings.

.8 Approved Product Bibby Ste Croix or approved equal.

2.8 INSPECTION OF PIPE AND FITTINGS

.1 Pipes and fittings shall be inspected by the Contractor for damage in transit. No defective material shall be delivered to the site. Any material subsequently damaged shall be removed from the site immediately.

2.9 INSULATION SHEETING OVER PIPE

.1 The General Contractor shall place inverted “U” insulation over piping that is installed with less cover than specified on the Contract Drawings and only as directed by the Contract Administrator.

.2 Insulation shall not be placed without authorization from Contract Administrator. Insulation placed without the Contract Administrator’s approval shall not be paid.

.3 Insulation material shall be high density rigid board extruded polystyrene sheeting conforming to the following:

.1 Insulation shall be prepared as an inverted “U” with each insulation sheet having a 50 mm thickness unless noted otherwise on the Contract Drawings.

.2 Vertical ‘side’ insulation boards shall be placed against the sidewalls of the trench and shall be 600 mm high unless noted otherwise on the Contract Drawings. The ‘top’ insulation board shall extend to 150 mm beyond each vertical side sheet and shall be placed directly on top of side sheets.

.3 Insulation boards shall meet CAN/ULC S701.

.4 Acceptable product: “Foamular 400” high density extruded polystyrene rigid (XPS) insulation by Owens Corning Canada or approved alternate.

2.10 CATHODIC PROTECTION

.1 Zinc casting alloy shall conform to the latest edition of ASTM B-418 Type II.

.2 Magnesium casting alloy shall conform to the latest edition of ASTMB 107 Type M-1 or AZ63A alloy Type H1.

.3 Anode castings shall be surrounded with a selected backfill material within a protected outer cover. Backfill material shall have an electrical resistivity less than 50 ohm-cm wet, a compacted density of 1.5 g/cm and Gypsum 77% ± 2%, Bentonite 15% ± 1% and Sodium Sulphate 8% ± 1%.

.4 Packaged anodes to be supplied with #10/7 STR copper cable having TWH insulation. Zinc anodes require the length to be 2.0 m long and magnesium shall be 3.0 m long.

.5 Packaged anodes shall be of the type as manufactured by Duratron Systems Ltd., 120 Melford Drive, Unit #9, Scarborough, Ontario, M1B 2X5, Phone (416) 299-4370, Fax (416) 299-9033 or approved equal.

2.11 VALVES, HYDRANTS AND FITTINGS ON NON-FERROUS WATERMAINS

.1 Fittings include bends, tees, crosses, sleeves, reducers, plugs, caps, joint restrainers and couplings.

.2 One (1) packaged 5.4 kg zinc anode, type DZP-24, is to be installed on every valve, hydrant and fitting smaller than 300 mm dia., connected to a non-ferrous watermain.

.3 One (1) packaged 10.9 kg zinc anode, type DZP-24, is to be installed on every valve, hydrant and fitting equal to or greater than 300 mm dia., connected to a non-ferrous watermain.

.4 Anodes shall be connected to each valve, hydrant, and fitting with a #10/7 STR copper cable having TWH insulation. An area 50 mm x 50 mm of the surface shall be cleaned

and filed to a white metal finish and the end of the copper cable shall be bared of insulation and attached to the prepared metal surface using a thermite weld. All thermite weld connections to be coated with Roybond 747 Primer and Royston "Handy Cap" or approved equal.

2.12 THRUST BLOCKING

.1 Concrete thrust blocking shall be placed against undisturbed ground. Joints and couplings shall remain free from concrete.

.2 Concrete for thrust blocking for fittings and appurtenances shall be in accordance with the details provided on the Contract Drawings and shall have a minimum 28-day compressive strength of 20 MPa.

.3 Straps, tie-rods, angles, nuts and bolts shall be stainless steel conforming to ASTM A276 Type 316 stainless steel.

PART 3 EXECUTION

3.1 FOUNDATION AND BEDDING

.1 Foundation and bedding shall be as shown on the Contract Drawings. Minimum bedding shall consist of 200 mm of Granular A compacted to 100% SPD.

3.2 COVER MATERIAL

.1 Cover material shall be as shown on the Contract Drawings. Minimum cover shall consist of 300 mm of sand compacted to 100% SPD.

3.3 TRENCH

.1 Conditions in the pipe trench shall be such that pipe jointing can be accomplished without getting mud, silt, or other foreign material into the joint. In general, this means that the trench shall be adequately dewatered with a firm bottom free of mud.

3.4 ALIGNMENT AND GRADE

.1 The watermains shall be laid to the alignment and grade shown on the drawings.

.2 Care shall be taken to align the pipe properly before joints are forced home. During insertion of the tongue or spigot the pipe shall be partially supported by a hand sling or crane as required to maintain lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Once the joint has been made, deflection of the joint shall be held to an absolute minimum.

.3 The Contractor shall carry out explorations where necessary to establish or discover the location of existing pipe, conduits, or other buried objects.

3.5 LOWERING AND LAYING

.1 Pipe and fittings shall be carefully lowered into the trench with proper appliances. Before lowering and while suspended, the pipe shall be inspected for defects.

.2 Foreign matter shall be removed from the inside of the pipe and fittings. The trench shall be kept dry and free from water, no pipe being laid in water except by permission of the Engineer. No water shall be allowed to run through installation during construction. No

pipe shall be laid until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.

.3 Installation shall be kept thoroughly clean throughout and during the progress of the work and until the completion and final acceptance thereof. They shall be left clean on the completion of the work.

3.6 PULL-UP PRESSURE

.1 Sufficient pressure shall be applied in making the joint to assure that the joint is "home" as defined in the Standard Installation Instructions provided by the pipe manufacturer. Sufficient restraint shall be applied to the line to assure that joints, once "home" are held so by tamping fill material under and alongside the pipe, or otherwise. At the end of a day's work the last pipe shall be blocked in such a manner as may be required to prevent creep during "down time".

3.7 MANUFACTURER'S INSTRUCTIONS

.1 Pipe and fittings shall be installed strictly in accordance with the manufacturer's instructions. A copy of the manufacturer's manual of instructions shall be kept on the job site.

3.8 BEDDING AND ENCASEMENT

.1 Pipes shall be laid to conform to their respective bedding or encasement as detailed on the Contract Drawings.

.2 The depth of trench excavations shall be sufficient to allow for the bedding required below the pipe bottom.

.3 The Contractor shall excavate for and provide at least 150 mm of approved and compacted granular material in the trench to support the pipe as described above, including the requirements shown on the Contract Drawings.

.4 Selected material from the excavations, as allowed by the Engineer, shall then be carefully consolidated over the pipe and backfilling shall proceed as described under excavation.

3.9 JOINTING WATERMAIN

.1 Where a concrete cradle or surround is to be provided, the trench bottom shall be carefully trimmed to receive it and the pipe shall be supported upon bricks or concrete blocks and hardwood wedges and securely retained at the requisite line and level. After jointing of the pipes, the surround or cradle shall be poured and worked around and under the pipe to fully support the pipe.

.2 Installation of push-on joint watermain pipe and mechanical joint fittings shall conform strictly to the manufacturer's instructions.

3.10 VALVES AND FITTINGS

.1 Valves and boxes shall be installed plumb at the locations and in the manner shown on the drawings.

.2 Bends, crosses, tees and other fittings shall be installed where shown and shall be anchored and supported by concrete thrust blocks.

3.11 CONNECTING TO EXISTING MAINS

.1 The Contractor shall locate and make connections to existing watermains as shown on the drawings, and shall maintain a satisfactory service at all times. The Contractor shall submit a program for this work, which shall be approved by the Engineer before the work commences.

3.12 INTERSECTING TRENCHES

.1 Where sewer or watermain trenches intersect, the trench of the lower pipe shall be backfilled with suitable granular material to the grade of the lower trench from wall to wall and shall be of a length along the trench not less than 600 mm greater than the nominal diameter of the higher pipe.

3.13 WATERMAIN LOCATION TOLERANCES

.1 No watermain joint shall be deflected more than the maximum permitted by the manufacturer.

.2 On straight lengths, no lateral deviation in excess of 150 mm will be tolerated and on straight grades no grade deviation in excess of 75 mm will be tolerated. The Engineer may require that lesser deviations be observed.

.3 The Contractor shall supply all fittings to complete the installation to the lines and grades shown on the Drawings. Where vertical or horizontal curves are shown, the pipe line shall not deviate more than 300 mm from the line, nor more than 75 mm from grade.

3.14 TESTING GENERAL

.1 The Contractor shall test all watermains, pipework and pipelines in accordance with OPSS No. 441 in such lengths or sections as the Engineer shall direct, and provide all labour, water, pumps, gauges, caps, stoppers, air release cocks, pipework and other apparatus required to complete the tests.

.2 The Contractor shall supply the Engineer with the pressure gauges intended to be used prior to the first test in order that they may be checked for accuracy. All equipment used by the Contractor in carrying out the testing shall be approved by the Engineer.

3.15 TEST IN SECTIONS

.1 The Contractor shall test the pipe in sections, the length of which shall be determined by the Engineer. Under no circumstances will the test length be permitted to exceed one kilometre.

.2 Pipe crossings under railway track, provisional roads, private rights-of-way, etc. shall be tested separately unless the Contractor receives written instructions from the Engineer to the contrary.

3.16 BLOCKING AND BLANKING

.1 As soon as the Contractor has been notified by the Engineer to test a section of the pipeline, the Contractor shall check that all relevant open ends formed by tees, crosses, etc., are blanked off and that all bends, etc. are adequately blocked to safely withstand the pressure developed under the pressure test, and in a manner satisfactory to the Engineer.

3.17 FITTING AND AIR RELEASE TAPS

.1 The section of the pipeline to be tested shall be slowly filled with water obtained by the Contractor at his own expense from a source approved by the Engineer. The pipeline shall remain filled for not less than 24 hours prior to the pressure test. The Contractor shall ensure that all the air has been removed from the section of the pipeline and shall install air release taps at all high points to accomplish this before the test pressure is applied.

3.18 TEMPORARY CONNECTION, TESTING AND DISINFECTION OF WATERMAIN

.1 For the lump sum price bid, the Contractor shall supply all labour, equipment and materials for the temporary connection, swabbing, hydrostatic testing, disinfection, dechlorination, flushing and final connection of watermains and services in accordance with this specification, OPSS No. 441 for hydrostatic testing, and the latest edition of AWWA C651 for disinfection and connection to the existing water distribution system. The specifications listed in this section represent minimum requirements. Additional requirements of the Municipality, if any, shall also apply and are deemed to be included in the lump sum price for this item.

.1 Temporary Connection:

.1 The temporary overland watermain shall be isolated from the existing water distribution system using a physical separation until satisfactory bacteriological testing has been completed and accepted by the Contract Administrator and the Municipality. Water required to charge the new main shall be supplied through a temporary connection between the existing water system and the temporary overland main. The temporary connection shall incorporate an appropriate cross-connection control device (e.g. a reduced pressure zone backflow preventer per CAN/CSA-B64.10). The cross-connection control device shall be disconnected (physically separated) from the new temporary overland main during hydrostatic testing and reconnected afterwards. Refer to the attached detail drawing entitled A Typical Temporary Connection for Watermains for limits of payment to be included in the lump sum price for this item and additional details.

.2 Swabbing and Preliminary Flushing:

.1 The temporary overland watermain shall be cleaned with a minimum of two clean new swabs. Additional swabbing is required at the Contractor’s expense if the water is not clear after the second swab has passed through the watermain. Swab length shall be 1.5 x swab diameter. Swab diameter shall be 50 mm greater than the inside diameter of the watermain. Swab density to be 1.5 lb/board ft. (high memory foam). Supply, installation and subsequent removal of temporary swab retrieval stubs/ports and all associated costs shall be included in the lump sum price for this item.

.2 The flow rate for swabbing/flushing should be sufficient to maintain the velocity in the main of 0.76m/s to 0.91 m/s to keep particles in suspension. Preliminary flushing of the main shall immediately follow the swabbing operation.

.3 Hydrostatic Leakage Test:

.1 Hydrostatic leakage testing shall be undertaken in accordance with OPSS 441.07.24 under the supervision of the Contract Administrator. Prior to commencing the hydrostatic test, the Contractor shall operate all line valves for the Contract Administrator and verify that they are in the open position. The

criteria for hydrostatic testing in this section pertain to all pipe materials, except polyethylene. Refer to OPSS 441.07.24.02 for polyethylene pipe testing criteria.

.2 The test pressure shall be 1035 kPa, which shall be maintained continuously for the duration of the two hour test. If necessary, additional water shall be added to the test section during the two hour test in order to maintain the test pressure (i.e. the pressure should not be allowed to drop significantly throughout the two hour test with all of the make-up water added at the end of the test).

.3 The allowable leakage is 0.082 litres per millimetre of pipe diameter per kilometre of watermain for the two hour test period.

.4 Disinfection:

.1 Watermains and services shall be disinfected in accordance with the latest editions of AWWA C651and C653. The entire main shall be filled with heavily chlorinated water. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenance. At the end of the 24 hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L of free chlorine. If the chlorine residual is less than 10 mg/L of free chlorine in any portion of the test section, the disinfection procedure shall be repeated.

.5 Final Flushing and Dechlorination

.1 After the requirements of the disinfection section have been met, heavily chlorinated water shall be completely flushed from the watermain and all branches until chlorine levels in the watermain are no higher than levels generally prevailing in the distribution system.

.2 The environment to which the chlorinated water is to be discharged shall be inspected. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to thoroughly neutralize the residual chlorine.

.3 The discharge of chlorinated water directly to receiving waters can be detrimental to aquatic life and therefore, should not be considered as an option. A storm sewer should be considered directly connected with the receiving water, which eliminates it as an option in most cases. Discharge to an open ditch or a vegetated field are good alternatives, especially if the point of discharge is a considerable distance from the receiving water and the ditch is unlined, heavily vegetated and overrun with organic materials. Sunshine and high temperatures aid in dissipation of the chlorine. Slow discharge to a sanitary sewer, if approved by the Operating Authority, may be an option. In order to avoid upsetting the biological processes at the wastewater treatment facility, the distance between the point of discharge and the treatment facility must be taken into account along with the rate of discharge in order to sufficiently dilute the chlorinated water before it reaches the facility.

.4 If dechlorination is necessary, there are several chemicals, which can be used effectively. Adequate dosage of the chemical and mixing with the chlorinated water must be ensured. The amount of dechlorination chemical required can be determined from the following equation:

Excess Chlorine Residual x Factor = Dechlorination Chemical Required

.5 This can be calculated in mg/L or whichever unit is appropriate.

.6 Five examples of dechlorination chemicals are listed below:

.1 Hydrogen Peroxide (Factor = 0.479); This may be the best option when discharging to an environmentally sensitive receiving water. It is inexpensive and an overdose will only add more oxygen to the watercourse.
.2 Sulphur Dioxide (Factor = 0.901); This chemical is inexpensive but it will slightly lower the pH in the receiving water.
.3 Sodium Thiosulphate (Factor = 2.225); This will cause some sulphur turbidity but an excess is essentially harmless.
.4 Sodium Sulphite (Factor = 1.775); Excess will lower the dissolved oxygen in the receiving water.
.5 Sodium Pyrosulphate (Sodium Metabisulphite) (Factor = 1.338); Excess will lower the dissolved oxygen in the receiving water.

.7 For example, a total chlorine residual of 20 mg/L measured in a disinfected watermain of 11,000 L could be neutralized with hydrogen peroxide. The dosage required would be:

20 mg/L x 0.479 = 9.6 mg/L

and the total amount needed would be

9/.6 mg/L x 11,000 L = 105,600 mg = 105.6 gm of H202

This would represent in terms of 35% commercial grade hydrogen peroxide (specific gravity 1.13 g/ml):

$$\frac{105.6 \times 100 \times 1}{35 \quad 1.13} = 267 \text{ mL of concentrate}$$

.8 The above information is offered as a guide only. The contractor is ultimately responsible to ensure that no negative environmental impact results from the disposal of chlorinated or dechlorinated water from the disinfection process.

.6 Sampling and Bacteriological Testing

.1 Under the lump sum price bid, the Contractor shall provide sufficient blow offs/sampling ports (including their eventual removal) to accommodate the sampling requirements detailed herein. After the requirements of previous sections have been met, two consecutive sets of water samples, taken at least 24 hours apart, shall be collected at the ends of all branches, stubs and not more than 350 m apart along the length of the watermain. In addition, it is recommended that the existing distribution system be sampled for testing as well. The watermain shall not be flushed or disturbed during the minimum 24 hour period between sets of samples. Samples shall be taken by municipal staff (Dufferin Water) using bottles provided by a provincially accredited laboratory.

.2 Bacteriological Testing Criteria:

Item	Microbiological Parameter	Standard (expressed as a maximum)
1	Escherichia coli (E.coli)	Not detectable
2	Fecal coliforms	Not detectable
3	Total coliforms	Not detectable
4	General bacteria population expressed as background colony counts on the total coliform membrane filter	200 colony forming units (CFU) per 100 millilitres
5	General bacteria population expressed as colony counts on a heterotrophic plate count	500 colony forming units (CFU) per 100 millilitres

.3 All samples from both sets of samples shall meet the above bacteriological testing criteria before the Municipality will grant approval for connection of the new watermain to the active distribution system.

.7 Final Connection/Commissioning

.1 The Contractor will be allowed to make the final connection(s) between the temporary overland watermain and the existing distribution system once the Municipality has granted its approval. The removal of the temporary connection apparatus and the installation of the final connection piping must be witnessed by the Contract Administrator.

.2 All piping and appurtenances utilized in completing the final connection must be thoroughly disinfected with a 1 percent sodium hypochlorite solution (or equivalent).

.3 The excavation must be maintained in a dry state to eliminate the possibility of trench water entering the watermain when the final connection is being made. The Contractor shall ensure that no foreign material whatsoever enters the watermain at this time. Should trench water or foreign material enter the watermain, the entire disinfection/sampling procedure shall be repeated at the Contractor's expense.

3.19 TRACER WIRE

.1 The Contractor shall conduct and produce a Tracer Wire Certification that the entire tracer wire system is installed and functioning properly.

3.20 PAYMENT FOR TESTING

.1 In addition to the regular 10% holdback, a further 10% holdback for piping items shall be retained until all watermain and service systems have been successfully tested.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This Section specifies the requirements for the supply and installation of 1.8 m high galvanized chain link fencing, and double swing gate including foundation requirements.

.2 Erection and maintenance of temporary security fencing around work site and materials storage areas.

.3 Fire routes.

1.2 REFERENCES

.1 OPSD 900.01 Chain Link Fence.

.2 OPSD 900.03 Chain Link Fence Gates.

.3 ASTM A53-90b, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.4 ASTM A90-81 (1991), Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.

.5 ASTM A121-86, Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

.6 ASTM A525M-91b, Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process.

.7 CAN/CSA-A23.1-M90, Concrete Materials and Methods of Concrete Construction.

.8 CAN/CSA-G164-M92, Hot Dip Galvanized of Irregularly Shaped Articles.

.9 CAN/CGSB-138.2-M80, Fence, Chain Link, Framework, Zinc-Coated, Steel.

.10 CAN/CGSB-138.3-M80, Fence, Chain Link – Installation.

.11 CAN/CGSB-138.4-M82, Fence, Chain Link, Gates.

.12 CAN/CGSB-1.181-92, Ready-Mixed Organic Zinc-Rich Coating.

1.3 RELATED SECTIONS

.1 The General Contractor is responsible for review of all Contract Documents for related sections.

1.4 SUBMITTALS

.1 Provide the following product data and shop drawings in accordance with Section 01340 – Submittals

.2 This information is considered a Category 1 Submittal.

.3 Submit shop drawings/product data for:

.1 Chainlink fence and gate, including foundation, layout, dimensions, in accordance with Engineer's instructions.

1.5 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.6 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.7 PROTECTION FOR OFF SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work and be responsible for damage incurred.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Concrete Mixes and Materials

.1 Sulphate resistant Portland cement;

.2 Nominal coarse aggregate size: 20-5.

.3 Compressive strength: 20 MPa minimum at 28 days.

.4 Air entrainment shall be 6% $\pm$ 1.5%.

.2 Permanent Chain-Link Fence and Gates:

.1 To OPSS.MUNI 772, Construction Specification for Chain-Link Fence;

.2 To OPSS.MUNI 1541, Material Specification for Chain-Link Fence Components;

.3 Fence fabric shall be Type 1, Class A, Heavy, Grade 3;

.4 All fence components shall be hot-dip galvanized; and

.5 All fence components including posts and gates shall be heavy duty grade.

.6 Gate frames: to ASTM A53, galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing.

.7 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.

.8 Fasten fence fabric to gate with twisted selvage at top.

.9 Furnish double gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.

.10 Furnish double gate with centre rest with drop bolt for closed position.

.3 Temporary Fencing

.1 Contractor shall fence site with 1.8 m high chainlink construction fence and gates as required prior to the start of site works. Gates shall be locked when Contractor is not on site.

.2 Temporary site fencing shall be heavy duty chainlink fence on tubular steel frame panels.

.3 Acceptable Product: Fast Fence Inc., or approved alternate.

PART 3 EXECUTION

3.1 GRADING

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

3.2 ERECTION OF PERMANENT FENCE

.1 Erect fence along lines as directed by Engineer and in accordance with CAN/CGSB-138.3

.2 Excavate post holes to dimensions indicated by methods approved by Engineer. Place smooth-wall prefabricated cylindrical form within each post hole prior to post foundation construction. Prefabricated cylindrical form to fit snugly within post hole. Fill annular space between post hole and form with granular material as required.

.3 Space line posts 3.0 m apart, measured parallel to ground surface.

.4 Space straining posts at equal intervals not exceeding 100 mm if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade is greater than 150 m.

.5 Install additional straining posts at sharp changes in grade.

.6 Install corner post where change in alignment exceeds 10 degrees.

.7 Install end posts at end of fence and at buildings. Install gate posts on both sides of gate openings.

.8 Install brace between end and gate posts and nearest line post. Install braces on both sides of corner and straining posts in similar manner.

.9 Place galvanized metal fence post in hole prior to placement of concrete. Extend concrete 25 mm above ground level and slope to drain away from posts. Brace posts in plumb position and true alignment and elevation until concrete has set.

.10 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

.11 Install bottom tension wire, strength tightly and fasten securely to end, corner, gate and straining pots with turnbuckles and tension bar bands.

.12 Layout fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals. Knuckled selvedge at bottom. Twisted selvedge at top.

.13 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals. Give tie wires minimum two twists.

3.3 INSTALLATION OF GATE

.1 Install gates in location as directed by Engineer.

.2 Level ground between gate posts and set gate bottom approximately 50 mm above ground surface.

.3 Determine position of centre gate rest for double gate. Cast gate rest in concrete as directed. Dome concrete above ground level to shed water.

.4 Install gate stops where directed by Engineer.

3.4 TOUCH-UP

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas in accordance with manufacturer's recommendations. Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

3.5 CLEANING

.1 Clean and trim areas disturbed by operations. Dispose of surplus material off-site.

3.6 TEMPORARY FENCING

.1 Fence shall be installed as per Contract Drawings prior to commencement of site works.

.2 Fence shall be maintained in good order throughout construction period.

.3 All fencing components shall be removed upon completion of construction.

END OF SECTION

GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International):

.1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A23.3-04, Design of Concrete Structures.

.3 CSA A283-00 (R2003), Qualification Code for Concrete Testing Laboratories.

.4 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.6 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.

.2 American Society for Testing and Materials International (ASTM):

.1 ASTM C260-01, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-07, Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-05, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C1017/C1017M-03, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.3 Ontario Provincial Standard Specification (OPSS):

.1 OPSS.MUNI 1350, Nov. 2014, Material Specification for Concrete - Materials and Production.

.2 OPSS.MUNI 904, Nov. 2012, Construction Specifications for Concrete Structures.

1.2 CONCRETE MIX DESIGN REQUIREMENTS

.1 In accordance with CSA A23.1, Table 5, Alternative 1 – Performance, and as described in “3.3 Mix Design” of Part 3 – EXECUTION.

1.3 SUBMITTALS

.1 All submittals required under this section shall be in accordance with Section 01340 - Submittals. These submittals shall be considered Category 1 submittals.

.2 Mix Designs:

.1 Promptly after award of the Contract and before any concrete work is commenced, the Contractor shall submit to the Engineer for review the proposed concrete design mixes.

.2 Submit mix designs to the Consultant on the most current OPSF 1350-1 Concrete Mix Design Submission Form. The form shall be signed by the Contractor and the Ready Mixed Concrete Supplier.

.3 When the Owner so requests, the Owner and the Concrete Supplier shall execute a confidentiality agreement to cover the protection of proprietary mix proportion information that is to be released as part of form OPSF 1350-2. Upon execution of the agreement and following Consultant's satisfactory review of the mix designs presented on OPSF 1350-1, the Contractor shall ensure that the concrete supplier submits to the Owner a confidential concrete mix design for the Contract, on the OPSF 1350-2 form.

.4 Each mix design shall have an individual mix code and shall indicate the intended application/element or location of the concrete.

.5 All portions of the Mix Design Submission Form shall be completed, including all applicable parts of the "Specification" section and the "Contractors Requirements" section. The source and type of all the materials used in each mix design shall be provided.

.6 Submit test results indicating proposed cements, blended hydraulic cements and aggregates do not present the potential for alkali-aggregate reactivity, as determined in accordance with CSA A23.2-27A.

.7 Submit with OPSF 1350-1, batch test results not more than 12 months old, from the plant supplying ready mixed concrete for the project, for each class of concrete as part of the mix design submission. Concrete supplier shall certify that the sample batches utilized the same materials and sources as given in the mix design submission. Batch test reports shall be provided for all of the properties required by the specific mix design, including but not limited to chloride ion penetrability, and low-shrinkage concrete where these properties are specified by CSA A23.1 or the Contract documents.

1.4 QUALITY ASSURANCE

.1 Ready Mixed Concrete Supplier's plant supplying this project shall meet the certification requirements of the RMCAO, and the Concrete Supplier shall provide evidence of certification to the Consultant at the time of Mix Design Submission.

.2 The Contractor and the Concrete Supplier, through the Contractor, shall produce and submit to the Consultant, written Quality Control Plans. The Quality Control Plans shall be coordinated between the Contractor and the Concrete Supplier to address the transfer of custody of the concrete in its plastic state.

.3 Quality Control Plans shall describe the procedures for correcting any deficiencies identified in the air content or slump of the plastic concrete when sampled by either the Contractor or the Owner's Concrete Testing Agency.

.4 Quality Control Plans shall describe the procedures for correcting any deficiencies identified in the compressive strength, chloride ion penetrability, or shrinkage of the hardened concrete when tested by either the Contractor or the Owner's Concrete Testing Agency.

.5 The Owner's Independent Inspection and Testing program will not augment or replace Contractor quality control, nor relieve the Contractor of their contractual responsibility.

.6 The Contractor shall provide to the Consultant and Owner reports of any concrete testing undertaken by the Contractor or Concrete Supplier, in accordance with the same requirements that apply to the Owner's Concrete Testing Agency.

.7 The Contractor shall keep a copy of reference standards CSA A23.1-09/A23.2-09 and OPSS.MUNI 904, Nov. 2012 on site, and available for reference by both the Contractor and Contract Administrator.

1.5 INDEPENDENT INSPECTION AND TESTING

.1 The Owner will appoint and pay for an independent Concrete Testing Agency certified under CSA A283 to sample and test the concrete.

.2 Concrete sampling and testing will be undertaken in accordance with CSA A23.1/A23.2. Reports will be distributed to the Owner, Consultant and Contractor.

.3 Contractor shall provide Concrete Testing Agency with unlimited access, and all concrete necessary to undertake the testing outlined in this item.

.4 Air content of the plastic concrete shall be measured for every load or batch, for each class of concrete cast on any one day, starting with the first load or batch and continuing until satisfactory control of the air content is established, and fewer tests are required by the Owner.

.5 An air content determination shall be made with every strength test.

.6 Slump or slump flow tests shall be made with every strength test, and every third air test.

.7 Not less than one compressive strength test shall be made for each 75 cu. m. of each class of concrete cast on any one day. Each compressive strength test shall consist of three cylinders. One cylinder will be tested at seven days, and two at the number of days at which the design compressive strength is specified. For concrete cast under cold weather conditions, cast one additional cylinder which shall be field cured adjacent to the work for seven days, before testing.

.8 For all CSA A23.1 Exposure Class A-1/C-1, one chloride ion penetrability test shall be undertaken with every second strength test until satisfactory control of the chloride ion penetrability is established, and fewer tests are required by the Owner. Testing shall be in accordance with ASTM C 1202.

.9 Shrinkage testing of concrete specified to meet CSA A23.1, 8.8, Low-shrinkage Concrete, shall be performed in conformance with ASTM C 157 if required by the Owner.

.10 Where the Contractor requests compressive strength results at other than standard durations, the Owner will deduct the cost of the additional testing from the value of the Contract.

.11 When requested by the Engineer, monitor thermocouples provided and installed in concrete by Contractor, in accordance with OPSS.MUNI 904.07.02.

.12 Inspection or testing by Engineer will not augment or replace Contractor quality control nor relieve them of their contractual responsibility.

PART 2 PRODUCTS

2.1 CEMENT

.1 Portland cements and blended hydraulic cements shall conform to the requirements of CSA A3001.

.2 Supplementary Cementing Materials shall conform to the requirements of CSA A3001.

.3 Portland cements, blended hydraulic cements, and supplementary cementing materials shall be listed on the Ministry of Transportation of Ontario (MTO) Designated Sources List.

2.2 AGGREGATES

.1 Normal density fine and coarse aggregates shall meet the requirements of CSA A23.1 for general characteristics, grading, limits of deleterious substances, cement- aggregate re-activity, soundness and organic impurities.

2.3 WATER FOR CONCRETE

.1 Water for use in concrete shall meet the requirements of CSA A23.1 and shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, sediment or any other deleterious substances.

.2 Water for use in concrete shall be obtained from a municipal water supply unless an alternative source is requested by the Contractor and accepted by the Consultant.

.3 Where the acceptance of a water supply other than a municipal supply is requested by the Contractor, test results indicating compliance with CSA A23.1 shall be submitted with the request.

2.4 ADMIXTURES

.1 Air entraining admixtures shall conform to the requirements of ASTM C260.

.2 Chemical admixtures shall conform to the requirements of ASTM C494 or ASTM C1017.

.3 All admixtures shall be compatible with each other and with other concrete materials and shall be used according to the manufacturer's recommendations.

.4 Air entraining and chemical admixtures shall be listed on the MTO Designated Sources List. Any other materials proposed as admixtures for use in Portland cement concrete, may only be used upon the written authority of the Engineer.

2.5 CURING COMPOUND

.1 Curing compound shall be white pigmented Type 2 Class B curing compound complying with ASTM C 309.

.2 Curing compound shall be listed on the MTO Designated Sources List.

.3 Where proposed for use on any part of a structure containing potable water, the curing compound shall be NSF-61 certified.

.4 Curing compound may only be used to comply with CSA A23.1 Table 20, type 1 or type 2 curing regimes. Curing compounds are not acceptable for use where a type 3 curing regime is specified.

.5 The Contractor shall ensure that any curing or curing and sealing compound used is compatible with all other applied sealers, hardeners, finishes, waterproofing/dampproofing, etc.

.6 The Contractor shall submit the manufacturer's technical information for the selected product together with proof of compatibility, for review by the Engineer, a minimum of seven days before its proposed use.

2.6 WATERSTOPS

.1 Provide waterstops at all joints in all process tank or liquid retaining structures, all below grade joints within basement areas, and elsewhere as shown on the drawings. Waterstops shall be capable of resisting minimum head pressure of 170 kPa. The Contractor shall arrange for the supplier's inspector to make one inspection trip on the first day of application. Waterstops shall be of the following types:

.1 Type 1: Hydrophylic rubber, NSF-61 certified, acceptable product: Adeka Ultra Seal MC-2010MN supplied by Form & Build Supply. Installation shall be in strict accordance with the manufacturer’s requirements.

.2 Type 2: Hydrophylic rubber, acceptable product: Adeka Ultra Seal KBA-1510FP, supplied by Form & Build Supply. Install in construction joints in slabs or walls less than 300 mm thick or with only one curtain of reinforcing steel. Type 2 waterstop shall not be used in joints in concrete which could be in contact with potable water. Installation shall be in strict accordance with the manufacturer’s requirements.

2.7 DOWEL ADHESIVE

.1 Dowel adhesive shall be a hybrid adhesive consisting of methacrylate resin, hardener, cement and water, or a two component epoxy adhesive.

.2 Dowel adhesive shall be listed on the MTO Designated Sources List.

.3 Where dowel adhesive is used to anchor dowels in a potable water containing structure, the adhesive shall be NSF-61 certified.

.4 Manufacturer of dowel adhesive shall provide full engineering support, including field assistance and troubleshooting, and anchor pull-out testing.

.5 Manufacturer of dowel adhesive shall have an “Accredited Installer Program.” Only accredited installers to install adhesive anchors.

.6 Acceptable systems: HIT-HY 200, HIT-ICE/HIT-HY 150, HIT-HY 150 MAX or HIT-RE 500, by Hilti (Canada) Corp.

2.8 CAST IN ABRASIVE STAIR NOSING

.1 Stair nosings shall be type No. FA411D as manufactured by American Safety Tread Company, or Engineer accepted alternative.

.2 Colour shall be safety yellow.

.3 The base shall be heat treated extruded aluminum alloy 6063-T6. The abrasive filler shall consist of a mixture of aluminum oxide and silicon carbide granules in an epoxy matrix locked into the extruded channels of the base. The abrasive ribs shall project a minimum of 1.5 mm above the extruded channels. Nosings shall terminate not more than 50 mm from ends of steps for poured concrete stairs. Aluminum in contact with concrete shall be protected with a minimum of two coats of heavy duty bituminous paint.

.4 Submit shop drawings, and a 1.2 m long sample to the Engineer for review.

PART 3 EXECUTION

3.1 STORING MATERIALS

.1 All materials to be used in connection with concrete work shall be stored in a manner that will prevent contamination or deterioration. Any material that has deteriorated or that has been contaminated shall not be used in connection with concrete work and shall be removed from the site.

3.2 SAMPLES

.1 The Contractor shall submit to the Engineer for approval, before any concrete work is commenced, the intended source of Portland Cement, Blended Hydraulic Cement, supplementary cementing materials and aggregates. The Contractor shall also supply on request samples of the above together with gradation charts for the aggregates prepared by an independent testing laboratory. The Engineer and their assistants shall be afforded full facilities for the inspection of the aggregates both at the site and at the source of supply wherever this may be situated.

.2 The Contractor shall provide certification by a qualified independent inspection and testing agency that plant equipment and materials to be used in concrete comply with requirements of CSA A23.1.

3.3 MIX DESIGN

.1 Promptly after award of the Contract and before any concrete work is commenced, the Contractor shall submit to the Engineer for approval the proposed concrete design mix.

.2 Provide certification by a qualified independent inspection and testing agency that mix proportions selected will produce concrete of specified quality and yield and the strength will comply with CSA A23.1 and that mix design is adjusted to prevent alkali aggregate reactivity problems.

.3 Concrete shall comply with CSA A23.1 and allow for the supplier's standard deviation as specified therein. A value of at least 4 MPa shall be used if the concrete suppliers has not established Standard Deviation for concretes of specified strength.

.4 The strength level of concrete will be considered satisfactory if averages of all sets of three consecutive strength tests for each mix design are at least equal to specified strength and no individual strength test is more than 3.5 MPa below specified strength.

.5 The use of calcium chloride in concrete shall not be permitted.

.6 Concrete may be produced with high volume supplementary cementing materials (HVSCM) in accordance with CSA A23.1, Article 8.8. When used, HVSCM shall be type 2, unless the Concrete Supplier requires use of type 1 to comply with the mix design criterion set out below, and the use of HVSCM type 1 is accepted by the Consultant. The Concrete Supplier shall furnish to the Consultant for review and acceptance, a written report outlining the reasons that the use of HVSCM type 1 is required.

.7 Any use of HVSCM shall be in accordance with the recommendations of CSA A23.1, Annex K. The Contractor shall undertake project specific batch testing of mix designs, prepare a proposed Curing Plan, and propose and pay for additional concrete quality control testing by the Concrete Testing Agency. The Contractor shall submit the

proposed Curing Plan and additional quality control testing requirements for Consultant's review and acceptance.

.8 The concrete mix design shall be as shown on the drawings.

3.4 READY MIXED CONCRETE

.1 The Contractor shall be deemed fully responsible for ensuring that ready mixed concrete complies with these Specifications.

.2 Ready mixed concrete shall be mixed and transported in accordance with CSA A23.1.

.3 Water shall not be added after the initial introduction of mixing water to the batch except in strict accordance with CSA A23.1. Water shall only be added when the measured slump is less than specified, and only on the instruction of the concrete supplier, who shall retain full responsibility for the quality of the concrete. In no case shall water be added more than 60 minutes after the batching of the concrete.

.4 The drum of the mixer shall be rotated at the site for a minimum of two minutes before the concrete is discharged.

.5 Ready mixed concrete, irrespective of the type of operation or the distance involved, shall not be hauled for more than 45 minutes from the time of leaving the batch plant to the time of delivery at the site.

3.5 JOINTS

.1 Construction joints shall be formed only in the locations shown on the Drawings. The locations and details of construction joints not indicated on the Drawings shall be subject to the approval of the Engineer.

.2 Construction joints shall be located and designed so as to least impair the strength and appearance of the structure.

.3 Reinforcement, where applicable, shall continue through the joint in its normal position.

.4 The Contractor shall form construction joints when the time between ceasing and restarting concreting exceeds one hour.

.5 Laitance formed on the concrete by the cement in setting shall be removed by means of a wire brush or water under pressure before the surface has become too hard for this to be carried out successfully.

.6 Before fresh concrete is placed against any concrete which has already set, the face of the set concrete shall be roughened to a minimum of five millimetres amplitude with a cutting tool to expose the aggregate. The surface thus exposed shall be thoroughly cleansed of all foreign matter.

.7 Joints shall be made at the positions indicated on Drawings unless other instructions are given and such joints shall be formed with vertical faces unless detailed otherwise on the drawings. The concreting of slabs and beams shall be carried out simultaneously where directed.

.8 Joints and joint recesses shall be truly horizontal and vertical and positioned to the approval of the Engineer and shall be formed in both horizontal and vertical surfaces.

.9 Where construction joints are planned or permitted by the Engineer in watertight concrete construction a water stop of a type, size and material approved by the Engineer shall be carefully installed. Where water stops cross or lap they shall be carefully spliced to ensure that a continuous watertight diaphragm is formed.

.10 Joint fillers and waterstops shall be placed where required by the Drawings and Specifications. They shall be rigidly supported before any concrete is placed so that their final position in the hardened concrete is true to line and grade and as shown on the Drawings.

3.6 CONVEYING AND PLACING CONCRETE

.1 Placing of concrete shall be in accordance with CSA A23.1.

.2 All water, snow, ice, loose soil, laitan curing compound, wood and other debris shall be removed from surfaces on which concrete is to be placed.

.3 The Engineer shall be notified at least 24 hours in advance of the proposed time of commencement of concreting.

.4 All concrete placing methods shall be subject to the approval of the Engineer.

.5 To prevent damage to fresh concrete during placing, suitable measures shall be taken to protect the plastic concrete.

.6 Concrete placing shall not be started until the Engineer has inspected and approved all preparation including forms, foundations, reinforcing steel, construction joints, and all mixing, conveying, spreading, compacting, finishing, curing and protection equipment.

.7 Concrete shall be conveyed from the mixer to the point of deposit as rapidly as practicable, using means and equipment which will prevent segregation or loss of materials. The Contractor shall not place concrete in the work later than 20 minutes after it leaves the drum of the mixer.

.8 No concrete shall be used after it has developed an initial set and any batch or part of a batch which has commenced to sit before being used shall be rejected.

.9 Equipment for conveying concrete such as buckets, cars and trucks, belt conveyors, and pumps shall be of such design, size and condition to ensure as continuous a supply of concrete as practicable to the point of delivery, without segregation.

.10 Should the cement mortar become separated from the aggregates for any reason, or the fine from the coarse aggregate, the concrete shall be discarded.

.11 Do not exceed 1.5 m for the free vertical drop of concrete.

.12 Conveying equipment, if supported by formwork, shall not impart harmful vibration to the green concrete nor cause misalignment of forms.

.13 The conveying equipment shall be kept free from hardened concrete and foreign material and shall be cleaned at frequent intervals. Wash water shall not be permitted to enter the forms to avoid premature swelling of the waterstop. Wash water shall not be permitted to be in contact with fresh concrete.

.14 Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. The placing of concrete shall be carried on at

such a rate that concrete is at all times plastic and flows readily into the spaces between the bars. No concrete that has been contaminated by foreign material shall be used, nor shall retampered concrete be used unless approved by the Engineer.

.15 When the placing is started, it shall be carried on as a continuous operation until the panel or section is completed. When construction joints are necessary, they shall be made as hereinbefore specified.

.16 All concrete shall be thoroughly consolidated by vibration or suitable means during placement. It shall be thoroughly worked around reinforcement and embedded fixtures and into the corners of the forms. The greatest care shall be taken to prevent any displacement or bending of the bars, ties, links, or stirrups and other members of the reinforcement.

.17 A sufficient number of vibrator machines shall be provided and shall be kept constantly moving inside the formwork to effect maximum compaction and to avoid segregation of the concrete materials. Under no circumstances shall the vibrators be employed to move the concrete horizontally in the forms. Each vibrator shall be attended by one workman who shall have no other duty to perform while concreting is in progress.

.18 The final surfaces of concrete slabs and walls and other flat work where exposed shall be given a float finish and left with a smooth, dense face free from defects and blemishes.

.19 Where concrete is deposited against formwork the fine part shall be worked to the front to leave a hard smooth face in the work.

.20 Beams and girders, column capitals and haunches shall be placed monolithically without horizontal joints in their depths unless specifically indicated otherwise on the Drawings.

.21 The length of wall that shall be poured in one operation shall not exceed ten metres (unless approved by the Engineer or shown otherwise on the structural drawings) and no fresh concrete shall be poured against other concrete for seven days thereafter.

.22 In arranging the formwork the contractor shall allow for the above and for all necessary stop ends and for reforming the faces of the wall as necessary, to close the construction gaps.

.23 Floors slabs on grade may be laid in approved checkerboard fashion. Concrete shall not be poured in adjacent slabs until seven days have elapsed. The Area of the floor which shall be laid at any one time shall not exceed 400 sq. m nor shall any width of slab taken perpendicular to its edge be greater than 20 m unless noted on the Drawings or approved by the Engineer.

.24 A record shall be kept on site of the time and date of placing the concrete in each section of the work.

.25 Cast in stair nosings in accordance with manufacturer's installation instructions. Protect from contamination of top surface during concrete placing, and from damage for the duration of the construction.

3.7 COLD WEATHER REQUIREMENTS

.1 When the air temperature is below 5ºC or when in the opinion of the Engineer there is a probability of its falling to that limit during the placing period within 24 hours, the entire area in the vicinity of the pour and the area immediately below, shall be enclosed and all concrete shall be placed according to CSA A23.1, 7.4.1.5, Cold Weather Concreting.

.2 When concrete is placed under the conditions described under “Cold Weather Requirements” there will not be extra payment.

.3 Under no circumstances shall concrete be placed in contact with a surface with a temperature below 5ºC. Effective means shall be provided for maintaining the temperature of the concrete at all surfaces at not less than 21ºC for five days or at not less than 10ºC for seven days after placing. Provide protection, insulation, and heated enclosures in accordance with CSA A23.1, 7.4.1.5.3 and ensure that cooling after removal of protection complies with Table 21. Maintain temperature records and provide to Contract Administrator as work progresses.

.4 In either case the concrete shall be kept from alternate freezing and thawing for at least 14 days after placement. No dependence shall be placed on salt or other chemicals for the prevention of freezing. All reinforcement, forms, and ground with which the concrete is to come in contact shall be free from snow and ice.

.5 No frozen material or materials containing ice or snow shall be used. Any concrete which has become affected by frost after being placed in position shall be cut out and replaced.

3.8 HOT WEATHER REQUIREMENTS

.1 When the air temperature is at or above 25ºC or in the opinion of the Engineer there is a probability of it rising to that limit during the placing period the temperature of the concrete when deposited shall be not more than 30ºC. All concrete shall be placed according to CSA A23.1.

.2 When concrete is placed under the conditions described under “Hot Weather Requirements” there will not be extra payment.

.3 Suitable precautions shall be taken to avoid drying of the concrete prior, during and after finishing operations. The use of windbreaks and sunshades shall be provided as directed by the Engineer.

3.9 CURING CONCRETE

.1 Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

.2 After all structural concrete has set sufficiently the exposed surfaces shall be wet cured in accordance with CSA A23.1-04 Table 20, Curing Type 3, for 7 consecutive days. During the curing period the temperature of the air in contact with the concrete shall be maintained at not less than 10ºC. All equipment needed for the curing and protection of the concrete shall be on hand and ready for use before the actual placing is started.

.3 Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet.

.4 Slabs shall be covered with absorbent material kept continuously saturated as soon as possible so the cement will not wash out or finish be damaged. All exposed surfaces of walls shall be kept wet and the Contractor shall ensure that water passes down between the forms and the concrete. Alternatively, concrete can be cured as specified until forms

are removed, followed by 24 hours of saturation, then followed with an application of two complete coats of curing compound.

.5 If forms are to be removed during the curing period, one of the above curing materials or methods, suitable for the Type of curing specified, shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

.6 During the curing period, the concrete shall be protected from damage by mechanical disturbance, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials or methods and by rain or running water.

.7 Self supporting structures shall not be loaded in such a way as to overstress the concrete until the concrete is thoroughly set and hardened and has reached the specified 28 days strength.

3.10 CONTROL OF TEMPERATURE AND TEMPERATURE DIFFERENCE

.1 Comply with the requirements of OPSS.MUNI 904.07.11.

.2 Monitor all concrete sections where the smallest dimension (thickness) is equal to or greater than 500 mm with thermocouples.

.3 Provide additional thermocouples and access for the Independent Inspection and Testing Company to independently monitor concrete temperature.

3.11 OPENINGS

.1 Pipe sleeves shall be poured integrally with the structure unless otherwise approved by the Engineer. If approval is given the following conditions shall prevail:

.1 Openings for all pipes shall be of sufficient size to give latitude in locating pipe and of sufficient clearance for later grouting. Diagonal reinforcing shall be provided around the opening. Openings shall be grouted with a stiff, non-shrink, non-metallic mortar.

.2 Openings for pipes at locations with earth or water pressure shall in addition be made tapered and keyed against blowout. The taper shall be 1 in 12 with the larger end on the pressure side. The key shall be 75 mm x 50 mm deep and shall be located in the centre of the wall and extended completely around the opening. A 6 mm thick steel plate water stop shall be welded to the puddle flange of the pipe. All wallpieces with puddle collars shall be installed in an accurate position and alignment prior to placing concrete.

3.12 TOLERANCES FOR CONCRETE

.1 Variations in Level or Plumb; for walls, slabs, beams and column surfaces the deflection shall not exceed:

.1 6 mm in 3 m.

.2 For any storey or bay or 6 m max., 10 mm.

.3 For any length 12 m or more, 19 mm.

.4 For exposed corners, lines and tops of walls the deflection shall not exceed: for any storey or bay or 6 m max., 6 mm for any length 12 m or more, 12 mm.

.2 Variation in Location of Plan; for established building locations:

.1 For any storey or bay or 6 m max., 12 mm for any length 12 m or more, 25 mm.

.2 For any size or location of sleeves and openings, 6 mm.

.3 For any cross-sectional dimensions of columns, beams or thicknesses of slab or walls, minus 6 mm to plus 12 mm.

.4 For any steps the rise shall have a 3 mm tolerance and the tread shall have a 6 mm tolerance.

3.13 FINISHING OF SURFACES

.1 The Contractor shall carry out the concreting in such a manner that the surfaces after striking the formwork, are true to line and level, homogeneous, and smooth in accordance with the formwork facing material specified, to the satisfaction of the Engineer.

.2 Where the Contractor has been given written permission to form holes into or through the concrete, such holes shall be made good by thoroughly caulking in cement mortar, from both faces where holes extend through the concrete.

.3 For floor areas noted to receive a chemical hardener or sealer.

.4 The Contractor shall cut out and reconstruct any work which, in the opinion of the Engineer is below standard. Alternatively at the discretion of the Engineer, the Contractor may be permitted to rectify any work out of true by tooling off with power operated machines and may be permitted to rectify surface inaccuracies by hacking, wetting and rubbing in mortar (one part cement to two parts sharp washed sand). No remedial work which will reduce the specified concrete cover will be allowed.

.5 Regardless of whether less restrictive finishing requirements are described below, all bug holes, air voids and surface imperfections greater than 16 mm in any direction parallel to the surface and 10 mm in depth shall, at the discretion of the Engineer, be repaired.

.6 Such rectification shall be carried out as directed and shall in no way relieve the contractor from their obligation to cut out and reconstruct work if, in the opinion of the Engineer, such rectification does not give the required standard of surface finish.

.7 Finish for vertical surfaces shall be as follows:

.1 Architecturally sensitive areas which consist of all exposed exterior walls and the interior walls of buildings shall be machine ground to a smooth surface and shall also receive a sack rubbed finish.

.2 Functionally sensitive areas which consist of the interior walls of all tanks and channels shall be machine ground to a smooth surface and sack rubbed.

.8 For surfaces which are to be waterproofed, the waterproofing sub-contractor and manufacturer’s representative shall visit the site following the casting of the first two adjacent slab or wall panels. The waterproofing sub-contractor and manufacturer’s representative shall review the acceptability of the concrete surface finish, including the joint between adjacent panels. If accepted by the waterproofing sub-contractor and manufacturer’s representative, this will establish the acceptance criterion for the concrete surface finish. Should the surface finish not be acceptable on the first visit, the waterproofing sub-contractor and manufacturer’s representative shall return after each additional panel is cast until the surface finish is accepted. Remedial work may include

machine grounding to a smooth surface compatible with the waterproofing system to be applied.

.9 Backfilled or otherwise covered surfaces which are not waterproofed need not be finished.

.10 Finish for horizontal surfaces shall be as follows:

.1 Plain Concrete:

.1 Unless otherwise specified, the final finish on the concrete surface shall be by screeding and floating, followed by trowelling with a steel trowel or finishing machine.

.2 Swirl Finish on Exterior Walkways and Exposed Roof Surfaces:

.1 A non-slip swirl finish for the exterior surfaces shall be by screeding and darbying followed by steel floating and trowelling and final floating with a wood float.

.3 Cast-in-Place Stairs:

.1 Interior concrete stair treads shall receive an abrasive surface finish consisting of powdered carborundum spread at a rate of not less than 18 kg per 10 m^2, in addition to cast in high visibility non-slip nosings specified elsewhere in this Section.

3.14 GROUTING

.1 Grouting around pipes passing through walls and similar locations under columns, under equipment bases and areas of concrete to be patched or repaired shall be done with non-shrink non-metallic mortar in strict accordance with the manufacturer's instructions.

3.15 SHRINKAGE CRACKS

.1 Where concrete surfaces develop cracks due to shrinking during the construction or guarantee period, the Contractor shall be required to repair the cracks and restore the appearance of the surfaces. In general, this shall entail the chipping out of the cracks to a depth of 20 mm (or more where cracks are wide) and filling with an approved epoxy-cement compound.

3.16 WATER TIGHTNESS TESTING

.1 Upon completion of the work and prior to the application of waterproofing membranes, all water retaining structures shall be tested in order to determine their degree of water tightness. The permissible leakage from these structures when tested shall not exceed the value specified below.

.2 All tanks retaining liquids shall be filled to their maximum level for 24 hours, topped up and checked over the next 24 hours for watertightness. The permissible leakage shall not cause a drop in water level greater than six millimetres during the 24 hour period. Any leakage in excess to the above quantity, and any leak which is visible, shall be repaired at the Contractor's expense, until the tests are satisfactory in every respect.

.3 The tests shall be carried out with adjoining tanks empty. Tanks may be backfilled, but this shall not relieve the Contractor of the cost of re-excavation for subsequent repair.

.4 All permanently exposed exterior tank walls, including the common walls between buildings and tanks shall be subjected to close visual inspections. Any exposed joints,

cracks or other areas that show signs of leakage, sweating or porosity, shall be waterproofed on the inside to the tanks at the Contractor's expense by specialists who shall guarantee their work, the Contractor shall supply water for testing purposes at their own expense.

.5 The Contractor shall provide all equipment, materials, and labour for testing at their own expense, and shall repeat all tests until all the requirements of the Specifications have been met.

END OF SECTION

053193_Division 3_03300-Cast-in-Place Concrete.docx
4/14/2026 12:17 PM

PART 1 GENERAL

1.1 GENERAL

.1 All conditions of the Contract apply to the work of this Section.

1.2 SCOPE OF WORK

.1 Tank supplier shall act as the General Contractor and design, furnish, and erect one new (1) 3,160 m³ (nominal volume) hybrid glass-fused-to-steel bolted-steel potable water storage tank, aluminum geodesic dome roof, subgrade helical piles, reinforced concrete foundation, and tank appurtenances as shown on the Contract Drawings and described herein.

.2 Tank supplier is responsible for demolition of existing tank and designing, supplying, fabricating, supervising, and erecting factory-applied glass-fused-to-steel, bolt-together tank and aluminum geodesic dome, including helical piles and detailed tie-in to concrete tank foundation, as specified under this Section.

.3 Provide all labour, materials and equipment from one (1) tank supplier source as outlined herein.

1.3 RELATED SECTIONS

.1 The Tank Supplier General Contractor is responsible for review of all Contract Documents for related Sections.

1.4 QUALITY ASSURANCES

.1 The work of this Section to conform to the following:

.1 Relevant Sections of the latest edition of the Ontario Building Code and associated regulations.

.2 The latest edition of the *National Building Code of Canada (NBCC)*.

.3 AWWA D103-19 - Factory-Coated Bolted Carbon Steel Tanks for Water Storage.

.4 AWWA D108-19 - Aluminum Dome Roofs for Water Storage Facilities

.5 ISO 28765-16 Class Level B - Standards for Vitreous and porcelain enamels

.6 NSF61 Standards for Drinking Water System Components

.7 Ontario Ministry of Labour, Relevant Sections of the latest edition of the Occupational Health and Safety Act (OSHA) and all applicable regulations and codes.

.8 Details and Fabrication – to NAMM – Metal Stair Manual, fourth edition, 1982.

.9 AISI - American Iron and Steel Institute.

.10 AISC - American Institute Steel Constructions.

1.5 QUALIFICATIONS OF TANK SUPPLIER GENERAL CONTRACTOR

.1 The factory-coated bolt-together tank construction for this project has been predicated upon the design criteria under AWWA D103-19, ISO 28765, and NSF-61, with construction methods as specified, and optimum coating for resistance to internal and external tank surface protection.

.2 Tank supplier shall provide a detailed reference list, outlined below, confirming five (5) tanks designed, built, and constructed in Ontario, Canada acting as a legal General Contractor by the Tank Supplier named or proposed, which utilized AWWA D103-19 & ISO 28765 design with NSF-61 certification, including demolition of existing standpipe, concrete foundation, designed and constructed by the Tank Supplier submitting the bid. Tank manufacturers will not be accepted. Tank projects not constructed by the named supplier submitting the bid will not be accepted.

Year Built	Project/Client Name	Tank Size	City / Province	Reference Name	Reference Phone Number

.3 Provide a new tank structure as supplied by a manufacturer specializing in the design, fabrication, and erection of factory-coated bolt-together tank systems.

.4 The tank manufacturer's quality system shall be ISO9001, ISO14001, and ISO18001 certified. Up-to-date health & safety and environmental certifications are required.

.5 The Tank Supplier shall hold a valid safety program with current Certificate of Recognition (COR) from the Infrastructure Health & Safety Association (IHSA).

.6 Tank supplier is to be in good standing with WSIB.

.7 Tank supplier shall have dedicated service crews regularly engaged in the inspection, maintenance, and repair of municipal potable water tanks available to provide servicing for warranty or on an as-needed basis when requested by the Owner.

.8 Tank supplier with a contract value above $1,000,000 shall provide a 100% labour, material, and performance bond issued to named company submitting the bid and performing the work.

.9 Tank supplier shall demonstrate carrying umbrella insurance coverage of $10,000,000.

.10 Acceptable supplier of tank materials and construction:

.1 Balmoral GFS Premium by Greatario Engineered Storage Systems
.2 Permastore TriFusion Plus by H2Flow Equipment

.11 Alternate tank suppliers wishing to bid shall submit the following to the Consultant for consideration during the question period, no less than 10 days in advance of the bid closing date:

.1 Typical structure and foundation drawing(s) in CAD.

.2 List of tank materials, appurtenances, tank coating specifications, and other documentation indicating compliance with all portions of this section

.3 Provide a detailed reference list, outlined below, confirming five (5) tanks designed, built, and constructed in Ontario, Canada acting as a legal General Contractor by the Tank Supplier named or proposed, which utilized AWWA D103-19 & ISO 28765 design with NSF-61 certification, including demolition of existing standpipe, concrete foundation, designed and constructed by the Tank Supplier submitting the bid. Tank manufacturers will not be accepted. Tank projects not constructed by the named supplier submitting the bid will not be accepted.

Year Built	Tank Name	Tank Size	City / Province	Client Reference Name	Client Reference Phone Number

.4 Proof of 100% labour, material, and performance bonding ability for the total project value with an Agreement to Bond letter issued to the named company submitting the bid and performing the work.

.5 Proof of umbrella insurance coverage not less than $10,000,000.

.6 Proof of COR Certificate of good standing.

.7 Proof of WSIB confirmation of good standing.

1.6 SUBMITTAL DRAWINGS AND SPECIFICATIONS

.1 Tank Submittals

.1 Bidders are required to furnish, for the approval of the Contract Administrator, but no increase in contract price, one (1) complete digital copy, one (1) 3D copy, and two (2) complete hard-copy specifications and construction drawings for all work not shown in complete detail on the Contract Drawings, including a complete set of structural calculations for the tank, tank foundation and dome structure, railings, ladders, platforms, and drawings to show dimensions, sizes, thickness, gauges, materials, finishes, joint attachment and erection procedure. All such submissions shall be stamped by a Registered Professional Engineer licensed in the Province of Ontario, as well as, by a Registered Professional Engineer employed on the tank manufacturer's engineering staff. Include the tank manufacturer's operator's manual with submittal information. The tank manufacturer's and installing contractor's standard published warranty shall be included with submittal information. The layout shall be approved by the Contract Administrator. Tank accessories to be provided as separate shop drawings from the main tank structure.

.2 A tank filling and disinfection plan shall be provided. Included in this plan shall be a letter that is stamped by Registered Professional Engineer licensed in the Province of Ontario stating that based on the proposed filling time, chlorine concentrations, and

previous laboratory testing on the sealant materials that there will be no chemical degradation, toxic byproduct formation, or off-gassing, that the sealant will remain structurally and chemically stable, that there will be no risk to public health upon completion, and that the sealant and tank will remain NSF 61 certified and is safe for drinking water storage.

.2 When reviewed, one (1) digital set of the submittal information will be returned to the bidder marked “REVIEWED” or “REVIEWED AS NOTED” and these drawings will then govern for the work detailed thereon. Review by the Contract Administrator of the tank supplier’s drawings shall be relating only to the general conformity with the Contract Drawings and Specifications.

.3 Submit shop drawings and operating manuals in accordance with the General Requirements.

1.7 HANDLING AND STORAGE

.1 The Supplier shall provide all necessary equipment, materials and labour to off-load equipment at the site and provide for any additional transportation necessary for storage or installation on-site. The methods employed for off-loading and handling must be to the satisfaction of the Supplier and/or Contract Administrator.

.2 Off-load equipment promptly and pay any charges due to delays.

.3 Before taking delivery examine the equipment for any damage. Rectify damage to equipment. Ensure that any repairs are first approved by the Supplier such that guarantees are not invalidated.

.4 If not required for immediate use, adequately store and protect all equipment against weather, damage and theft. Take particular care with corrodible and electrical equipment. Store mechanical equipment in an area heated to a minimum of 10°C.

1.8 APPURTENANCES, FITTINGS, CONNECTING PIPE AND ACCESSORIES

.1 Supply and install with the equipment and materials all appurtenances, fittings, connecting piping and accessories necessary for the proper installation and functioning of the equipment and materials, and that are reasonably inferable from the Contract Documents, whether or not specifically indicated on the Drawings or in the Specifications.

1.9 RELATION TO OTHER TRADES

.1 Coordinate process and mechanical work with all other trades involved in the execution of the Works, so arranged as not to interfere with nor delay other sub-trades.

1.10 SHOP DRAWINGS AND MAINTENANCE DATA

.1 Submit drawings in accordance with Section 01340 – Shop Drawings and Submittal Procedures.

.2 Provide operation and maintenance data for above grade reservoir.

.3 All tank drawings and calculations are to be stamped by a Professional Engineer registered in the Province of Ontario. This includes but is not limited to the foundation, tank structure, roof and appurtenances, ladders, platforms, railings, guards, fall arrest anchorage points, safety systems, lightning protection, etc.

1.11 MEASUREMENT FOR PAYMENT

.1 Payment for the above grade reservoir tank and connections to piping will be on a lump sum basis under the appropriate item in the Schedule of Items and Prices.

1.12 GENERAL CONTRACTOR'S RESPONSIBILITY

.1 Supplier shall be responsible for delivery to site all items in their scope of supply, erection and commissioning.

.2 Tank equipment package and related components to be installed under Division 13.

.3 The General Contractor shall determine extent of equipment supply and shall provide all labour material and equipment necessary for a complete operational system.

PART 2 PRODUCTS

2.1 SUPPLIER'S RESPONSIBILITY

.1 Unless noted otherwise, the complete above-grade reservoir, including concrete base, piping and piping supports within a 2.0 m radius of the tank, shall be supplied by the tank supplier. Electrical instrumentation equipment and wiring shall be supplied and installed under Division 16.

.2 The General Contractor shall coordinate with supplier all connection points outside of the 2.0 m radius described above.

2.2 EQUIPMENT

.1 Equipment to be supplied as per the attached specifications, the Contract Drawings and all other necessary piping, instrumentation, concrete, etc. to provide a complete system in accordance with Suppliers scope of supply.

.2 The General Contractor is to note that the supplier is to complete and submit final design for approval during the shop drawing stage.

2.3 TANKS

.1 The factory-coated hybrid glass-fused-to-steel bolt-together tank shall have an inside diameter of approximately 10.918 m, with a nominal height to eave of tank of approximately 35.0 m. Tank capacity shall have a nominal liquid storage capacity of approximately 3,160 m^3 based on a freeboard of 1.2 m.

.2 Finished floor elevation and maximum liquid level as per Contract Drawings.

.3 The vitreous coating on the tank, bolt head and encapsulation material, and joint sealant shall have been approved for listing under ANSI/NSF Standard 61.

.4 The materials, design, fabrication, coating and erection of the bolt together tank shall conform to the general principles of ISO 28765-16 Class Level B – "Standards for Vitreous and Porcelain Enamels" and the AWWA Standard for "Factory-Coated Bolted Steel Tanks For Water Storage" – ANSI/AWWA D103, latest revision.

2.4 DESIGN LOADS

.1 Seismic, dead and live loads are as indicated below and as listed in ANSI/AWWA D103.

.2 Design Loads and Seismic criteria established for Wingham are provided in MMAH Supplementary Standard SB-1 of the 2024 OBC, O. Reg. 203/24 and the geotechnical investigation report as follows:

.1 Wind Velocity: 0.46 kPa

.2 Wind Importance Factor: 1.15

.3 Ss: 2.6

.4 Sr: 0.4

.5 Seismic site class: D

.6 Seismic use group: IV

.7 Sa (0.2): 0.198

.8 Sa (0.5): 0.213

.9 Sa (1.0): 0.131

.10 Sa (2.0): 0.0628

.11 PGA: 0.108

.3 Design foundation and tank structure to Post Disaster requirements as established in the Ontario Building Code, latest revision.

2.5 TANK APPURTENANCES

.1 Pipe Connections

.1 Where pipe connections are shown to pass through tank panels, they shall be precut by the tank manufacturer prior to glass application, when necessary, field located saw cut, (Acetylene torch cutting or welding is not permitted) and utilize an interior and exterior flange assembly and the tank shell reinforcing shall comply with AWWA D103 latest edition

.2 Overflow

.1 Overflow weir box to be provided by the tank manufacturer along with overflow piping and rubber duckbill check valve as per the Contract Drawings. Overflows 300 mm and smaller shall be constructed of aluminum. Overflows larger than 350 mm shall be constructed of stainless steel. Duckbill check valve shall be flanged and shall be Tideflex or approved equal.

.3 Inlet / Outlet

.1 Inlet / outlet stainless steel piping shall be 316L Schedule 40 and installed by the tank supplier as shown on contract drawings. Piping shall extend through the tank floor and exit the foundation below the applicable frost level in a manner specified by the tank manufacturer. All piping beneath the tank shall be concrete encased to the underside of the tank floor with 25 MPa concrete and shall include a minimum of unreinforced concrete beneath the piping and up the pipe/trench sidewalls.

.4 Outside Tank Ladder

.1 An outside tank ladder and top observation platform shall be furnished and installed as shown on the contract drawings. Ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs and be provided with a fall arrest system. If a

safety cage and step-off platforms are required they shall be fabricated of galvanized steel. Ladders shall be equipped with a hinged lockable entry device.

.5 Tank Sidewall Access Manway

.1 One (1) tank sidewall access manway shall be provided as shown on the Contract Drawings in accordance with AWWA D103-19.

.2 Manways shall be 800mm in diameter and shall include a properly designed reinforcing frame and cover plate complete with hinge connected to the reinforcing frame.

.6 Lightning Protection

.1 Tank supplier to provide design and installation for lightning protection system for the tank in accordance with CSA B72:20.

.7 Obstruction Lighting

.1 Rotating type CL-865 medium intensity white flashing obstruction lighting system to be installed at the tank roof meeting Transport Canada Standard 621 installed in accordance with Division 16.

.8 Identification Plate

.1 A manufacturer's nameplate shall list the tank serial number, tank diameter and height, and maximum design capacity. The nameplate shall be affixed to the tank exterior sidewall at a location approximately 1,500 mm from grade elevation in a position of unobstructed view.

.9 Cathodic Protection

.1 The tank will include a sacrificial anode cathodic protection system as designed and supplied by the tank manufacturer. The anodes shall be designed for ten (10) year life.

.10 Cable Tray

.1 The tank will include an aluminum cable tray (minimum 300 mm wide) on the exterior sidewall of the tank extending the full sidewall height for power, monitoring and instrumentation wiring.

.2 Tank supplier to confirm cable tray width required with General Contractor.

.3 The cable tray shall be fastened to the tank via a bolted connection inherent with the bolted steel tank design.

.4 The cable tray shall be located adjacent to the ladder unless otherwise shown on the design drawings.

2.6 INSULATION AND CLADDING

.1 Insulate standpipe sidewall and dome roof and clad sidewall only as follows:

.1 100 mm thick insulation with a minimum R value of R20.

.2 Metal wall cladding with minimum thickness 0.46 mm (0.018 inches) 26-gauge having a standard sheet size of 900 mm width x 38 mm depth. Finish shall be zinc-coated steel AZ 150 "Galvalume" sheet steel. Finish the exterior side (exposed to view) with Stelcolour 10,000 series fluoropolymer 2-coat finish or approved equal. Colour to be

selected by Owner during the submittals stage. Contractor to send physical colour samples to both the Owner and Contract Administrator for review prior to selection.

.3 Supply fasteners and sealants according to the Manufacturer's recommendations to provide a weathertight installation. Exposed fasteners and sealants to be colour matched to the adjacent materials).

2.7 EXTERIOR LOGO – SIGNAGE

.1 Provide an exterior logo, placed on the tank side, to be sized approximately 4 m x 4 m. Logo file to be provided by the Owner.

.2 The exterior logo shall be 3M exterior rated UV vinyl, placed in a direction and height selected by the Owner. Prior to ordering, a mockup of the logo itself and a rendering drawing of the logo on the tank (to scale) shall be submitted in a shop drawing for review and approval by the Owner.

.3 The Contractor shall notify the Owner / Contract Administrator a minimum of five (5) business days in advance of logo installation to provide a representative on site during installation for acceptance of final placement location.

2.8 DOME ROOF

.1 Tank shall be constructed with a dome roof structure in accordance with AWWA D108 – Aluminum Dome Roofs for Water Storage Facilities."

.2 The dome roof shall be provided with a step-off access platform adjacent to the tank ladder, measuring approximately 900mm x 900mm.

.3 The dome roof shall be provided with an aluminum safety railing connected to dome step-off platform providing access to the peak of the roof. The railing shall have a guard rail with a mid rail and toe board.

.4 Provide one (1) 300 mm diameter access port complete with a blind flange to accommodate any future instrumentation.

.5 Roof vent shall be provided and designed by the tank manufacturer.

.6 One (1) tank roof access hatch (min. 750 mm x 750 mm) with safety grating shall be designed by the tank manufacturer as per the Contract Drawings, complete with fall protection rated tie off points, supplied and installed with adequate anchor points for travel restraint system on the roof surface and platform in accordance with O.Reg. 213/91, Section 26.7.

.7 All accessible locations on the dome roof shall be provided with a non-skid coating.

2.9 ACTIVE MIXING & CIRCULATION

.1 Above grade reservoir shall be outfitted with an Active Mixing & Circulation system. Design, supply, and installation shall be by the tank supplier.

.2 Complete Water Circulation Required. To meet the project objectives, the tank or reservoir circulation shall be achieved by a single submerged unit within each reservoir capable of providing long distance circulation of water. The mixer shall have a direct measurable flow rate where suction shall enter specified mixer's intake positioned within 2 inches of reservoir floor and discharging water vertically in a sheet flow pattern to

induce a large volume, low velocity flow to reach the tank or reservoir water surface. The mixer must be placement flexible in design to allow best hydraulic positioning for tank or reservoir conditions to prevent hydraulic short circuiting within tank or reservoir. Suction not within 2 inches of tank or reservoir floor is not allowed.

.3 Number of units required. To meet the project objectives, the following number of mixers are required.

Tank	Qty	Model
1	1	GridBee GS-9 by IXOM Watercare

.4 Continuous Operation with 120VAC, 20 Amp Power Source. The mixer shall be capable of operating continuously during the day and night while connected to electric grid power.

.5 The mixer shall be controlled by a control panel (GridBee Full Featured SCADA Control Panel) supplied by the mixer manufacturer to connect and be integrated into the SCADA system of the water system.

.6 Stainless Steel Construction. The mixer shall be constructed primarily of Type 316 stainless steel metal for strength and superior corrosion resistance and shall be secured to the tank roof with a stainless steel chain and float balls.

.7 Motor. The mixer shall be mechanically operated by a submersible motor that meets the following criteria.

.1 Direct Drive, with no gearbox and no lubrication maintenance required.
.2 Designed for submersible operation. Mixer design shall include flow sleeve or housing around motor to provide water flow past motor per submersible motor design criteria to lower the total motor temperature and increase winding life.

.8 Exposed Rotating Protection: The mixer **shall not** have any rotating equipment openly exposed. Rotating shafts, impellers, and motors shall not be openly exposed to tank contents, and in the event of any part of the mixer exterior contacting the floor or cord, it shall not cause damage to either.

.9 Low Elevation Intake: The mixer shall be supplied with an intake capable of being positioned at the lowest elevation of the tank or reservoir floor. The intake level shall bring water into the mixer at horizontal layer within 2 inches of the tank or reservoir floor to prevent hydraulic short circuiting of inflow water through the tank.

.10 The complete mixer shall be NSF / ANSI Standard 61 and NSF / ANSI Standard 372 listed for safe contact with potable water.

2.10 MATERIALS SPECIFICATIONS

.1 Plates and Sheets

.1 Plates and sheets used in the construction of the tank shell, tank floor, and tank roof, shall comply with the minimum standards of AWWA D103, latest edition.

.2 Design requirements for mild strength steel shall be ASTM A1011 Grade 30 with a maximum allowable tensile stress of 100 MPa (14,566 psi).

.3 Design requirements for high strength steel shall be ASTM A1011 Grade 50 with a maximum allowable tensile stress of 179 MPa (26,000 psi).

.4 The annealing effect created from the glass coated firing process shall be considered

in determining ultimate steel strength. In no event shall yield strength greater than 345 MPa (50,000 psi) be utilized for calculations detailed in AWWA D103, Sections 3.4 and 3.5.

.5 Multiple vertical bolt line sheets and plates of ASTM A607 Grade 50 only shall be manufactured such that holes are staggered in the vertical bolt lines and that no two (2) adjacent holes are in-line horizontally, except at the center of the sheet or plate.

.6 The tank design shall incorporate standard design plate thickness as per AWWA D-103. Laminating of sheets to meet required tank wall thickness will not be acceptable.

.2 Galvanized Steel

.1 All outer surfaces (platforms, safety railing, etc.) that are constructed of steel shall be protected by hot dipped galvanizing according to CSA G-164M providing a minimum zinc mass of 610 g/m^2.

.3 Rolled Structural Shapes

.1 Material shall conform to minimum standards of ASTM A36 or AISI 1010.

.4 Horizontal Wind Stiffeners

.1 Intermediate horizontal wind stiffeners shall be either angle sections or “web truss” design details. These will permit the wind loads to be distributed.

.2 Horizontal wind stiffeners will generally be mild steel to BS EN 10025 with hot dip galvanized coating to EN ISO 1461.

.3 The size of the wind stiffeners will be calculated in accordance with the guidelines provided in AWWA D103-09.

.5 Bolt Fasteners

.1 Bolts used in tank lap joints shall be ½” – 13 UNC-2A rolled thread.

.2 Bolt Material.

.1 SAE Grade 2

.1 Tensile Strength – 510 MPa (74,000 psi) Min.
.2 Proof Load – 380 MPa (55,000 psi) Min.
.3 Allowable shear stress – 125 MPa (18,164 psi) (AWWA D103).

.2 SAE Grade 8/ASTM A325 heat treated to:

.1 Tensile Strength – 1,035 MPa (150,000 psi) Min.
.2 Proof Load – 825 MPa (120,000 psi) Min.
.3 Allowable shear stress – 255 MPa (36,818 psi) (AWWA D103).

.3 Bolt Finish – Geomet Coated

.4 Bolt Head Encapsulation

.1 High impact polypropylene encapsulation of entire bolt head up to the splines on the shank.
.2 Resin shall be stabilized with an ultraviolet light resistant material.
.3 Bolt heads shall be individually coloured for each length for ease of identification of bolts on site during construction and maintenance.

.5 All bolts shall be installed such that the head portion is located inside the tank, and the washer and nut are on the exterior.

.6 All lap joint bolts shall be properly selected such that threaded portions will not be exposed in the “shear plane” between tank sheets. Also, bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torquing will not be permitted.
.7 All lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during torquing.
.8 Hot dipped galvanized bolts shall not be permitted.

.6 Sealants

.1 The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall be suitable for contact with potable water and shall be certified to meet ANSI/NSF Standard 61 for Indirect Additives.

.1 Sika 1A or approved equal
.2 CIM 1000 Trowel Grade

.2 The sealant shall be used to seal lap joints, bolt connections and sheet edges. The sealant shall cure to a rubber-like consistency, have excellent adhesion to the glass coating, have low shrinkage, and be suitable for interior and exterior exposure.

.3 The sealant shall be resistant to a concentration of 50 ppm chlorine within the first 10% of the tank by volume during AWWA C652 Method 3 disinfection procedure only.

.4 Sealant curing rate at 22.8˚C and 50% RH.

.1 Tack-free time: 6 to 8 hours.
.2 Final cure time: 10 to 12 days.
.3 Neoprene gaskets and tape type sealer shall not be used.

.7 Structural aluminum – to Aluminum Company of Canada designations:

.1 Extruded structural shapes 6061-T6.

.2 Smooth plates 5052-H323.

.3 Grating and bearing plates 6351-T6.

.4 Handrail and posts 6063-T6.

.5 Pipe 6351-T6.

.8 Nuts and bolts (tank accessories) – stainless steel, conforming to ASTM A320, Grade B8 (ANSI Type 316L).

.9 Drill in anchors – stainless steel Type 304 adhesive anchors by "Hilti" or approved equal.

.10 Aluminum Welding Rod

.1 CSA-HA6-GM50P (Commercial Designation Type 5356) for joints to smooth aluminum plates.

.2 CSA-HA6-S5 (Commercial Designation Type 4043) for other work.

.3 Stainless Steel Welding Rod – E308.15 or 16, Anneal welds, where possible.

.11 Rivets – aluminum to CSA-HA4-G41-H32.

.12 Aluminum Grating – serrated top edge, depth to suit loading conditions.

.13 Safety Treads – serrated top edge complete with end plates having slotted holes and

front edge having abrasive nosing.

2.11 FABRICATION AND ERECTION – GENERAL

.1 Fabricate all items in accordance with reviewed shop drawings.

.2 Fit and assemble Work in shop where possible and deliver to site in largest practical sections. Where shop fabrication is not possible, make trial assembly in shop. Fabricated Work shall be complete with components required for anchorage.

.3 Fabricate stairs with all welded joints and connections. Provide slotted, bolted connections where provision for movement may be required. Grind welds flush and smooth with main metal. Maintain sharp profiles and arises. Remove all weld spatter and scale.

.4 Isolate where necessary to prevent electrolysis due to dissimilar metal to metal contact or metal to masonry or concrete. Use bituminous paint or other approved isolating material.

.5 Carefully make and fit all details and make special care so that the finished Work presents a neat and workmanlike appearance.

.6 Assemble all members true and without twists or open joints.

.7 Provide properly sized holes for connecting the Work of other trades where such can be determined prior to fabrication. Where possible, such holes shall be shown on shop drawings. Holes shall be placed so as not to cause an appreciable reduction in the strength of member.

.8 Field re-fabrication of structural components or panels will not be accepted. Forcing of the structure to achieve fit-up during construction is expressly forbidden and not acceptable.

.9 All sealant joints shall be tooled slightly concave after sealant is installed. Care shall be taken to keep sealant confined to joint area, and any outside of the joint shall be removed so that the panels will be free from misplaced sealant. All gasket materials shall be continuous; splices will not be allowed.

2.12 GLASS COATING SPECIFICATION

.1 Surface Preparation

.1 Following the decoiling and shearing process, sheets shall be steel grit-blasted on both sides to the equivalent of SSPC-10. Sand blasting and chemical pickling of steel sheets is not acceptable.

.2 The surface anchor pattern shall be not less than 1.0 mil.

.3 These sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.

.2 Cleaning

.1 After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying.

.2 Inspection of the sheets shall be made for traces of foreign matter or rust. Any such sheets shall be recleaned or grit-blasted to an acceptable level of quality.

.3 Coating

.1 All sheets shall receive one (1) coat of a catalytic nickel-oxide glass precoat to both sides and then air dried.

.2 A second coat to both sides of the sheets, of milled cobalt blue glass, shall be made. The sheets shall be coated in strict accordance with the manufacturer's quality process controls.

.3 The sheets shall then be fired at a minimum temperature of 815˚C in strict accordance with the manufacturer's ISO 9001 quality process control procedures.

.4 The final cover coat of milled glass shall be applied to the inside of the sheet. This milled glass shall be formulated in powder form and applied electrostatically to ensure a pure glass topcoat. The exterior of the sheets shall be the same colour. The sheets shall then be fired at a minimum temperature of 815˚C.

.5 The same glass coating as applied to the sheet surfaces shall be applied to the exposed edges during the electrostatic process.

.6 The dry film interior coating thickness shall be 10.0 to 18.0 mils (0.010 to 0.018 inches) minimum.

.7 The dry film exterior coating thickness shall be 6.0 to 19.0 mils (0.006 to 0.019 inches) minimum.

.8 The interior and exterior coating for all sheets must be a 3-coat, 2-fire process.

.1 Acceptable Suppliers:

.1 GFS Premium by Balmoral
.2 TriFusion Plus by Permastore

2.13 INSPECTION

.1 The manufactured quality system shall be ISO 9001 certified.

.2 Measurement of Glass Thickness

.1 Glass thickness shall be measured using an electronic dry film thickness gage (magnetic induction type). The thickness gage shall have a valid calibration record.

.2 Frequency of the test shall be every tenth sheet. The thickness of the glass shall be between 10.0 and 18.0 mils (0.010 and 0.018 inches).

.3 Measurement of Color

.1 The exterior color of the sheets shall be measured using a colorimeter. The colorimeter shall have a valid calibration record.

.2 Frequency of the test shall be every tenth sheet. The color must fall within the tolerance specified by the Contract Administrator.

.4 Impact Adherence Test

.1 The adherence of the glass coating to the steel shall be tested in accordance with ASTM B916-01. Any sheet that has poor adherence shall be rejected.

.2 Frequency of this test shall be one sheet per gage lot run minimum.

.5 Electrical Holiday Test

.1 An electrical holiday detection test shall be performed to the internal surface of every sheet. Any sheets that have discontinuities in the glass contact surface shall be rejected. The minimum voltage of this test shall be 1,100v.

.1 An electrical Holiday detection test shall be performed to the external and internal surface of every sheet in accordance with ISO 28765 and test A of EN 14430 or approved equal. The test instrument shall be a high voltage detector having 90,000 ohms resistance using 3% sodium nitrite solution as the approved wetting agent.

.2 Sheets having any discontinuities in the glass contact surface shall be rejected. Only finished sheets with zero glass continuity defects on the surfaces shall be released for packing.

.3 The Owner reserves the right to request all Quality Control (QC) documentation from the manufacturer for inspection of the sheets to be supplied for this project.

2.14 PACKAGING

.1 All approved sheets shall be protected from damage prior to packing for shipment.

.2 Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion.

.3 Individual stacks of panels will be wrapped in heavy mil black plastic and steel banded to special wood pallets built to the roll-radius of the tank panels. This procedure eliminates contact or movement of finished panels during shipment.

.4 Shipment to the job site will be by dedicated truck, hauling the tank components exclusively. No common carrier, drop, or transfer shipments.

PART 3 EXECUTION

3.1 BUILDING PERMIT, INSPECTIONS AND GENERAL REVIEW

.1 Complete Building Permit application, provide stamped drawings and calculations and submit to the municipal building department. Do not commence construction of any portion of the tank until the Building Permit has been issued.

.2 Cost of the Building Permit will be paid out of a Contract Allowance.

.3 Adhere to all requirements of the Building Permit including scheduling required inspections with Building Department inspection staff.

.4 Provide general review of tank foundation and tank superstructure in accordance with PEO guideline “Professional Engineers providing general review of construction as required by Ontario Building Code. Submit reports to Contract Administrator and the Building Department.

3.2 FOUNDATION

.1 The tank foundation, including helical pile deep foundation, is a part of this contract and shall be designed by the tank supplier to safely sustain the structure and its live loads.

.2 The tank foundation, including helical pile deep foundation, shall be constructed by the tank supplier.

.3 Tank footing and foundation design shall be based on the soil properties provided in the geotechnical investigation report with helical piling and pile cap as required based on the geotechnical conditions.

3.3 TANK FLOOR

.1 The floor design shall be reinforced concrete containing an embedded steel starter sheet per the manufacturer's design and in accordance with AWWA D103-19 Section 13.4 Type 6. The floor and embedded ring connection pour shall be monolithic.

.2 A "notch" style foundation where the embedded steel ring is grouted will not be acceptable.

.3 Levelling of the starter ring shall be required and the maximum differential elevation within the ring shall not exceed 3.2 mm, or exceed 1.6 mm within any 3 m length.

.4 A levelling plate assembly consisting of two (2) 450 mm anchor rods (19mm diameter) and a slotted place (89 mm x 275 mm x 9.6 mm) shall be used to secure the starter ring, prior to encasement in concrete. Installation of the starter ring on concrete blocks or bricks, using shims for adjustment, is not permitted.

.5 One bentonite-impregnated water seal shall be placed on the inside surface of the starter ring a minimum of 150mm below the concrete floor line. One butyl rubber elastomer water stop seal shall be placed directly above and in contact with the Bentonite rubber seal. Materials shall be installed in accordance with tank manufacturer's primer and instructions.

.6 One coping fillet placed on the 90-degree internal joint between the concrete and embedded tank sheet shall be applied using CIM 1000 trowel-grade.

3.4 TANK SUPERSTRUCTURE

.1 The tank supplier shall provide field erection of the glass-fused, bolted-steel tank and dome in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks.

.2 The tank supplier's erection crew must have built a minimum of five (5) glass-fused-to-steel bolted tanks in Ontario that are used for municipal potable water storage, reference projects are only acceptable for tanks the named supplier erected as named and have been operating for a minimum of five (5) years. Reference projects by erection crew must be demonstrated as per Clause 1.5 Qualifications of the Tank Supplier.

.3 Specialized erection jacks and building equipment developed and manufactured by the tank manufacturer shall be used to erect the tanks and domes.

.4 Particular care shall be taken in handling and bolting of the tank panels and members to avoid damage of the coating system. Prior to liquid test, all surface areas shall be visually inspected by the Contract Administrator.

.5 An electrical leak test shall be performed during erection using a nine (9) volt leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with manufacturer's published touch up procedure.

.6 The placement of sealant on each panel may be inspected prior to placement of adjacent panels. However, the Contract Administrator's inspection shall not relieve the supplier

from his responsibility for liquid tightness.

.7 No backfill shall be placed against the tank sidewall without prior written approval and design review of the tank manufacturer. Any backfill shall be placed according to the strict instructions of the tank manufacturer.

3.5 FIELD TESTING

.1 Hydrostatic and Disinfection

.1 The Contractor shall provide a shop drawing outlining their proposed hydrostatic and disinfection testing plan.

.2 Water required for testing shall be furnished as described in Section 01715 –Testing. Water for hydrostatic testing and initial filling will be supplied by the Owner's water distribution system. The Contractor shall supply all necessary labour, pumps, gauges, caps, flanges, pipework and other apparatus necessary to complete the test including backflow preventer(s) for the temporary connection(s).

.3 Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling the tank to its overflow elevation.

.4 Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations.

.5 Liquid retaining structures shall be filled to their maximum level over a 24-hour period. The tank shall then be topped up and checked over the next 24 hours for water tightness. Maximum permissible drop in level over this 24-hour period shall be 10 mm to account for tank expansion. Any level drop in excess of this quantity or any leak which is visible shall be repaired at the Contractors' expense until the test is satisfactory.

.6 Labour and equipment necessary for tank testing is to be included in the price of the tank.

.7 Water utilized for testing shall be dechlorinated prior to disposal.

.8 Tank Supplier shall follow AWWA C652 – Method 3 for disinfection and initial fill procedure.

.9 Isolation valve to the distribution system shall remain closed during testing and until written confirmation is provided following acceptance. The Contractor shall ensure that the water level in the tank is never higher than the initial proposed high water level of 368.0 m when the isolation valve to the water distribution system is open to ensure that the water system is not overpressurized.

3.6 WARRANTY

.1 Tank Structure

.1 The tank manufacturer shall include a warranty for the tank materials and coating. The tank manufacturer shall warrant the liquid storage tank shall be free from any defect in material or workmanship under normal and proper use, maintenance and operation for one (1) year from the time overall contract substantial performance is granted to the General Contractor. The tank manufacturer shall warrant the glass coated exterior surfaces and the glass coated interior surfaces of the liquid storage tank will not corrode, under normal and proper use, maintenance and operation.

.2 Tank Glass Coating System

.1 The tank manufacturer shall warrant the glass coated exterior surfaces and the glass coated interior surfaces of the tank will not corrode, under normal and proper use, maintenance and operation, during the period expiring on the earlier of five (5) years after liquid is first introduced into the tank. The tank builder shall certify the cathodic system performance at the time of initial operation of the tank.

PART 4 PAYMENT

.1 Payment for meeting the requirements of this Section shall be on a lump sum price and included under the appropriate Item in the Schedule of Unit Prices.

.2 There will be no separate payment for the design and construction of the concrete foundation and slab. Include all related costs in the lump sum price bid for the above grade reservoir item in the Schedule of Unit Prices.

.3 Lump sum price to include leakage testing of tank.

END OF SECTION

053193_Division 13_13010-Above Grade Reservoirs.docx
4/14/2026 12:18 PM

General Electrical Requirements

1 GENERAL

1.1 Description

.1 This Section covers items common to Sections of Division 16. This section supplements Division 1 – General Requirements.

.2 In case of a discrepancy between statement(s) or value(s) in this section or contract drawing(s), the higher statement or value takes precedence and shall govern.

1.2 Definitions

.1 The following are definitions of terms and expressions used in the documents:

.1 “Inspection Department or Authority” mean agents of any authority having jurisdiction over construction and safety standards associated with any part of electrical work on site.

.2 “Power Supply Authority” means electrical local utility company responsible for delivery of electrical power to project site.

.3 “Electrical Code” means Canadian Electrical Safety Code C22.1 or code in force at project location.

.4 “Indicated” means as shown on contract drawings or noted in contract documents

.5 “Provide” means fabricate, supply, install, test and commission the electrical system and/or equipment.

.2 Refer to CSA C22.2 No.0 for “Definitions and General Requirements.”

1.3 Scope of Work

.1 Provide all labour, material, equipment, tools and services necessary to complete the supply, installation and connection of all electrical power, instrumentation and control including PLC panel revisions, PLC and SCADA programming and related equipment as specified under all Sections of Division 16 and/or detailed drawings unless otherwise noted herein.

.2 Where equipment is provided under other Divisions and requires electrical power connections and services, these shall be provided to meet requirements or approved supplier's drawings.

.3 The work included under this division of the specifications includes the following major items:

.1 Underground duct systems.

.2 Connection to equipment supplied by other divisions of this contract such as standpipe mixer.

.3 Revisions to the existing power panelboard and installation of receptacle and obstruction light at top of standpipe and other miscellaneous services.

.4 PLC panel revisions and associated wiring and conduit.

.5 Coordination of work with approved Control System Integrator (CSI). Assist the CSI in the field testing and commissioning of the instrumentation.

.6 Re-calibration of the existing standpipe level instrumentation (pressure) with the installation of the new standpipe. Provide a calibration report as a shop drawing submission. Calibration to be performed by a vendor specializing in calibration of instrumentation (SPD Sales, Krutik Parekh, 1.416.550.7170 or equivalent).

.7 Conduit, fittings, outlets, wire and cable as required providing a complete operating system.

.8 All field wiring and terminations.

.9 Start-up, commissioning, training and site acceptance testing, as detailed below in Part 1.6, is required for all new and pre-purchased equipment.

.4 Start-up Assistance: When the complete system for this location is ready for service, provide assistance for operating instruction and start-up procedures during scheduled start-up for all equipment specified herein. Provide all necessary assistance to place the equipment into normal operating modes and train the operators.

1.4 Work by Control System Integrator (CSI) Contractor

.1 PLC Panel shop drawings and as built drawings depicting the existing PLC Panel and applicable revisions.

.2 The CSI Contractor is to commission the revisions to the existing PLC and instrumentation equipment as per the contract documents and the Township's standards, in conjunction with the electrical contractor.

.3 The CSI shall provide a completely operational system, in conjunction with the electrical contractor, as described in these specifications or as shown on the drawings.

.4 The CSI Contractor will provide all required PLC, HMI and SCADA programming, as per the Township standards, to monitor and control the new and existing electrical equipment and instruments.

.5 The Control System Integrator is to review the contract drawings for project details and requirements.

.6 Provide submittals and shop drawings of the control narrative, HMI and SCADA screens for review, as specified herein.

.7 Co-ordinate with and assist the electrical contractor in the proper field installation and connection of all components.

.8 Complete I/O checks, factory acceptance testing and software site acceptance test (SAT), SCADA system integration and commissioning and operator training.

.9 Supply record drawings, operation and maintenance manuals, control narrative, program listings, etc. as specified herein.

.10 Field installation of all equipment will be carried out by the electrical contractor in conjunction with the CSI. The electrical contractor, through the CSI, will take sole responsibility for all supply, installation, programming, testing, commissioning and training.

.11 Electrical Contractor is to install, test, and commission the revisions to the existing PLC Panel, including provide all wire tagging, wiring and conduit between the PLC Panel and all field devices.

.12 All work performed by the CSI Contractor is to be paid as part of this contract, refer to the tender form for details

.13 The Municipality's approved CSI Contractor is:

Actemium Toronto Summa
401-1875 Buckhorn Gate
Mississauga, ON. L4W 5P1

Attn: Sanjay Sawhney
e: sanjay.sawhney@actemium.com
b: 1.905.678.3388 ext. 292
m: 1. 416.998.0070

1.5 Start-up, Commissioning, Training and Site Acceptance Testing

.1 Where possible, source equipment from one manufacturer.

.2 Provide the services of a factory-trained representative(s) to inspect, operate, test, adjust, and troubleshoot the installation.

.3 The factory-trained representative(s) mentioned above will certify that the equipment is ready for operation before use by the Municipality. In addition, the factory-trained representative(s) shall instruct and train the Municipality's operation personnel in the proper operation and maintenance of the equipment supplied herein.

.4 Provide additional supervision of installation by Equipment Supplier as required.

.5 Arrange with Engineer a mutually agreeable date when the representative(s) should be on site.

.6 Submit a report, signed by the factory-trained representative(s), describing in detail the inspection, tests, and adjustments made, quantitative results and suggestions for precautions to be taken to ensure proper maintenance. The report must verify that the equipment conforms to all specifications.

.7 As a minimum, the factory-trained representative(s) shall be on-site for one 8hr day for start-up, one 8-hr day for commissioning, and, one 8-hr day for training.

.8 Site Acceptance Testing (SAT) in the presence of the engineer. In preparation for the SAT, the contractor must pre-test all systems prior to our attendance at the site. The SAT is intended to demonstrate the complete working system in advance of the trial period of the station. The control system integrator and contractor are required to be in attendance during the SAT. The Control System Integrator is to include all necessary programming revisions during site acceptance testing (SAT) with the engineer.

1.6 Codes and Standards

.1 Do complete installation in accordance with the latest editions of the Canadian Electrical Code – CSA C22.1, the Ontario Electrical Safety Code and any local codes and requirements which govern the installation. Where these regulations conflict, apply the most stringent condition.

.2 Do overhead and underground systems in accordance with CSA C22.3 No.1-10 and No.7-M86 except where specified otherwise.

.3 Electrical Abbreviations: to CSA Z85_1983.

1.7 Care, Operation and Start-up

.1 Instruct Engineer and operating personnel in the operation (testing), care and maintenance of equipment.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.8 Voltage Ratings

.1 Operating voltages: to CAN3_C235_83.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.3 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.9 Permits, Inspection and Fees

.1 Submit drawings and specifications to Electrical Inspection Department and Supply Authority to obtain all required electrical permits.

.2 Notify the Electrical Inspection Department in sufficient time for them to inspect work. Contractor is responsible to arrange multiple inspections (as required) to ensure the work has been properly inspected at completion of project.

.3 Contractor to keep a separate “logbook” related to the Electrical Inspections. Contractor must record inspector’s name, date and scope of inspections, recording all statements, decisions and permissions made during each inspection visit. Notify Engineer of any changes required by Electrical Inspection Department prior to making changes. Submit logbook to Engineer at completion of project.

.4 Submit to Engineer “Certificate of Acceptance/ Approval” from Electrical Inspection Department at completion of project. Building Occupancy will not be granted unless electrical inspection certificate has been completed and submitted to engineer.

.5 Division 16 Contractor to pay all associated fees for electrical permits, inspections and special product approvals.

1.10 Coordination with “Power Supply Authority”

.1 The contractor is responsible to coordinate and satisfy all requirements of the Power Supply Authority, to ensure availability of (permanent) power service is provided at completion of project.

.2 Division 16 Contractor to pay all associated connection fees or charges for power supply authority services.

1.11 Coordination with Other Trades

.1 Be responsible and coordinate other sub-trade work with electrical requirements and ensure that there is no interference with or delay caused by such work to the electrical or other trades work.

.2 Notify other sub-trades of all openings, inserts, anchors, sleeves, hangers, foundations, etc., necessary for electrical work, and be responsible that these are provided and correctly installed at the proper time.

.3 Fully cooperate with all trades in the provision and maintenance of electrical power in all areas throughout the period of construction.

1.12 Construction/Shop Drawings

.1 Submit data (drawings) in accordance with Division 1 for review prior to commencement of manufacturing or installing with the exception of conduit, standard conduit fittings and low voltage wiring.

.2 Show all details of construction, dimensions, capacities, weights, and electrical performance characteristics of equipment or material.

.3 Prepare composite construction drawings, fully dimensioned of cables, conduit, cable tray, bus duct, sleeves, clearances, pipes, ducts, etc., and equipment in mechanical and electrical equipment rooms, ceiling spaces and all other critical locations to avoid a conflict of trades. Base drawings on manufacturer's shop drawings. Drawings should be developed from consultation with and agreement of all trades involved.

.4 Prepare drawings of equipment bases, anchors, slabs, floors and roof curbs, if needed, for the electrical work.

.5 Include, but not necessarily limit to, the following:

.1 Single line diagram.

.2 Elementary control diagrams for motor starters, control circuits, etc. Include wire numbering system.

.3 Manufacturer's data and specifications of major electrical equipment, such as MCC, panelboard, etc.

.4 Control panel layouts, and all auxiliary controls and indicating panels.

.6 Indicate the number or letter used on the drawings/specifications as an identification symbol on product data for panel boards, light fixtures, instruments and other equipment submitted.

.7 Bind one complete set of construction/shop drawings showing "Record" conditions in each operating and maintenance instruction manual.

1.13 Record Drawings

.1 Before commencing work, obtain two sets of electrical drawings for showing "As Built" conditions. As job progresses, mark on field set of prints to indicate accurately all installed work. At completion of project, manually transfer all information onto second set of drawings using red marker/pen, and indicate "Contractors Certified Approval of Accuracy" before submitting to Engineer for review and record use.

.2 Indicate on record drawings "As Built" stamp.

.3 Include with the record drawings a list of all motors indicating motor or equipment number and name, name-plate voltage, horsepower and current, the size of overload and breaker or fuse protection provided for each motor.

.4 Indicate on record drawings, location of all buried services. This information is to be certified correct by Engineer before backfilling commences.

1.14 Workmanship

.1 Install all equipment, conduit and cables in a workmanlike manner to present a neat appearance and to function properly.

.2 Install exposed systems and equipment neatly and grouped to present a neat appearance, without conflict to other services.

.3 Install equipment and apparatus requiring maintenance, adjustment or eventual replacement with due allowance therefore, in terms of space and accessibility.

.4 Include in the work all requirements of manufacturers shown on the shop drawings or manufacturers' installation instructions, and make provision for future plant and equipment as shown.

.5 Replace without extra cost work unsatisfactory to the Engineer.

.6 Protect all equipment from damage during delivery to the site and during installation. Make good any damage or deterioration whatsoever and have it covered by replacement guarantee.

1.15 Materials and Equipment

.1 Equipment and material must be CSA certified. Where there is no alternative to supplying equipment, which is not CSA certified, obtain special approval from Electrical Inspection Department. Pay all associated fees.

.2 Factory-assemble control panels and component assemblies.

.3 Provide Canadian manufactured equipment and materials, except where specified otherwise or where Canadian made materials or equipment do not exist.

1.16 Finishes

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1_1_1955.

.2 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y_1_1958 (ASA #61).

.2 Clean and touch up surfaces of shop painted equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean and prime exposed non-galvanized hangers, racks and fastenings o prevent rusting.

1.17 Equipment Identification

.1 Supply and install identification nameplates on all equipment such as motor starters, safety switches, panelboards, pushbutton stations, control panels, etc., and any equipment not so supplied.

.2 Nameplates:

.1 Lamicoid 3 mm thick plastic engraving sheet, black face, white ore, mechanically attached with stainless steel screws or rivets.

NAMEPLATES:
Size 1: 1 line, 3 mm high letters
Size 2: 1 line, 6 mm high letters
Size 3: 2 lines, 6 mm high letters
Size 4: 1 line, 12 mm high letters
Size 5: 2 lines, 12 mm high letters
Size 6: 1 line, 25 mm high letters
Size 7: 2 lines, 25 mm high letters

.3 Wording on nameplates to be approved by Engineer prior to manufacture.

.4 Allow for average of twenty-five (25) letters per nameplate.

.5 Identification to be English.

.6 Disconnects, starters and contactors: Size 4, indicate equipment description and voltage.

.7 Terminal cabinets, pull and junction boxes: Size 2, indicate panelboard system and voltage.

.8 Transformers: Size 5 indicate tag number, kVA capacity, phases, system primary and secondary voltages.

.9 Provide a typewritten circuit directory with clear plastic cover for each panel board in a suitable holder on the inside of each panel door. Indicate breaker circuit number, rating, load description, and associated load data. On outside of panel board door, indicate tag number, capacity, phases and voltages.

.10 For all buried incoming ducts provide a “buried cable” marker on the building where the buried service enters.

1.18 Wiring Identification

.1 Identify wiring with permanent indelible identifying markings, numbered on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1_1986.

.4 Use colour coded wires in communication cables, matched throughout system.

1.19 Conduit and Cable Identification

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 10 m intervals.

.3 Colours: 25 mm wide prime colour and 12 mm wide auxiliary colour.

	Prime	Auxiliary
up to 600 V	Yellow	green
up to 5 kV	Yellow	blue
up to 15 kV	Yellow	red
Telephone	Green	
Other communication systems	Green	blue
Fire alarm	Red	
Emergency voice	Red	blue
Other security systems	Red	yellow

1.20 Wiring Terminations

.1 Lugs, terminals, screws used for termination of wiring to be suitable for copper conductors.

1.21 Manufacturers and CSA Labels

.1 Visible and legible after equipment is installed.

1.22 Warning Signs

.1 As specified and to meet requirements of Electrical Inspection Department and Engineer.

.2 Decal signs, minimum size 175 x 250 mm.

1.23 Single Line Diagram

.1 Provide electrical single line diagrams in glazed frames at main service entrance switch.

.2 Drawings: 600 x 600 mm minimum size. Develop drawing using "AutoCAD 2002 version. Submit CD copy of drawings to Engineer.

.3 Submit diagram to Engineer for review prior to installation.

1.24 Mounting Heights

.1 Mounting height of equipment is from finished floor to centerline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise:

.1 Local switches: 1200 mm.

.2 Wall receptacles:

.1 General: 300 mm.

.2 Above baseboard heater: 300 mm.

.3 Above top of counters or counter splash backs: 175 mm.

.4 In mechanical rooms: 1200 mm.

.3 Panelboards: as required by Code or as indicated.

.4 Telephone and interphone outlets: 300 mm.

.5 Wall mounted telephone and interphone outlets: 1500 mm.

.6 Fire alarm stations: 1500 mm.

.7 Fire alarm bells: 2100 mm.

.8 Television outlets: 300 mm.

.9 Wall-mounted speakers (horns): 2100 mm.

.10 Clocks: 2100 mm.

.11 Doorbell pushbuttons: 1500 mm.

.12 Exterior wall mounted fixtures: 2600 mm.

1.25 Load Balance

.1 Measure phase current in each panelboard with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, report listing phase and neutral currents in panel boards, dry-core transformers, switchboards, and motor control centers, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.26 Conduit and Cable Installation

.1 Install conduit and sleeves prior to pouring of concrete or core-drilling through existing walls. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

.2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.3 Arrange for holes through exterior walls and roof to be flashed and made weatherproof.

1.27 Insert, Sleeves, Fastenings and Supports

.1 Provide all necessary inserts, hangers, fastenings, sleeves and curbs for electrical equipment, suspended from or passing through structural walls or floors, to suit the specific location, and as approved by the Engineer.

.2 Sleeves: allow 12 mm clearance over the O.D. of all cables and conduits, 25 mm horizontally and vertically for rectangular openings.

.3 Finish sleeves flush with wall finish (each side) or the ceiling to curb top.

.4 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors or nylon shields, properly sized for the load to be carried.

.5 Secure equipment to poured concrete with expandable inserts, properly sized for the load to be carried.

.6 Secure equipment to hollow masonry walls or suspended ceilings with factory made threaded or toggle type inserts, properly sized for the load to be carried.

.7 Secure surface-mounted equipment with twist clip fasteners to inverted T-bars ceilings. Ensure that T-bars are adequately supported to carry weight of equipment specified before installation.

1.28 Cutting, Patching and Welding

.1 Where installation of equipment by this section requires cutting or patching of new or existing work, the work shall be performed by, and under direction and supervision of, this section. Make good surface finishes to satisfaction of the Engineer.

.2 No cutting or welding of beams, columns or structural surfaces is permitted without approval of the Engineer and all damage to finished or unfinished surfaces shall be made good to the satisfaction of the Engineer.

.3 Pay all costs for cutting and patching resulting from failure to co-ordinate timely installation of electrical inserts, sleeves, etc., into masonry structures.

1.29 Fireproofing

.1 Where sleeves or openings are installed in walls, floors, roof or partitions to accommodate raceways, cables or bus duct, provide all necessary seals, fittings, barriers and fire-resistant materials to restore the installation to its original fire rating to the satisfaction of the Building Code, governing authorities and the Owner's insurance underwriters. Work to be completed by authorized fire proofing contractor.

1.30 Excavation and Backfill

.1 Ensure that route and depth of excavation for underground electrical services is as indicated. Provide protective materials around and over services and be present at all times during excavation and backfilling to supervise work.

.2 Contact Electrical Inspection Authority prior to backfilling of electrical service cables and ductbanks.

1.31 Field and Quality Control (Testing)

.1 General

.1 Prior to the Owner's acceptance, all electrical equipment, materials and systems installed shall be subject to an inspection and applicable performance tests supervised by the Owner and/or the Engineer to ensure that the operation of the system and components satisfy the requirements of the Contract Documents.

.2 Ensure that the system and its components are ready prior to the inspection and test for acceptance.

.3 Conduct all testing by fully qualified personnel only. Tests requiring initial power energization of a system shall not be made without notification of the Owner and/or Engineer. Tests, checks and the like carried out by or on behalf of the Contractor shall be documented and certified at no additional cost to the Owner. Submit two copies of the test certificates to the Engineer.

.4 Carefully check wiring for each system and/or part of a system to ensure that the system will function properly as indicated by wiring and schematic diagrams, description of operation, etc.

.5 Manually operate alarms and control devices to check whether their operation during normal and abnormal operating conditions causes the proper effect.

.6 In addition to tests on purely electrical systems, supply the necessary labour and equipment for operational tests required by other Divisions where electrical services are involved and make final adjustments to the electrical controls at no additional cost to the Engineer.

.7 Perform tests on auxiliary or specialized systems with the assistance of the manufacturer's representative. Upon successful conclusion of the tests, obtain a certificate from the manufacturer stating that the system has been installed to their satisfaction and that it is in good working order.

.8 Ensure circuit protection devices such as overcurrent trips, relays and fuses are installed to values and settings as indicated.

.9 Replace at no additional charge all fuses, relays, or other devices destroyed during field quality control (testing).

.10 Supply all instruments, meters and personnel required for the tests.

.11 Clean equipment by vacuum. Clean, wax and polish all new exterior surfaces, check and tighten all electrical connections.

.2 Cable and Wire - 1000 Volt and Below:

.1 Limit all tests on cables in this voltage range to insulation resistance measurements using a megger: 500 V instrument for circuits up to 350 V systems; 1000 V instrument for 351-600 V systems.

.2 Record all test results in a logbook and submit to the Engineer for reference. Replace or repair all circuits which do not meet minimum requirements specified in the governing Electrical Safety Code. Measure insulation resistance of the following circuits:

.1 Power, lighting and motor feeders (with equipment disconnected): phase-to-phase, and phase-to-ground.

.2 Control circuits: measure to ground only.

.3 Do not perform megger tests on control circuits containing transistorized or solid-state components.

.4 Where power factor correction equipment is installed, it may be necessary to disconnect the capacitors from the system prior to testing to avoid overvoltage.

.3 Grounding System

.1 Test the ground system efficacy for compliance with CSA Standard C22.1 and Supply Authority requirements. Verify that the ohmic resistance values specified therein are not exceeded. Provide method used to obtain results.

.2 Notify Inspection Authority and Power Supply Authorities that they may be present to witness Contractor testing and provide any assistance required by these Authorities for their own testing procedures.

1.32 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.33 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

END OF SECTION

Shop Drawing Log

Item	Reviewed By	Review Status	Date Received	Date Returned	Comments
Section 16010 Electrical General Requirements					
Record Drawings					
Cable and Wiring Testing					
PLC Panel					
Pressure Instrumentation – Calibration Report					
Section 16105 – Underground Duct Systems					
Ductbank Pictures					
Section 16120 – Wires & Cables					
Low Voltage Wire and Cable (1000V and Below)					
Section 16400 Basic Electrical Equipment					
Obstruction Light					
Section 16850 Services for Mechanical Equipment					
Elevated Water Storage Tank					
Elevated Water Storage Tank – Electric Mixer					
Section 16920 Process Control Narrative					
Process Control Narrative					
SCADA Screens					

Review Status:
C Conforms with Intended Design
CRN Conforms with Intended Design with Revisions Noted
NCR Non-Conforming - Revise and Resubmit

END OF SECTION

Underground Duct Systems

1 GENERAL

1.1 General Conditions

.1 All sections of Division 1 form a part of this Specification. Read and fully adhere to exactly as if repeated here in full.

.2 Refer to all other Divisions of the Specifications and these documents to determine their effect upon the work of this section.

.3 All sections of Divisions 1 to 16 inclusive form part of the Contract Documents. Refer to Section 16010 for General Electrical Requirements related to this work.

1.2 Scope

.1 Furnish all labour, materials, supervision, equipment and services specified, indicated or requested to supply and install the underground duct systems, chambers, vaults, and handholes described herein.

.2 Perform “locates” of existing site conditions prior to any excavation work.

1.3 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.4 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

2 PRODUCTS

2.1 Rigid PVC

.1 Direct Buried ducts: Rigid PVC conduit, schedule 40 pipe dimensions, complies with CSA C22.2 No. 211.2-06

.2 Concrete encased ducts: PVC type DB2 conduit, complies with CSA C22.2 No.211.1-06.

2.2 PVC Duct Fittings

.1 PVC, opaque solvent welded type couplings, bell end fittings, plugs, caps, adaptors, split ducts as required to make complete installation.

.2 Expansion joints and wobble joints.

.3 PVC angle couplings: 90°, 45° and 22.5° bends with 915mm diameter radius bends (long sweeps).

.4 Solvent weld compound for all PVC duct joints.

2.3 Grounding

.1 Ground rods: to Section 16450 – Grounding.

2.4 Markers

.1 Concrete type cable markers: 600 x 600 x 100 mm, with the words “cable,” “joint” or “conduit” impressed in top surface, with arrows to indicate change in direction of duct runs.

2.5 Duct Spacers and Wooden Mandrel

.1 Rigid interlocking plastic material, for the conduit diameters and spacing required on drawings.

.2 Wooden Mandrel: Condux International #CDX08020600.

2.6 Cable Pulling Equipment

.1 6 mm stranded nylon pull rope with tensile strength of 5 kN.

2.7 Cable Pulling Lubricant

.1 Polywater LZ Universal Cable Pulling Lubricant.

3 EXECUTION

3.1 Concrete-Encased Duct Banks

.1 Perform “locates” prior to any excavation work and coordinate all work with civil contractor, as applicable.

.2 Supply and install the concrete-encased underground duct banks indicated on the drawings. Supervise all excavation, formwork, reinforcement, concreting, and backfilling.

.3 Build duct bank(s) and manholes on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum proctor dry density.

.4 Open trench completely between manholes to be connected before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.

.5 Prior to laying ducts, construct “mud slab” not less than 75 mm thick.

.6 Install ducts at elevations as indicated, with a minimum slope of 1 to 400. Solvent weld (glue) all PVC duct joints.

.7 Install base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of ducts.

.8 Lay PVC ducts with configuration and reinforcing as indicated with preformed interlocking, rigid plastic intermediate spacers to maintain spacing between ducts horizontally and vertically as shown on drawings. Stagger joints in adjacent layers at least 150 mm and make joints watertight. Encase duct bank with concrete cover to elevation (or thickness) shown on drawings.

.9 Make transpositions, offsets and changes in direction using 5° bend sections, do not exceed a total of 20° with duct offset.

.10 Use bell ends at duct terminations in manholes or buildings.

.11 Use conduit to duct adapters when connecting to conduits.

.12 Terminate duct runs with duct coupling set flush with the end of concrete envelope when dead ending duct bank for future extension.

.13 Cut, ream and taper end of ducts in field in accordance with manufacturer’s recommendations, so that duct ends are fully equal to factory made ends.

.14 Allow concrete to attain 50% of its specified strength before backfilling (minimum 24 hours after placing of concrete) unless otherwise authorized by Engineer. Ensure that backfill is placed in maximum 13 mm layers and compacted to the satisfaction of the Engineer.

.15 Use anchors, ties and trench jacks as required to secure ducts and prevent moving during placing of concrete. Tie ducts to spacers with twine or other non-metallic material. Remove weights or wood braces before concrete has set and fill voids.

.16 Clean ducts before laying. Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

.17 Immediately after placing of concrete, pull through each duct a wooden mandrel not less than 300 mm long and of a diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Avoid disturbing or damaging ducts where concrete has not set completely. Pull stiff bristle brush through each duct immediately before pulling in cables.

.18 Install four 3 m lengths of 20M reinforcing rods, one in each corner of duct bank when connecting duct to manholes or buildings. Wire rods to 15M dowels at manhole or building and support from duct spacers. Protect existing cables and equipment when breaking into existing manholes. Place concrete down sides of duct bank filling space under and around ducts. Rod concrete with flat bar between vertical rows filling voids.

.19 In each duct install pull rope continuous throughout each duct run with 3 m spare rope at each end.

.20 For long duct runs (greater than 50 m), install expansion couplings at 30 m intervals.

.21 Provide removable watertight cap to seal each spare duct end. Install caps on all duct ends left open during construction.

.22 Ensure that a responsible and competent supervisor is present during concreting operations, to protect against broken, damaged or disturbed ducts. Advise the Engineer in advance of concreting, so that he may inspect the ducts prior to pouring, and be present during the pour.

3.2 Direct Buried Duct Banks

.1 Perform “locates” prior to any excavation work and coordinate all work with civil contractor, as applicable.

.2 Rigid ducts for direct burial shall be of the type approved for direct burial.

.3 Ensure that the trench bottom is of undisturbed soil or soil compacted to a density of 95% of the maximum dry density, free of stones and uniformly graded to give continuous support to the rigid ducts throughout their entire length.

.4 Slope ducts with 1 to 400 minimum slope. Solvent weld (glue) all PVC duct joints.

.5 Ensure all couplings used to join PVC conduits are given a tight fit. Make connections with an approved PVC solvent supplied by the conduit manufacturer.

.6 Provide protection covers or planks, where required or indicated.

.7 Install pull cord in each duct with 3 m spare cord at each end and cap until ready for use.

.8 Pull through each duct wooden mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.

.9 Install markers as required or as indicated.

3.3 Markers

.1 Mark location of duct runs under hard surfaced areas not terminating in manhole with railway spike driven flush in edge of pavement, directly over run. Place concrete duct marker at ends of such duct runs. Construct markers and install flush with grade.

.2 Mark ducts every 150 m along straight runs and changes in direction.

.3 Where markers are removed to permit installation of additional duct, reinstall existing markers.

.4 Lay concrete markers flat and centered over duct with top 25 mm above earth surface.

.5 Provide drawings showing locations of markers.

3.4 Inspections

.1 Provide clear pictures of ductbanks prior to pouring concrete or backfilling. Provide electronic files, 8MP minimum.

.2 Advise Engineer so that he may inspect ducts prior to placing and be present during placement of concrete and clean out.

3.5 Cable Installation in Ducts

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour-coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct sealing compound.

END OF SECTION

Raceway Systems

1 GENERAL

1.1 General Conditions

.1 All sections of Division 1 form a part of this Specification. Read and fully adhere to exactly as if repeated here in full.

.2 Refer to all other Divisions of the Specifications and these documents to determine their effect upon the work of this section.

.3 All sections of Divisions 1 to 16 inclusive form part of the Contract Documents. Refer to Section 16010 for General Electrical Requirements related to this work.

1.2 Scope

.1 Supply and install all conduits, fittings, supports, hangers and miscellaneous support materials and hardware required for the complete systems in accordance with the applicable codes and regulations and as specified herein and on the drawings.

1.3 Location of Conduit

.1 Drawings do not indicate all conduit and supporting runs. Those indicated are in diagrammatic form only.

1.4 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.5 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

2 PRODUCTS

2.1 Conduits

.1 Minimum conduit size: 21mm (3/4”).

.2 Rigid steel metal threaded conduit, hot dip galvanized inside and outside with a coated layer to inhibit rust. Complies with CSA C22.2 No. 45 (R2003).

.3 Epoxy coated conduit: with zinc coating and corrosion resistant epoxy finish inside and outside.

.4 Rigid PVC conduit, manufactured to schedule 40 wall thickness. Solvent weld compound for all PVC joints. Complies with CSA C22.2 No. 211.2-06.

.5 Flexible steel conduit and liquid tight flexible metal conduit, spirally wound interlocked aluminum armour construction with overall PVC jacket. Complies with CSA C22.2 No.56-04.

2.2 Conduit Fastenings and Supports

.1 One-hole and two-hole hot dip galvanized steel straps.

.2 Hot dipped galvanized steel beam clamps.

.3 Hot dipped galvanized steel channel type supports, U-shape, size 41x41 mm, 2.5 mm thick.

.4 6 mm diameter threaded galvanized steel rods to support suspended channels. Provide all necessary galvanized steel spring-loaded bolts, nuts, washers and lockwashers.

2.3 Conduit Fittings

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit. Fittings to incorporate nylon insulated throat or bushing.

.2 Factory “ells” where 90° bends are required for 25 mm and larger conduits.

.3 Pressure type terminals for all rigid steel conduit grounding wire connections.

.4 Rigid steel conduit hub type connectors in wet or outdoor areas: nylon insulated with recessed neoprene ‘O’ ring.

.5 Liquid tight flexible conduit fittings to incorporate a threaded grounding core, nylon compression ring and gland. Insulated throat, male thread and locknut or bushing with an integral ‘O’ ring seal.

.6 Locknuts bonding type with sharp edges for digging into metal wall of enclosure

2.4 Expansion Fittings for Rigid Conduit

.1 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.

.2 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 Conduit Seal Fittings, Drains and Breathers

.1 Suitable for Class 1, Zone 1, Group II B, hazardous areas.

.2 Sealing compound: Chico A, restricts passage of gases, vapours, or flames between conductors and fitting.

.3 Include drain to automatically remove condensation in each seal fitting.

2.6 Fish Cord

.1 6 mm stranded nylon cord, tensile strength 5 kN.

3 EXECUTION

3.1 Installation

.1 Use rigid PVC conduit for all non-hazardous areas, indoor and outdoor wiring. Solvent weld (glue) all PVC joints.

.2 Install ground conductor in all types of conduits.

.3 Use rigid galvanized steel conduit for any exposed “life-safety” circuit wiring in non-hazardous areas. Refer to Section 46 of the OESC.

.4 Use rigid galvanized steel threaded conduit in all hazardous or classified areas, and as required by Ontario Electrical Safety Code.

.5 Use epoxy coated conduit in damp and corrosive areas, as noted on drawings.

.6 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.7 Use flexible metal conduit for connection to recessed incandescent fixtures without a prewired outlet box, connection to surface or recessed fluorescent fixtures.

.8 Use liquid tight flexible metal conduit for connection to all motors or vibrating equipment.

.9 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.10 Mechanically bend steel conduit over 19 mm diameter.

.11 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.12 Install fish cord in empty conduits.

.13 For recessed panelboards, run two 25 mm spare conduits up to ceiling space and two 25 mm spare conduits down to ceiling space from each flush panel. Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in flush concrete type box.

.14 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

.15 Dry conduits out before installing wire.

.16 Support equipment using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.17 Install expansion sleeves wherever conduits cross a structural expansion joint.

3.2 Surface Conduits

.1 Use metal conduit (with separate ground wire) for all life safety devices such as emergency lighting and exit signage and as defined in Section 46 of the Ontario Electrical Safety Code.

.2 Run parallel or perpendicular to building lines.

.3 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.4 Run conduits in flanged portion of structural steel.

.5 Group conduits wherever possible on surface mounted channels.

.6 Do not pass conduits through structural members except as indicated.

.7 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

.8 Do not use 'C'-type clamps or perforated metal straps.

.9 The maximum length of straight conduit run shall be 60 m between pull boxes or other terminations. Reduce this length by 15 m for each 90º bend or 7 m for each 45º bend or offset. Conduit runs to include not more than the equivalent of two 90º bends between pull boxes except where indicated otherwise on the drawings.

.10 Make no holes in building structural members for supporting conduits without the permission of the Engineer.

.11 Touch up and repair coated conduits and fittings on which the epoxy or PVC finish has been damaged; paint with a compound material supplied by the original conduit manufacturer.

.12 Fasten exposed conduit to building construction or support system using straps.

.1 One-hole galvanized steel straps to secure surface conduits 50 mm and smaller.

.2 Two-hole galvanized steel straps for conduits larger than 50 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.13 Suspended support systems.

.1 Support individual conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support two or more conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

.14 For surface mounting of two or more conduits use channels at 1.5 m o.c. spacing.

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

3.3 Concealed Conduits

.1 Do not install horizontal runs in masonry walls.

.2 Do not install conduits in terrazzo or concrete toppings.

.3 Run concealed conduits in ceiling spaces in straight lines with large radius bends where applicable.

.4 Install conduits in cores of concrete masonry walls as the walls are being erected.

.5 Do not cut into the wall after the walls are in place, unless otherwise authorized by Engineer.

3.4 Conduits in Cast-in-Place Concrete

.1 Locate to suit reinforcing steel. Install in middle third of concrete slab or wall.

.2 Fix conduit to reinforcing bars (or provide chairs) to prevent conduit from moving during concrete placement.

.3 Protect conduits from damage where they stub out of concrete. Terminate stub-ups 100 mm above finished floor and seal with threaded cap.

.4 Install sleeves where conduits pass through slab or wall.

.5 Where conduits pass through waterproof membrane provide oversized sleeve before membrane is installed. Use cold mastic between sleeve and conduit.

.6 Do not place conduits in slabs in which slab thickness is less than 4 times conduit outer diameter.

.7 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.8 Organize conduits in slab to minimize crossovers.

3.5 Conduits in Cast-in-Place Slabs on Grade

.1 Run conduits 25 mm and larger below slab and encased in 75 mm concrete envelope. Provide 50 mm of sand over concrete envelope below floor slab.

.2 Protect conduits from damage where they stub out of concrete. Terminate stub-ups 100 mm above finished floor and seal with threaded cap.

.3 Install sleeves where conduits pass through slab or wall.

3.6 Conduits Underground

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

END OF SECTION

Wire and Cables

1 GENERAL

1.1 General Conditions

.1 All sections of Division 1 form a part of this Specification. Read and fully adhere to exactly as if repeated here in full.

.2 Refer to all other Divisions of the Specifications and these documents to determine their effect upon the work of this section.

.3 All sections of Divisions 1 to 16 inclusive form part of the Contract Documents. Refer to Section 16010 for General Electrical Requirements related to this work.

1.2 Scope

.1 Furnish all labour, materials, supervision, equipment and services specified, indicated or requested to install the complete wiring systems specified herein including, but not limited to:

.1 Low voltage wire and cables.

.2 Include in the wiring system all wiring, terminations, wire markers, cable tags, cable ties, splice fittings, insulation tapes, connectors and miscellaneous materials necessary to complete the wiring system.

1.3 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.4 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

2 PRODUCTS

2.1 Low Voltage Wire and Cable (1000V and Below)

.1 Conductors: stranded Copper conductors, with minimum power conductor size: No. 12 AWG, minimum control conductor size: No. 14 AWG.

.2 Power conductors: size as indicated, with cross linked polyethylene (XLPE) insulation rated 1000 V – RW90 or RWU90, as indicated.

.3 Provide Sunlight Resistant ("SR" type) insulated conductors where exposed to weather.

.4 Control conductors: XLPE insulation rated 600 V – RW90.

.5 Control panel wiring: copper with thermoplastic insulation type TEW rated at 600 V.

.6 Provide multi-conductor cables wrapped with interstitial fillers and an overall PVC (minus 40°C) flame retardant, low acid gas evolution jacket.

.7 Insulated ground conductors forming part of a multi-conductor cable assembly shall have green colour coding.

.8 Colour coding of insulated conductors:

.1 1-conductor cable-Black

.2 2-conductor cable-Black, White

.3 3-conductor cable-Red, Black, Blue

.4 4-conductor cable-Red, Black, Blue, White

.5 Multi-conductor cables-Number code

.6 Intrinsically safe field wiring: Yellow

.9 Teck90 Cable requirements:

.1 Conductors: Class B compressed stranded Copper conductors, size as indicated, with cross linked polyethylene (XLPE) insulation rated 1000V – RW90.

.2 Inner jacket: Black PVC flame-retardant, moisture resistant

.3 Armour: flexible interlocking aluminum armour.

.4 Overall jacket: PVC flame-retardant, moisture and sunlight resistant, with fully printed label of cable description on jacket.

.5 Compliances: cable rated for wet and dry installation, and hazardous locations. Compliant with CSA C22.2 Nos. 131 and 174, including CSA FT1 and FT4.

.6 Armoured/Teck90 Cable connectors:

.1 Watertight connectors for non-hazardous areas.

.2 Class 1, Zone 1, Group II B rated connectors c/w sealing compound for hazardous areas.

2.2 Wiring Accessories

.1 Wire markers: computer printed, black letters on white background, self-laminating – vinyl markers, number of markers as required.

.2 Cable markers for cables or conductors greater than 13 mm diameter: strap-on type, rigid PVC, black letters on white background, with PVC covered aluminium straps.

.3 Terminal blocks: minimum 600 V rated, modular, sized to accommodate conductor size used.

.4 Where screw-type terminals are provided on equipment field wiring: terminate with pressure-type insulated copper fork tongue terminals.

.5 Splice connectors for wire sizes Nos. 12-10 AWG inclusive: compression spring type.

.6 Splice connectors for wire sizes No. 8 AWG and larger: split-bolt type, sized to suit number and size of conductors, c/w flame retardant foot-type insulator.

.7 Cable ties shall be nylon, one-piece, self-locking type.

.8 Connectors for Teck armoured cables installed in hazardous locations: design approved for the application.

.9 Connectors for Teck armoured cables installed in wet areas or outdoors: watertight design.

.10 Cable pulling lubricant: compatible with cable covering and will not cause damage and corrosion to conduits or ducts.

3 EXECUTION

3.1 Installation – General

.1 Install all wire and cable according to the drawings, with a minimum power conductor size of No. 12 AWG and minimum control conductor size of No. 14 AWG.

.2 Pull cable into ducts and conduits in accordance with the cable manufacturer's recommendations, using patented cable grips suitable for the type of cable or using pulling eyes to be installed directly onto the cable conductors.

.3 Limit pulling tensions to those recommended by the manufacturer to avoid overstressing cable.

.4 Utilize adequate lubricant when pulling cables through ducts and conduits to minimize wear on cable jackets.

.5 Install all through wiring in junction and pull boxes having no connection within the box with a minimum of 150 mm of slack left inside the box.

.6 Install instrument and thermocouple extension wiring separate from power and control wiring.

.7 Make connections to equipment “pig-tails” with mechanical, insulated, screw-on connectors for wire sizes Nos. 12-10 AWG. For wire sizes No. 8 AWG and larger utilize split-bolt connectors, taped with three layers minimum of insulating tape.

.8 No splices shall be permitted in cable or wiring runs, and shall only be permitted in junction boxes.

.9 Unless otherwise specified, make all wiring tapes, splices and terminations with identified compression screw type terminal blocks, securely fastened to avoid loosening under vibration or normal strain. Make connections for interior and exterior lighting circuits and 120 V, 15 amp convenience receptacle circuits using screw-on or split-bolt connectors and insulating tape.

.10 Identify each conductor by plastic slip-on markers at each termination indicating the circuit designation or wire number.

.11 Identify each cable by attaching a suitable marker, stamped or indelibly marked with the cable number, at each end of the cable and in all intermediate manholes, junction boxes and pull boxes.

3.2 Testing

.1 Perform tests in accordance with Section 16012 Field and Quality Control (Testing).

.2 Ensure all safety procedures are in place prior to performing any cable tests.

END OF SECTION

Electrical Boxes

1 GENERAL

1.1 General Conditions

.1 All sections of Division 1 form a part of this Specification. Read and fully adhere to exactly as if repeated here in full.

.2 Refer to all other Divisions of the Specifications and these documents to determine their effect upon the work of this section.

.3 All sections of Divisions 1 to 16 inclusive form part of the Contract Documents. Refer to Section 16010 for General Electrical Requirements related to this work.

1.2 Scope

.1 Furnish all labour, materials, supervision, equipment and services specified indicated or requested to install all electrical boxes specified herein and on the drawings.

1.3 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.4 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

2 PRODUCTS

2.1 Enclosure Ratings for all Equipment Listed Herein

.1 Indoor and dry locations: NEMA/EEMAC 12, unless otherwise noted on drawings.

.2 Below grade, damp or outdoor locations: NEMA/EEMAC 4X, unless otherwise noted on drawings.

.3 Hazardous or classified areas: suitable for Class 1, Zone 1, Group II B areas.

2.2 Junction and Pull Boxes

.1 Reference: CAN CSA C22.2 No. 40-M1989.

.2 Welded galvanized steel construction with screw-on lockable flat covers for surface mounting and captive non-corroding chain.

.3 Lockable covers with neoprene gasket and 25 mm minimum extension all around, for flush mounted pull and junction boxes.

.4 Piano-type hinges on boxes larger than 300 x 300 mm.

2.3 General Outlet and Conduit Boxes

.1 Reference: CAN CSA C22.2 No. 18-M1987.

.2 Size boxes in accordance with CSA C22.1.

.3 102 mm square or larger outlet boxes as required for special devices.

.4 Boxes in hazardous areas: suitable for Class 1 Zone 1, Group II B areas.

.5 Gang boxes where wiring devices are grouped.

.6 Blank cover plates for boxes without wiring devices.

.7 Combination boxes with barriers where outlets for more than one system are grouped.

2.4 Sheet Steel Outlet Boxes

.1 Electro galvanized steel single and multi-gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.2 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.3 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster walls.

2.5 Masonry Boxes

.1 Electro galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls, c/w preformed knock-outs.

2.6 Concrete Boxes

.1 Electro galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.7 Conduit Boxes

.1 Cast FS or FD boxes with factory threaded hubs and mounting feet for surface wiring of switches and receptacle.

2.8 Fittings – General

.1 Bushing and connectors with nylon insulated throats.

.2 Knock out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

2.9 Manufacturers

.1 Acceptable manufacturers: Appleton, Crouse-Hinds, W.C. Pursley, BEL, Stelpro, Pyle National, Taylor, and C.E.B.

3 EXECUTION

3.1 Installation

.1 Install splitters and mount plumb, true and square to the building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

.3 Install pull boxes in inconspicuous but accessible locations.

.4 Mount cabinets with top not higher than 2 m above finished floor.

.5 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

.6 Provide equipment identification in accordance with Section 16010 – Electrical General Requirements.

.7 Provide access panels in ceilings where junction and pull boxes are located in spaces not otherwise accessible.

.8 Make cut-outs for outlet boxes recessed in walls neatly and of the minimum practical size.

.9 Install boxes to clear all building and mechanical services equipment. Where two or more devices are shown at one location, utilize multi-gang boxes. Supply all outlet boxes with covers or plaster rings as required.

.10 Size all boxes to accommodate the number of conduits, conductors and terminal blocks. Provide junction boxes with 20% spare terminal blocks.

.11 Securely fasten surface-mounted boxes to the building or mounting structure and support independently of the conduits entering the box.

.12 Install junction and pull boxes mounted on brick, concrete or block walls with 3 mm thick lead or nylon washers between box and wall face.

.13 Provide all boxes sized to the Ontario Electrical Safety Code requirements, in all conduit raceway systems to limit length of straight conduit runs to 60 m. Reduce this length by 15 m for each 90° bend or 8 m for each 45° bend or offset.

.14 Mark location and size of all pull boxes on the record drawings.

.15 Install boxes in hazardous locations as required and shown on the drawings. Provide conduit seals for all conduits entering enclosure.

.16 Support boxes independently of connecting conduits.

.17 Fill outlet and conduit boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.18 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.19 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

END OF SECTION

Wiring Devices

1 GENERAL

1.1 General Conditions

.1 All sections of Division 1 form a part of this Specification. Read and fully adhere to exactly as if repeated here in full.

.2 Refer to all other Divisions of the Specifications and these documents to determine their effect upon the work of this section.

.3 All sections of Divisions 1 to 16 inclusive form part of the Contract Documents. Refer to Section 16010 for General Electrical Requirements related to this work.

1.2 Scope

.1 Furnish all labour, materials, supervision, equipment and services specified, indicated, or requested to install the wiring and control devices specified herein and on the drawings.

1.3 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.4 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

2 PRODUCTS

2.1 General AC Switches

.1 Single pole, double pole, 3-way, 4-way switches, as indicated, 20 Amp, 120 VAC, CSA approved.

.2 Non-hazardous areas: manually operated, industrial grade AC switches. Colour to be advised by Engineer.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, with silver alloy terminals.

.4 Switches of one manufacturer throughout project.

.5 Acceptable manufacturers:

.1 Arrow Hart, Pass & Seymour, Hubbell and Leviton.

2.2 General AC Receptacles

.1 Industrial grade, 15A-125V AC rated with CSA type 5-15R configuration or 20A-125V AC rated T-slot with CSA type 5-20R configuration (as indicated on drawings), U ground and CSA approved. Single or duplex receptacle as indicated on drawings. Colour to be advised by Engineer.

.2 Hazardous or classified areas: suitable for Class 1, Zone 1, Group II B areas, delayed action – circuit breaking receptacle with plug adapter. Single or two gang assemblies as indicated on drawings.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

.5 Acceptable manufacturers:

.1 Arrow Hart, Pass & Seymour, Hubbell and Leviton.

2.3 Ground Fault Interrupting Receptacles

.1 Receptacle: Duplex CSA 5-15R configuration, 125V, 15A, Class A type interrupter.

.2 Integral solid state ground sensing device.

.3 Integral “test” and “reset” pushbuttons.

.4 Acceptable manufacturers: Leviton, Hubbell and Bryant.

2.4 Cover Plates

.1 Cover plates from one manufacturer throughout project.

.2 Stainless steel utility box cover for wiring devices installed in surface mounted utility boxes.

.3 Stainless steel cover plates (1 mm thick) for wiring devices mounted in surface mounted FS or FD type conduit boxes.

.4 Weatherproof (WP) double lift spring loaded cast aluminium cover plates complete with gaskets for duplex receptacles as indicated.

.5 Weatherproof spring loaded cast aluminium cover plates complete with gaskets for single receptacles or switches.

3 EXECUTION

3.1 General Switch Installation

.1 Install single throw switches with handle in “UP” position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height specified in Section 16010 – Electrical General Requirements or as indicated.

3.2 General Receptacle Installation

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

.2 Mount receptacles at height specified in Section 16010 – Electrical General Requirements or as indicated.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Provide a separate grounding wire from power source (panel board) to each receptacle, light switch, control panel, junction box, etc.

3.3 Cover Plate Installation

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

END OF SECTION

Basic Electrical Equipment

1 GENERAL

1.1 General Conditions

.1 All sections of Division 1 form a part of this Specification. Read and fully adhere to exactly as if repeated here in full.

.2 Refer to all other Divisions of the Specifications and these documents to determine their effect upon the work of this section.

.3 All sections of Divisions 1 to 16 inclusive form part of the Contract Documents. Refer to Section 16010 for General Electrical Requirements related to this work.

1.2 Scope

.1 Furnish all labour, materials, supervision, equipment and services specified, indicated or requested to install all equipment and materials specified herein and on the drawings.

.2 All (local) control panels and pushbutton stations indicated on the Electrical Drawings will be supplied, installed and tested under this section.

1.3 Shop Drawings

.1 Submit in accordance with Division 1.

.2 For each control panel and pushbutton station include all layout drawings, terminal blocks, control relays, wire numbering system, panel dimensions, enclosure rating, wiring arrangement, nameplates, etc.

1.4 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.5 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

2 PRODUCTS

2.1 Enclosure Ratings

.1 Refer to Table 65 in the OESC.

.2 Indoor and dry locations: EEMAC 12.

.3 Below grade, damp or outdoor locations: EEMAC 4X. Provide 316 stainless steel as indicated.

2.2 Obstruction Luminaire

.1 Transport Canada type CL-865f & Compliant with CARs 621 obstruction light.

.2 Construction: UV resistant cover and base complete with lightning/surge protection in flash head and control box.

.3 Power: 120VAC, 60Hz, 32W (day mode), 9W (night mode).

.4 Light output colour: white/white/red.

.5 Light intensity, day mode = 20.000cd+/- 25%.

.6 Light intensity, night mode = 2.000cd+/- 25%.

.7 Horizontal coverage = 360 degree.

.8 Vertical beam = 3 degree.

.9 Operating temperature: -55 degree C to +55 degree C.

.10 Acceptable manufacturer:

.1 Inter Signal Aviation Obstruction Inc. Solis LED System, Single Flash Head, Goni Mior, 450-288-4190, Goni@Inter-Signal.com.

2.3 AC Control Relays (Instantaneous)

.1 General purpose plug-in type relays, low coil current heavy-duty contacts with minimum three SPDT contact poles. Coil rating: 120 V, 60 Hz. Contact rating: 120 V, 10A resistive.

.2 Acceptable manufacturers: Allen-Bradley, Potter Bromfield, Omron.

2.4 Relay Accessories

.1 Overlap contact cartridges: supplied in pairs having NO contact that closes before NC contact opens (early make -late break).

.2 Mounting strips: indexed strips easily cut to required length and bolted in place. Relays are installed in rows on strip with captive mounting screws. Rows of relays on mounting strip form their own wiring trough.

2.5 Timing Relays

.1 General purpose plug-in type relays, low coil current heavy-duty contacts with multi-contact poles as indicated. Coil rating: 120 V, 60 Hz. Contact rating: 120 V, 10A.

.2 Timing adjustment: self contained to provide time interval adjustment. Timing range as indicated.

.3 Acceptable manufacturers: Allen-Bradley, Potter Bromfield, Omron.

2.6 Pushbuttons

.1 Momentary contact type: 30mm heavy duty – oil tight, operator flush type, colour as indicated, 1-NO and 1-NC contacts rated 5A at 120V AC, labels as indicated.

.2 Push-pull contact type: 30mm heavy duty – oil tight, operator 30.5mm mushroom head type, red colour, provision for padlocking in “OFF” position, 2-NO and 2-NC contacts rated 5A at 120V AC, labels as indicated.

.3 Pushbutton ratings:

.1 EEMAC/ NEMA type 13 for indoor control panels

.2 EEMAC /NEMA type 4 for outdoor control panels

.3 EEMAC/NEMA type 7 suitable for Class 1, zone 1 hazardous areas

.4 Acceptable manufacturers: Allen-Bradley, Cutler-Hammer, Siemens, and Square D (Schneider).

2.7 Selector Switches

.1 Maintained contact type, two or three positions (as indicated), 30mm heavy-duty, oil-tight, operators standard knob, contact arrangement as indicated rated 5A at 120V AC, labels as indicated.

.2 Selector switch ratings:

.1 EEMAC/NEMA type 13 for indoor control panels

.2 EEMAC/NEMA type 4 for outdoor control panels

.3 EEMAC/NEMA type 7 suitable for Class 1, zone 1 hazardous areas.

.3 Acceptable manufacturers: Allen-Bradley, Cutler-Hammer, Siemens, and Square D (Schneider).

2.8 Key Switches

.1 Maintained contact type, two or three positions (as indicated), 30mm heavy duty – oil tight, operators standard knob, contact arrangement as indicated rated 5A at 120V AC, labels as indicated.

.2 Switch ratings:

.1 EEMAC/NEMA type 13 for indoor control panels

.2 EEMAC/NEMA type 4 for outdoor control panels

.3 EEMAC/NEMA type 7 suitable for Class 1, zone 1 hazardous areas.

.3 Key removal from one position only.

.4 Acceptable manufacturers: Allen-Bradley, Cutler-Hammer, Siemens, and Square D (Schneider).

2.9 Indicating Lights

.1 30mm heavy duty – oil tight, transformer type, lens colour: as indicated, supply voltage: 120 V, lamp voltage: 6 V, labels as indicated.

.2 Indicating light ratings:

.1 EEMAC type 13 for indoor control panels

.2 EEMAC type 4 for outdoor control panels

.3 EEMAC/NEMA type 7 suitable for Class 1, zone 1 hazardous areas.

.3 Acceptable manufacturers: Allen-Bradley, Cutler-Hammer, Siemens, and Square D (Schneider).

2.10 Control Circuit Transformers

.1 Single phase, dry type.

.2 Primary: as indicated, 60 Hz AC.

.3 Secondary: 120V or 24V AC as indicated.

.4 Rating: as indicated plus 20% spare capacity.

.5 Secondary fuse kit (terminal block type chips) and fuse, size as indicated.

.6 Close voltage regulations as required by magnet coils and solenoid valves.

.7 Acceptable manufacturers: Hammond or Marcus.

3 EXECUTION

3.1 Installation – General

.1 Install and/or connect equipment as indicated.

.2 Perform tests in accordance with Section 16010 – Electrical General Requirements and manufacturer's recommendations.

3.2 Power Panelboards

.1 Connect loads to circuits. Perform a "load balance" check after all loads are connected. Refer to Section 16010.

.2 Connect neutral conductors to common neutral bus with respective neutral identified.

.3 Breaker sizes listed in the panelboard schedule(s) are provided as a general guide. Prior to installation, contractor to confirm all breaker sizes with final equipment loads

.4 Contractor to size all panelboard feeder wiring and conduit based on Ontario Electrical Safety Code - latest edition. Include insulated ground conductor in all conduit raceways.

.5 Provide a Nameplate: Size 4.

3.3 Control Panel Installation and Testing

.1 Install all control panels according to size and type indicated on contract drawings.

.2 Arrange and mount pushbuttons, selector switches, etc. on control panels as indicated on drawings.

.3 Where three or more control devices are mounted in a single enclosure, wire them to terminal blocks at bottom of enclosure for connection of field wiring. Identify all wiring at each termination point with wire markers.

.4 Identify each control panel and each corresponding group of control device with nameplates, with identical wording as indicated on drawings.

.5 Arrange all wiring within control panel systematically so that all circuits can be readily traced.

.6 Wire runs up to ten conductors may be tie-wrapped. For wiring installations exceeding ten conductors, plastic wire ducts with covers shall be used.

.7 Provide terminal block terminations for all outgoing wiring connections including spare terminals totaling at least 25% of those actually used.

.8 Wiring connections to terminal blocks: do not exceed two wires per terminal. Use Bridge Bars if more than two wire connections are required.

.9 Provide all terminals blocks with clear plastic snap-on safety covers.

.10 Install all panels true, plumb and square to build lines, and to mounting height specified in Section 16010 – Electrical General Requirements.

.11 Perform tests in accordance with Section 16010 – Electrical General Requirements.

.12 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at a time and check out operation of section.

.13 Where 'control modules' are supplied by other divisions for panel mounting, co-ordinate with the appropriate division.

.14 Install strip heaters in outdoor enclosures to prevent condensation build-up. Install No. 12 AWG, copper, high temperature, heat resistant cables for all connections. Do not drill through enclosure wall to mount strip heater.

END OF SECTION

Services for Mechanical Equipment

1 GENERAL

1.1 Intent

.1 Coordinate the work of all section of Division 16 with the power and control requirements for the equipment specified in Division 15 – Mechanical, and as shown on the process, mechanical and electrical drawings.

1.2 Related Work Specified Elsewhere

.1 The following are specified in Division 15:

.1 Elevated Water Storage Tank.

.2 Elevated Water Storage Tank Electric Mixer.

.2 Provide the necessary labour, materials and equipment to install, connect and operate the equipment/systems listed above.

1.3 Measurement for Payment

.1 No measurement for payment will be made under this section.

1.4 Basis of Payment

.1 All labour, materials and equipment necessary for the work in this Section shall be included in the lump sum prices in the Schedule of Items and Prices.

2 PRODUCTS

2.1 General

.1 Refer to the applicable section under Division 16 for all the electrical material and equipment used or required to install and/or connect the equipment supplied under Divisions 15.

3 EXECUTION

3.1 Installation – General

.1 For all mechanical equipment, supply and install the following:

.1 Power wiring and conduit or power cable, as indicated.

.2 Control wiring and conduit or control cable, as indicated.

.3 Motor starters, contactors, control relays, control devices and control panels to operate the equipment specified under Division 15 (except where indicated as components of 'packaged' equipment).

.4 'Packaged' equipment as specified under Divisions 15, to location shown on contract drawings.

.5 Interlocks between equipment.

.6 Analyzers, instrument "backboards" and feed pumps supplied 'loose' or removed under Division 15.

.2 All necessary supports, fastenings, mounting hardware, outlet boxes, junction boxes, switches, etc. to provide a complete and safe operating system.

END OF SECTION

Control Narrative

1 GENERAL

1.1 General Conditions

.1 All sections of Division 1 form a part of this Specification. Read and fully adhere to exactly as if repeated here in full.

.2 Refer to all other Divisions of the Specifications and these documents to determine their effect upon the work of this section.

.3 All sections of Divisions 1 to 16 inclusive form part of the Contract Documents.

1.2 Scope

.1 Supply, deliver and install the "Control Narrative" as specified herein in greater detail and as shown on the drawings.

.2 Contractor is responsible for coordinating the Control Narrative specified herein with the information on the contract drawings. Ensure all processes will operate in accordance with these descriptions through the new EWST PLC, as specified in Section 16910, and all existing PLCs.

1.3 Related Work Specified Elsewhere

.1 Electrical General Requirements: Section 16010 (lists the acceptable "Control System Integrator").

.2 Basic Electrical Equipment: Section 16400.

.3 Services for Mechanical Equipment: Section 16850.

.4 For "PLC I/O List" refer to the contract drawings.

1.4 Intent

.1 This section is to provide control narrative description of the process for the Township of North Huron, Wingham Standpipe. The process equipment covered in this document includes miscellaneous process and instrumentation equipment at the new Standpipe as well as communication with the existing North Huron SCADA infrastructure and programming revisions to the well pump and high lift pump operation within the Township.

.2 These descriptions are specifically written for use by a "Control Programmer" to write the software program for the Process Control System (PLC). They are to convey the control strategies that apply to the EWST PLC/HMI as well as the local Master Supervisory Control and Data Acquisition System (SCADA) and their relationship to the process equipment. Refer to the contract drawings as they supplement the description of this section.

.3 The Control System Integrator is to include all necessary programming revisions during site acceptance testing (SAT) with the engineer.

.4 In Part 2, "Products," each section is further subdivided into the following categories:

.1 Process Description:

.1 This section identifies the equipment involved and a general understanding of the process control strategies.

.2 PLC Program:

.1 This section describes the actual PLC Program function for the equipment involved. The modes of operation are identified, including list of conditions by which the appropriate mode is determined. Each mode of operation is individually described, listing all constraints and limitations.

.2 If applicable, a list of variables will be provided to identify those aspects of the program, which can be adjusted from the local HMI and/or SCADA system. Examples of variables include timers, level set points, motor speeds, etc.

.3 All the variables listed in this document are to be mapped to the PLC for interaction with the HMI/SCADA system.

.3 Monitoring and Alarm:

.1 This section describes the alarms and status conditions of the equipment involved.

1.5 Submittals

.1 A detailed submittal package identifying the equipment to be supplied and its operation shall be furnished. The intent of the submittal is to ensure complete project scope coverage and does not relieve the supplier from fulfilling any specified requirements. The following shall be provided:

.1 Description of all hardware and software to be supplied.

.2 Description of the major user-related features and operating characteristics of the proposed system.

.3 Control narrative including HMI/SCADA screens.

1.6 Shop Drawings

.1 Submit Shop Drawings in accordance with Division 1.

.2 Shop drawings shall be submitted for all equipment listed in these specifications. The system supplier shall submit three copies of shop drawings to be retained by the Owner, plus the number of copies required for his own use.

1.7 Record Drawings

.1 Record drawings for the control and monitoring system shall be produced consisting of marked-up contract drawings showing any changes and deviations from the contract drawings.

1.8 Operations and Maintenance (O & M) Manuals

.1 The following printed materials shall be provided:

.1 Submit Operating and Maintenance Manuals in accordance with Division 1.

.2 Detailed O & M manuals shall be provided with complete information concerning the operation of the system and support necessary with diagnostics down to the module and card replacement level.

.3 A detailed written description of system hardware, software and system operation shall be provided. The description of master site hardware and software shall identify pertinent references to sections of standard hardware and software manuals where operational procedures are detailed. Control loops shall be fully described in the O & M manual. A detailed description of PLC site hardware and programmed features such as I/O and local control loops shall be included.

.4 Four sets of complete O & M manuals with all project specific information shall be furnished in three-ring binders with indexed tab

sections. Also provide electronic version of O&M manual in searchable PDF format.

.5 A listing of all recommended spare parts shall be included in the O&M manuals.

.6 Data sheets shall be supplied for all significant equipment used in the system. The data shall include, as a minimum, the component name, manufacturer, model number, quantity and any special O & M characteristics.

.7 One set of detailed data base program listings.

1.9 Operation and Testing

.1 Perform tests to demonstrate the complete working system in the contractor's premises in the presence of the Engineer and Operating Authority.

.2 Contractor shall note the requirements of the Division 1 regarding commissioning, start-up and warranty period inspection requirements.

1.10 Guarantee

.1 The system supplier shall guarantee that all products and services covered by or supplied pursuant to this contract shall:

.1 Comply with the specifications for the said equipment.

.2 Be free from defects in design, manufacture, workmanship, or materials for a period of 24 months from final commissioning and acceptance at site.

.3 Perform efficiently and without unwanted interruption for a period of 24 months from final commissioning and acceptance at site.

.4 Have any breakage, damage, defects or deterioration (other than those due to the negligence of parties other than the supplier or to the imposition on the equipment of extraordinary working conditions or to normal wear and tear) in the said equipment that occur or are detected and are reported to the supplier within the guarantee period referred to in c) above made good promptly by the supplier at his entire expense including the expense of all necessary labour, supervision, travelling, replacement parts and transportation. (To assist the supplier in having work carried out on installed equipment

or in removing or replacing installed equipment or parts, thereof; the Owner will take all reasonable steps to provide the supplier with ready access to such equipment).

2 PRODUCTS

2.1 General – System Overview

.1 The following sections are intended to describe, in a general sense, the operating methodology and control and monitoring requirements for the proposed Wingham Standpipe, to be located at 199 John Street East in Wingham, Ontario. It will be the responsibility of the Control System Integrator (CSI) to make the necessary programming changes to any existing PLC/HMI/SCADA and related equipment.

.2 The community of Wingham is serviced by a drinking water system (DWS) that takes water from two groundwater wells. The following details the capacity of the Wingham Water System:

System Component	Capacity	Source Information
Well Supplies Well 3	6,537 m^3/day	MDWL/PTTW
Well 4	5,270 m^3/day	MDWL/PTTW
Combined Wells 3 & 4	11,807 m^3/day	PTTW
High Lift Pumps (Well 4)	3@33 L/s	DWWP
Treated Water Storage (Standpipe)	Total = 1,736m^3 Effective = 229m^3	BMROSS Calc.

Notes: 1. PTTW = Permit to Take Water

.3 The following are the locations for Well 3 and Well 4:

.1 Well 3 – Arthur Street and Water Street, in Wingham.

.2 Well 4 – Albert Street West, in Wingham.

.4 The existing standpipe is to be bypassed during the construction of the new standpipe. The CSI is to provide support in reprogramming the existing well pump operation and the existing high lift pumps at Well 4, as necessary to facilitate the bypassing of the existing standpipe during construction and returning operation back to normal as part of the commissioning of the new standpipe. Well pump high lift pumps at Well 4 operation to be based on pressure. The CSI is to coordinate all work with the Township's water system Operating Authority and obtain permission prior to completing any changes to the system.

.5 The proposed standpipe will generally consist of the following process equipment that will either be controlled and/or monitored by the PLC and/or the existing SCADA System:

.1 Instrumentation monitoring as follows:

.1 Standpipe Level (existing pressure instruments)

.2 Miscellaneous systems:

.1 Electric Standpipe Mixer.

.2 Obstruction Light Monitoring.

.6 Refer to contract drawings for arrangement of Process Control System.

.7 Refer to contract drawings and Control Narrative for field device settings. All setpoints noted as TBA are “To Be Advised” during construction phase prior to starting of PLC program development.

.8 Selected alarms will be sent to the HMI/SCADA system for Operator notification. Selection of alarms for notification is at Owners discretion.

.9 The HMI/SCADA system will be developed to include all necessary site layouts and process schematic screens, control and alarms for the standpipe. CSI to provide sample screens for review and approval by the Engineer and Owner. Additional development of reporting requirements, based on Owner input will be required. Additional control and monitoring requirements will be required as detailed in this specification.

.10 Provide PLC programming in all affected processors such that for all alarm conditions an addressed register be set for use by the alarm monitoring and notification software for indication of each specific alarm condition. The CSI is to consult with Client and Engineer for final approval.

.11 Provide additional PLC, HMI and SCADA programming such that all PLC control, status, trending and alarming signals be available from the HMI/SCADA System for all equipment.

.12 Provide all necessary PLC, HMI and SCADA programming such that all alarm signals from the proposed standpipe will be annunciated on the Township’s Central SCADA Alarm System, in addition to the local HMI and alarm dialer located at the standpipe. Final direction to be confirmed during construction.

.13 Provide training to Operators on how to download all required trending information and to how to extract all pertinent information, as requested by Operators, from the HMI/SCADA system.

2.2 Instrumentation Monitoring

.1 Process Description:

.1 The standpipe level control instrumentation is existing.

.2 CSI is to assist in the re-calibration of the existing pressure instruments to the new standpipe.

.3 All existing alarming and setpoint elevations to remain.

2.3 Miscellaneous Systems

.1 Process Description:

.1 The miscellaneous monitoring systems consist of the following equipment:

.1 Standpipe Electric Mixer.

.2 Obstruction Light Monitoring.

.2 Control Program

.1 Provide programming for starting, stopping and monitoring of the standpipe mixer. The mixer can be started/stopped from SCADA. The PLC will receive a mixer running signal from the mixer control panel. The PLC will also receive a 4-20 mA analog input signal to represent the mixer motor current. Provide additional programming such that the mixer current will be monitored as well as a loss of signal alarm. Provide High/Low current setpoints within SCADA and alarmed in the event the current exceeds or is below the setpoint values.

.2 Provide programming such that mixer runtime will be calculated daily for display on SCADA. Provide PLC programming such that runtime can be trended on SCADA, for a selectable time period, entered on SCADA at the discretion of the Township.

.3 Provide programming such that a daily minimum, maximum, average current for the mixer motor will be calculated at one minute intervals

and stored in memory for display on SCADA. Provide PLC programming such that these values will be displayed on SCADA and be reset by the PLC for a new daily minimum, maximum and average at 12:00 a.m.

.4 The PLC/SCADA system will monitor the inputs from the obstruction light.. Control is not available. The program will indicate the signals listed under the “Monitoring and Alarm Conditions”.

.3 Monitoring and Alarm Conditions:

.1 Configure the PLC program and HMI/SCADA to display items (as manually selected by the operator) and alarms as follows:

.1 Standpipe Mixer Running Status.

.2 Standpipe Mixer Run Time.

.3 Standpipe Mixer High/Low Current Alarm.

.4 Obstruction Light - Power Failure Alarm.

.5 Obstruction Light - Light Alarm.

.6 Obstruction Light - Motor Alarm.

.7 Obstruction Light - Photocell Alarm.

.2 Configure the PLC program to indicate each alarm. If any alarm is activated and after a pre-set time delay, the program will perform the following:

.1 Set an addressed register to be used by the alarm monitoring and notification software to indicate each alarm.

.2 Display a message of the activated alarm on the HMI/SCADA.

.3 Remain in the alarm state until the alarm has been acknowledged and reset on the HMI/SCADA.

.4 Send an alarm signal to the alarm dialer.

.5 Provide programming such that all alarms can be enable or disabled from the HMI/SCADA. All alarms to be operators selectable.

END OF SECTION

BURNSIDE

Document F

Special Provisions

Index to Document F – Special Provisions

Item No.	Description	Page No.
SP1	Standard Requirement No. 1 – Environmental Protection	1

SP1 STANDARD REQUIREMENT NO. 1 – ENVIRONMENTAL PROTECTION

General

The preservation, protection and restoration of the local environment will form part of the work of this Contract.

This Operational Constraint sets out the general requirements required to ensure and maintain an environmentally safe work place is supplemental to works covered under related items.

It is intended that the Work be executed in such a manner which, to the fullest possible extent, minimizes any adverse effect on the cultural and natural environment of the project area. The environmental conditions of the Contract stated herein must be complied with in all respects. It is a responsibility of the Contractor that all personnel be sufficiently instructed so that the Work is carried out in a manner consistent with minimizing environmental impact.

Refuelling Areas

The Contractor shall undertake a detailed review of their proposed route of construction to plan access routes and fuelling areas. Refuelling and maintenance of equipment shall not be undertaken in or adjacent to a watercourse. Suitable fuelling and maintenance areas shall be established away from the waterway and all maintenance and fuelling conducted in these areas. The locations of such areas are subject to review by the Contract Administrator. Procedures for the interception and rapid clean-up and disposal of spillages that do occur shall be submitted to the Contract Administrator for review prior to starting work. All materials required for clean-up of fuel spillages shall be maintained readily accessible on site.

The exception of these fuelling locations requirements shall be generators, cranes, backhoes or shovels which may be fuelled at other than the designated fuelling areas. However, no fuelling of backhoes shall be carried out within 30 m of any watercourse.

Any spills apt to cause impairment to the natural environment must be immediately reported by the Contractor to the Contract Administrator and to the local Ministry of the Environment District Office.

Sediment Basins & Settling Ponds

The Contractor shall take all precautions so as not to affect the quality of water as it passes through the area and to prevent eroded material from construction operations from entering streams, watercourses or private property. Appropriate sediment retention measures shall be incorporated in the Work to ensure that sediment discharge to watercourses adjacent to the working area is minimized. These may include sedimentation ponds to which pumped water or run-off is directed prior to discharge to the adjacent watercourse.

As part of the Work to be performed under this Contract and where sediment traps are required they shall be constructed downstream of all road culverts where run-off from slopes under construction may enter a watercourse or private property. Sediment

traps or similar sediment protection shall be constructed for receiving the discharge from dewatering operations. Temporary sediment traps shall be constructed in advance of any work where eroded materials could enter the watercourse. The overflow rate from settling or sedimentation ponds shall be such that the solids carryover is minimal. The Contractor shall incorporate filter berms or sandbags, as required, to retard and filter run-off prior to discharge to the watercourse.

In general, concentrated run-off from un-stabilized areas shall be intercepted and diverted to stabilized areas under sheet flow conditions. Any water pumped for the purposes of trench or structure excavation or dewatering shall be directed to a settling basin or other device to reduce suspended solids content prior to discharge to a storm sewer, drainage ditch or natural watercourse.

The Contractor shall clean and maintain the sediment traps as required. The traps shall be cleaned when approximately fifty percent (50%) filled with sediment and as directed by the Contract Administrator. Sediment material removed from the traps shall be hauled and disposed of outside the Contract limits in areas arranged for by the Contractor.

The sediment traps shall be maintained until embankment slopes and ditches in the area are reinstated. The traps shall then be removed and the area restored to its original grade or as shown on the Contract Drawings.

The Contractor shall not permit any excavated materials or other material to be deposited in any watercourses except as indicated in the Contract Documents such as rip rap, river stone or clear stone.

Permits and Authorization

The requirements set out in any permits issued for the project shall form part of this Contract and shall be strictly adhered to.

The Contractor shall provide rock check dams and straw bale flow checks as indicated on the Contract Drawings, as specified by the Permit Issuing Authorities, and as directed by the Contract Administrator.

Any deviation from the prescribed requirements and/or methods contained in or implied by the permits as issued and this Contract will result in a work stoppage until such time as the Contractor produces suitably approved or revised permits acknowledging the proposed deviation. All costs associated with revised work permits will be solely the responsibility of the Contractor.

General Restoration

Restoration shall not be undertaken as a final project task but shall be initiated as soon as backfilling and compaction activities have been completed.

Measurement for Payment

No direct measurement of quantities will be made for this work. The work will be administered as being part of the related environmental protection items or as part of the overall site work.

BURNSIDE

Document G

Articles of Agreement

G. ARTICLES OF AGREEMENT

Township of North Huron
Wingham Standpipe Replacement
Contract No. 300053193.0000

THIS AGREEMENT _____ day of _____, 2026.

BY AND BETWEEN:

.....
(herein and throughout the Contract Documents called the "Contractor")

- and -

The Corporation of the Township of North Huron
.....
(herein and throughout the Contract Documents called the "Owner")

WITNESSETH

That the Owner and the Contractor in consideration of the fulfilment of their respective promises and obligations herein set forth covenant and agree with each other as follows:

ARTICLE I

(a) This Agreement applies to the supply of all labour, material and equipment necessary to complete the Work as set out in this Contract.

(b) This Agreement, together with the documents listed in clause 3.2 of Document A of the Bid Documents constitute the "Contract" and are to be read herewith and form part of the Contract as fully and completely to all intents and purposes as though all the stipulations thereof had been embodied herein.

(c) The date from which this Contract is to be in force is the _____ day of _____, 2026.

(d) Interest

(i) Subject to GC 8.02.04.09, Interest for Late Payment and GC 8.02.04.10, Interest for Negotiations and Claims, should either party fail to make payments as they become due under the terms of the Contract or in an award by arbitration or court, interest at a variable nominal rate per annum equal on each day to the Bank Rate then in effect plus one and one-half percent (1.5%) on the outstanding payment shall also become due and payable until payment.

(ii) Subject to GC 8.02.04.09, Interest for Late Payment and GC 8.02.04.10, Interest for Negotiations and Claims, interest shall apply at the rate and in the manner prescribed by the preceding section on the amount of any claim advanced and for which the Contractor is thereafter entitled to payment, either pursuant to Section GC 3.13 of the General Conditions of Contract, or otherwise, from the date the amount would have been due and payable under the Contract, had it not been in dispute, until the date it is paid.

(e) The Contract supersedes all prior negotiations, representations, or agreements, either written or oral, relating in any manner to the Work, including the Bid Documents that are not expressly listed as forming part of the Contract Documents. The Contract may be amended only as provided in the Contract Documents. The Contract Documents shall enure to the benefit of and be binding upon the parties hereto, their respective successors and permitted assigns.

(f) Notwithstanding any other provision(s) in the Contract Documents, in the event of a pandemic, as declared by the World Health Organization, the terms put forth in this subsection will take precedence and apply to this Contract. Should circumstances arise due to a pandemic which significantly frustrate the Contractor's ability to perform and/or complete the Work, to a degree which, in the sole judgement of the Contract Administrator (in consultation with the Owner and the Contractor), renders continuation of the Work substantially inefficient or impractical and/or completion of the Work impossible, then the Owner may suspend the Work or terminate the Contract, as appropriate under said circumstances.

In the event of a Work suspension, the duration of which would be initially determined and subsequently adjusted as necessary by the Contract Administrator (in consultation with the Owner and the Contractor), the Contractor will be reimbursed by the Owner for reasonable direct costs associated with the suspension (e.g., demobilization/remobilization costs, directly related administrative costs, other specific/direct costs as approved by the Contract Administrator). Consequential/indirect costs or losses

incurred by the Contractor and all subcontractors/suppliers (e.g., loss of profit, loss of opportunity, business impact costs, special or any other incidental/indirect/consequential cost or loss) are excluded from consideration for reimbursement by the Owner in their entirety. The Contract Administrator, in a fair and balanced manner, will be the sole arbiter with respect to determination of qualifying direct costs and excluded indirect/consequential costs. The Contract Time shall be extended for a period of time matching the duration of the suspension, at a minimum, or such longer period of time as deemed appropriate by the Contract Administrator to account for schedule inefficiencies associated with suspending and restarting the Work.

In the event of Contract termination, the Contractor will be reimbursed by the Owner for reasonable direct costs associated with the termination (e.g., payment for all Work performed up to the date of termination as verified by the Contract Administrator, directly related administrative costs, material restocking fees, full payment for materials which cannot be returned/ restocked, demobilization, direct subcontract cancellation costs – excluding all associated consequential/indirect costs or losses incurred by subcontractors and suppliers, other specific/direct costs as approved by the Contract Administrator). Consequential/indirect costs or losses incurred by the Contractor and all subcontractors/suppliers (e.g., loss of profit, loss of opportunity, business impact costs, special or any other incidental/ indirect/consequential cost or loss) are excluded from consideration for reimbursement by the Owner in their entirety. The Contract Administrator, in a fair and balanced manner, will be the sole arbiter with respect to determination of qualifying direct costs and excluded indirect/consequential costs.

(g) Construction Act (Ontario Amendments (Effective January 1, 2026)

1 Precedence and Compliance:

i. **Precedence:** This Articles of Agreement clause governs the administration of hold back, lien rights, prompt payment, proper invoices, adjudication, and statutory notices for the Contract and prevails over all other provisions in the Bid/Contract Documents, including supplementary conditions, specifications, and drawings, to the extent of any inconsistency.
ii. **Statutory Compliance**: The Parties shall perform the Work in full compliance with Ontario's *Construction Act* and its regulations as amended and proclaimed effective **January 1. 2026**, including amendments introduced by the Building Ontario For You Act (Bill 216) and refined by the Fighting Delays. *Building Faster Act*. 2025 (Bill 60).

2 Mandatory Annual Release of Basic Holdback:

i. **Annual Obligation:** For Contracts extending beyond one (1) year, the Owner shall release the **accumulated basic holdback annually** (the "Annual Holdback Release"). This is a statutory requirement and is **not optional**.
ii. **Notice and Timing**: Within **fourteen (14) days** after each anniversary of the Contract Date, the Owner shall **publish a Notice of Annual Release of Holdback** in the prescribed form on a designated construction trade news website. Payment of the annual hold back shall be made **no earlier than sixty (60) days** and **no later than seventy-four (74)** days after publication, provided no preserved or perfected lien remains outstanding in that period.
iii. **Flow-Down:** Upon receipt of an annual holdback payment, the Contractor shall release the applicable annual hold back to its first-tier Subcontractors **within fourteen (14) days**, and each lower tier shall do likewise **within fourteen (14) days**, except to the extent prohibited by a preserved or perfected lien in the immediate tier.
iv. No Set-Off of Holdback Post-Termination/Abandonment: Where a contract or subcontract is abandoned or terminated, holdback amounts **shall not** be used as set-off to obtain substitute services or satisfy claims **until all potential liens against that holdback are resolved.**

3 Lien Rights and Expiry:

i. **No Annual Lien Expiry:** The Annual Holdback Release **does not** extinguish lien rights. The prior proposal to align holdback release with **annual lien expiry** has been **removed;** standard lien expiry provisions under section 31 of the Act continue to apply.
ii. **Notice of Termination:** If the Contract is terminated, the Party whose lien rights are subject to expiry (including the Owner or Contractor, as applicable) shall **publish a Notice of Termination within seven (7) days.** For statutory purposes, **the date of termination is deemed to be the date of first publication,** without prejudice to any Party's right to contest the validity of termination.

4 Statutory Notices and Publication:

i. **Designated Platforms:** All statutory notices under the Act (including, without limitation, the **Notice of Annual Release of Holdback**) shall be published on a **designated construction trade news website** in accordance with **0. Reg. 304/18** (currently

including Daily Commercial News, Link2Build, and Ontario Construction News).

ii. **Forms:** The **prescribed form** for the Notice of Annual Release of Holdback (Form 6, as amended) shall be used for compliance with section 26 of the Act, as modified by the 2026 amendments.

5 Proper Invoices and Prompt Payment:

i. **Expanded Proper Invoice Content:** A **proper invoice** includes the statutory minimum content **and** any **additional information reasonably required** for the Owner's accounts-payable system, as contemplated by the amended Act.

ii. **Deemed Proper Invoice:** An invoice that does not strictly comply with formal content requirements shall be **deemed a proper invoice** unless the Owner **notifies the Contractor** i**n writing of deficiencies within seven (7) days** of receipt, which notice shall detail the missing or non-conforming information.

iii. **Tender Alignment:** The Parties acknowledge that the Owner may specify reasonable additional content requirements for proper invoices in the Bid Documents, provided such requirements are consistent with the amended Act.

6 Adjudication; Combined Proceedings:

i. **Adjudication Scope and Process:** The Parties reaffirm their obligations to participate in **interim adjudication** under the *Act*. The 2026 amendments refine adjudication procedures and clarify interaction with payment and notice timelines without altering the core availability of adjudication introduced in prior reforms.

ii. **Combined Lien and Trust Claims:** As permitted by amended **O. Reg. 302/18, lien and trust claims may be combined** in a single proceeding where they arise from the same or related facts.

7 Transitional Rules:

i. .**New Contracts:** For Contracts **entered into on or after January 1, 2026**, the Annual Holdback Release applies **on the first contract anniversary** and annually thereafter.

ii. **Existing Contracts:** For Contracts entered into before **January 1, 2026,** the Annual Holdback Release applies beginning on the **second contract anniversary after January 1, 2026,** at which time all accrued hold back to that date shall be released, followed by annual releases thereafter.

8 No Waiver of Statutory Rights; Conflict

i. **No Waiver:** No provision of the Bid Documents shall be construed to **waive, limit, or contract out of** rights, remedies, or obligations imposed by the Act and its regulations, as amended.
ii. **Conflict Resolution:** In the event of conflict between this clause and any other part of the Bid/Contract Documents, this clause **governs**. In the event of conflict between this clause and the Act, the **Act governs.**

ARTICLE II

THE CONTRACTOR UNDERTAKES AND AGREES:

(a) To do all the work and furnish all the labour, equipment, materials, tools, plant, appliances and transportation necessary or proper for the performing and completing of the Work, as set forth in the Contract Documents, and in the manner and within the time specified in the Contract Documents and otherwise do and fulfill everything indicated by the Contract Documents.

The Contract Documents are intended to cover and provide for proper completed work in all respects, and everything necessary to carry out this intent which may reasonably be implied from the Contract Documents must be done by the Contractor, even if not explicitly referred to.

(b) The Contractor shall guarantee the Work free from any defects in materials and workmanship under normal operating conditions throughout the Warranty Period as defined in the Contract.

(c) The decision of the Contract Administrator is to be final and binding on the Contractor and the Owner as to the nature and cause of any defects and deficiencies in the Work and as to the remedy required for each and as to which party shall bear the cost of such remedy. Failure to comply with the directions of the Contract Administrator within forty-eight (48) hours after written notice may result in the Contract Administrator having the work performed by others and the cost thereof being deducted from the amount due to the Contractor.

(d) To furnish the following:

i) Performance Bond and Labour and Materials Payment Bond each in the amount of one hundred percent (100%) of the Total Bid Price (per Appendix “G” of Document B) including HST, or an acceptable Letter of Credit Security (or alternate security, if applicable).

ii) Evidence of all Insurance required by the Contract Documents.

iii) Current Clearance Certificate from the Workplace Safety & Insurance Board (WSIB).

(e) The Contractor hereby acknowledges and agrees that the cost of any item of work reasonably inferred to be necessary for proper completion of the Work yet not specifically listed in the Schedule of Unit Prices is considered to be incorporated in the prices that are listed in Schedule of Unit Prices. The Contractor further acknowledges and agrees that the prices listed in Schedule of Unit Prices include, without limitation, duties, taxes, tariffs, royalties, permits, customs, insurance, bonds, handling, transportation, overhead, profit and all other charges and expenses in effect at the time of bid submission, except only for the Value Added Tax.

(f) The Contractor also acknowledges and agrees that:

(i) The estimated quantities in the Schedule of Unit Prices are only approximate and are not a representation, warranty or guarantee of the number of units of each item that will be a part of the Work and the measured quantities of completed work or materials may vary from such estimated quantities. Such variation will not invalidate the Contract or the prices in Schedule of Unit Prices and the Owner shall have no liability or obligation to the Contractor in regard to such variation including, without limitation, incidental, consequential, direct, loss of profits, loss of opportunity, loss of good will, loss of revenue, special or other damages.

(ii) With the exception of the lump sum amounts for completed items set out in Schedule of Unit Prices, payment will only be made for the actual measured quantities of completed work performed or materials furnished as a part of the Work, as determined in accordance with the Contract Documents.

(g) These amounts may be subject to adjustments as provided for in the Contract Documents.

(h) As such payments become due, the Contractor shall, in accordance with the terms of its agreements with any Subcontractors, pay all of its Subcontractors in full on account of work properly performed or Materials properly supplied, as applicable, less any holdback monies retained in compliance with the *Construction Act* (Ontario).

ARTICLE III

THE OWNER UNDERTAKES AND AGREES:

(a) The Owner shall pay Contractor, for the performance of the Work, in accordance with the Contract Documents, the following:

(i) for the completed lump sum components of the Work, the lump sum amounts set out in Schedule of Unit Prices; and

(ii) for the completed unit price components of the Work, the aggregate amount of the actual number of units of measurement of each item multiplied by the appropriate unit price that is set out in the Schedule of Unit Prices.

(b) Subject to, and in accordance with, the provisions of the Contract Documents, and the *Construction Act* (Ontario), the Owner shall:

(i) Make monthly progress payments to the Contractor on account of the Work performed when due in the amount verified by the Contract Administrator together with such Value Added Taxes as may be applicable to such amount verified by the Contract Administrator;

(ii) Retain both the 10% Statutory Holdback plus a 2.5% Warranty Holdback from all Contact Payments.

(iii) Upon Substantial Performance of the Work, and upon expiration of the lien period and satisfaction of the Contract and *Construction Act* requirements, pay to the Contractor the 10% Statutory Holdback, as modified by annual Holdback release for multi-year Contracts (If applicable).

(iv) Upon expiry of the Warranty period, rectification of all deficiencies, and required completion of incomplete work, pay to the Contractor the 2.5% Warranty Holdback.

ARTICLE IV

All communications in writing between the parties or between them and the Contract Administrator shall be deemed to have been received by the addressee if sent to:

The Contractor at:

Or by email

- and to the Owner at:

Township of North Huron
Kevin Watson
274 Josephine St, PO Box 90
Wingham ON N0G 2W0
Or by email KWatson@northhuron.ca

- and to the Contract Administrator at:

R.J. Burnside & Associates Limited
Jeremy Taylor
449 Josephine St
Wingham ON N0G 2W0
Or by email Jeremy.Taylor@rjburnside.com

ARTICLE V

This Agreement shall enure to the benefit of and be binding upon the parties hereto and their respective successors, executors, administrators and assigns. Note that the use of seals, while encouraged when available, is not mandatory.

IN WITNESS WHEREOF the Contractor and the Owner have respectively affixed their corporate seals and the hands of their proper officers on or about the day and year first above written.

Contractor

For the Contractor/Signature & Seal

Date Signed

Witness

Owner

For the Owner/Signature & Seal

Date Signed

Witness

BURNSIDE

Reference Documents

[Note: Reference Documents do not form part of the Bid or Contract Documents]

BURNSIDE

Asbestos Management Plan
Wingham Standpipe Control Building

Township of North Huron
274 Josephine Street
Wingham Ontario N0G 2W0

Asbestos Management Plan
Wingham Standpipe Control Building

Township of North Huron
274 Josephine Street
Wingham Ontario N0G 2W0

R.J. Burnside & Associates Limited
449 Josephine Street P.O. Box 10
Wingham ON N0G 2W0 CANADA

December 2025
300053193.0002

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
0	Yes	Yes	Township of North Huron

Record of Revisions

Revision	Date	Description
-	September 10, 2025	Initial Submission to Township of North Huron
	December 5, 2025	Final Submission to Township of North Huron

R.J. Burnside & Associates Limited

Report Prepared By:

Patty Workman
Environmental Technologist
PW:af/js

Report Reviewed By:

Jim Walls, P.Geo., QP_{ESA}
Senior Geoscientist

Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by the Township of North Huron (Township) to prepare an Asbestos Management Plan (AMP) for the Wingham Standpipe Control Building (WSCB) located at 199 John Street East, Wingham Ontario, in accordance with Occupational Health and Safety Act; Ontario Regulation 278/05 Designated Substances – Asbestos on Construction Projects and in Buildings and Repair Operations. The location of the WSCB is shown in Figure 1.

A Designated Substances and Hazardous Materials Survey (DSHMS) was completed by Burnside in 2023 (Appendix A). The DSHMS identified the presence of two asbestos-containing materials (ACM) within the WSCB, as follows:

- Vermiculite insulation – 1% Tremolite Asbestos by dry weight was identified within cinderblock wall cavities. The block walls surround the 3 x 3 m building, approximately 2.4 m in height.
- Caulking, white – 8% Chrysotile Asbestos by dry weight was detected in caulking around the interior and exterior door frame, for an approximate total of 10 linear m.

The vermiculite insulation is considered friable asbestos, requiring Type 2 or Type 3 abatement operations depending on scope. If disturbed, the vermiculite insulation is considered a health risk to workers and occupants within the WSCB. If left undisturbed, the risk of airborne asbestos from the vermiculite insulation is low during regular daily operations within the building.

The caulking is considered non-friable asbestos, requiring Type 1 or Type 2 abatement operations depending on scope, and is not considered to be a risk for airborne asbestos during regular daily operations within the building.

This AMP applies to the Township of North Huron's Wingham Standpipe Control Building located at 199 John Street East in Wingham Ontario.

Asbestos Management Coordinator should be designated to oversee the AMP. The person and any other staff should be appropriately trained.

Inform the Joint Health and Safety Committee (JHSC) about the AMP. The involvement and cooperation of the JHSC is considered an integral part of the AMP.

A warning label must be posted immediately adjacent to any friable, non-friable, or suspected ACM. Warning labels should be prominently displayed and remain posted until the labelled ACM is removed. Signs can be adhered directly to the material.

This plan must be reviewed annually.

A copy of this plan should be available at the WSCB for use by staff and contractors that may come into contact with the vermiculite insulation or white caulking.

Table of Contents

1.0 Introduction 1
1.1 Background 2
1.2 Regulatory Requirements 4
2.0 WSCB Asbestos Survey 6
2.1 Program Management 6
2.2 Reassessment Strategy 7
2.2.1 Existing ACM 7
2.2.2 Documentation and Notification of Results 7
2.2.3 Evaluation for ACM 8
3.0 Program Management Responsibilities 8
3.1 The Asbestos Management Coordinator 8
3.1.1 Summary of Asbestos Management Coordinator Responsibilities 9
3.2 Qualifications of the Asbestos Management Coordinator 10
3.3 Management Support 11
3.4 Contractors 11
3.5 Joint Occupational Health and Safety Committee 11
3.6 Staff Resources 12
3.7 Reporting Procedures / Work Orders 12
4.0 Worker Training Requirements 12
4.1 Maintenance Personnel 13
4.2 Asbestos Management Coordinator 13
4.3 Documentation of Training 14
4.4 Trainers 14
4.5 New Hires and Language / Comprehension Issues 15
4.6 Respirator Training and Use 15
5.0 Notifications and Reporting 15
5.1 Identification of ACM 15
5.2 Labelling 15
5.3 Information 17
5.4 Work Order System 18
6.0 Program Audit and Review 19
7.0 Asbestos Removal / Repair Procedures 19
7.1 Type 1 Operations – Ontario Regulation 278/05 Section 12(2) 20
7.1.1 Type 1 Operations – Measures and Procedures (O.Reg. 278/05 Section 14) 21
7.2 Type 2 Operations – Ontario Regulation 278/05 Section 12(3) 22
7.2.1 Type 2 Operations – Measures and Procedures (O.Reg. 278/05 Section 15) 23
7.2.2 Type 2 Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 16) 25

7.2.3 Type 2 Operations – Glove Bag Procedures (O.Reg. 278/05 Section 17)....26
7.3 Type 3 Operations – Ontario Regulation 278/05 Section 12 (4)....28
7.3.1 Type 3 Operations – Measures and Procedures (O.Reg. 278/05 Section 15)....29
7.3.2 Type 3 Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 18(1,2)....30
7.3.3 Type 3 Outdoor Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 18(3))....32
7.3.4 Type 3 Indoor Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 18(4))....33
7.3.5 Type 3 Operations – Air Testing (O.Reg. 278/05 Section 18(5,6,7,8,9))....36
7.4 Dust Control Measures....38
7.5 Personal Protective Equipment....38
7.6 Equipment Requirements....39
7.7 Cleaning Up and Waste Removal....39
7.7.1 Washing Facilities....40
7.8 Transport and Disposal Standards....40
7.8.1 Federal Regulations....40
7.8.2 Provincial Regulations....41
7.9 Checklist for Type 1 or Type 2....42
7.10 Emergency Response in Type 2 or Type 3 Work Site....44
7.10.1 Medical Emergency Notification Response....44
8.0 Asbestos Removal / Repair Procedures: Contract Work....44
8.1 Contractors....44
8.2 General Safety....45
9.0 Requirements for Asbestos Removal/Repair Contractors....46
9.1 Duties of the Owner's Environmental Consultant....46
9.2 Duties of the Owner....47
9.3 Duties of the Asbestos Management Contractor....47
9.3.1 Notification....48
9.4 Criteria for Temporary Suspension of Abatement....49
9.4.1 Work Practices....49
9.5 Asbestos Control Procedures....49
9.5.1 Contractor Employee Training....49
9.5.2 Personal Protective Equipment....49
9.5.3 Asbestos Removal Projects....50
10.0 Medical Surveillance....50
11.0 Summary and Recommendations....50

Figures

Figure 1 Site Plan
Figure 2 ACM Plan

Appendices

Figures
Appendix A Designated Substances and Hazardous Materials Report
Appendix B Building Survey and Exposure Reassessment
Appendix C Sample Work Order Forms
Appendix D Certificate of Workers Training
Appendix E Amendment to Asbestos Management Plan Form
Appendix F Ministry of Labour Project Notification Forms

Disclaimer

Other than by the addressee, copying or distribution of this document, in whole or in part, is not permitted without the express written consent of R.J. Burnside & Associates Limited.

In the preparation of the various instruments of service contained herein, R.J. Burnside & Associates Limited was required to use and rely upon various sources of information (including but not limited to reports, data, drawings, observations) produced by parties other than R.J. Burnside & Associates Limited. For its part R.J. Burnside & Associates Limited has proceeded based on the belief that the third party/parties in question produced this documentation using accepted industry standards and best practices and that all information was therefore accurate, correct and free of errors at the time of consultation. As such, the comments, recommendations and materials presented in this instrument of service reflect our best judgment in light of the information available at the time of preparation. R.J. Burnside & Associates Limited, its employees, affiliates and subcontractors accept no liability for inaccuracies or errors in the instruments of service provided to the client, arising from deficiencies in the aforementioned third party materials and documents.

R.J. Burnside & Associates Limited makes no warranties, either express or implied, of merchantability and fitness of the documents and other instruments of service for any purpose other than that specified by the contract.

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by the Township of North Huron (Township) to prepare an Asbestos Management Plan (AMP) for the Wingham Standpipe Control Building (WSCB) located at 199 John Street East, Wingham Ontario, in accordance with Occupational Health and Safety Act; Ontario Regulation 278/05 Designated Substances – Asbestos on Construction Projects and in Buildings and Repair Operations. The location of the WSCB is shown in Figure 1.

The purpose of an Asbestos Management Plan is to minimize the potential exposure of building occupants to airborne asbestos fibres in buildings originating from asbestos containing materials (ACM). This document has been prepared to provide the necessary information for all building occupants including management and maintenance staff. Although the plan is written to protect worker health, statutory obligations fall on management to make sure that the plan is effective and attains the stated goals and legislative requirements.

This Asbestos Management Plan (AMP) for the Wingham Standpipe Control Building (WSCB) at 199 John Street East, Wingham Ontario is both a process and a document. It is designed to protect occupants and employees from exposure to asbestos while ACM remain in the building. This can best be accomplished by implementing a program that specifically addresses the management of the ACM for the life of the building or until the ACM is removed.

Any work that will directly or indirectly involve ACM at the WSCB facility will be subject to the requirements and guidelines prescribed in this document. Under O. Reg. 278/05 Section 1 (Definitions), “asbestos-containing material” is defined as material that contains 0.5% or more asbestos by dry weight.

A Designated Substance and Hazardous Materials Survey (DSHMS) was completed by at the WSCB by Burnside in 2023. A copy of the DSHMS is included in Appendix A.

The DSHMS identified ACMs at the WSCB including vermiculite insulation within concrete block wall cavities (1% tremolite asbestos), and white caulking around the interior and exterior door frame (8% chrysotile asbestos). A general Site Plan is shown in Figure 1. The layout of the WSCB, including the location of the ACMs, is displayed in Figure 2.

The asbestos testing results and photographs of the vermiculite insulation and the caulking are included in the DSHMS report in Appendix A.

1.1 Background

Asbestos was used extensively in the construction industry because of its near indestructibility while also providing effective insulation. The majority of installations from the 1950s onward used asbestos as the primary material for insulating heating related piping, boilers, furnaces, etc., as a spray applied to provide fire retardation properties to load-bearing structural members in large office buildings and factories, as a reinforcing fibre in floor and ceiling tile, cement piping and sheeting, as a paper-like wrap for pipes. Asbestos was added as a component of caulking compounds to improve their heat resistance, durability and flexibility. Vermiculite, a naturally occurring mineral which sometimes contains asbestos fibres was often installed within concrete block wall cavities as well as in attic spaces as insulation.

The majority of asbestos used in Ontario involves the asbestos mineral form called chrysotile. This form of asbestos was detected in the interior and exterior door caulking of the WSCB. A less common form of asbestos called tremolite was detected within the vermiculite insulation. Asbestos was regulated in the “asbestos-using industry” in the 1970s but the prevalence and risk to occupants of buildings where asbestos was installed was not investigated until the “Royal Commission on Matters arising out of the use of Asbestos” delivered its report in 1984. The Regulation respecting Asbestos on Construction Projects and in Buildings, and Repair Operations followed directly from the Commission’s report. Some relevant facts and issues emerged from this report and are worth mentioning here:

- Most of the knowledge of the health effects of asbestos exposure comes from studies of workers routinely exposed to very high levels of asbestos in their jobs. Information on the health effects of low-level exposure is much less certain.
- Although asbestos is hazardous, the risk of asbestos related disease depends upon exposure to airborne asbestos fibers. An individual must breathe asbestos fibers in fairly high quantities in order to incur any chance of developing an asbestos related disease. The number of fibers a person must inhale to develop disease is uncertain; however, at very low exposures, such as those found in buildings where the asbestos is properly managed, the risk is considered negligible. It is important to realize that intact installed asbestos poses no risk. It may become hazardous when damaged, disturbed or when it deteriorates over time due to lack of maintenance.
- Based upon available data, the average airborne asbestos levels in buildings are typically very low. Asbestos levels in buildings without friable asbestos appear to be indistinguishable from levels seen in the open air outside the buildings.
- The removal of asbestos is often not a building owner’s best course of action to reduce exposure. In fact, an improper removal can create a dangerous situation where none previously existed. By their nature, asbestos removals tend to elevate the airborne level of asbestos fibers. Unless safeguards are properly applied, a removal operation can actually increase rather than decrease the risk of asbestos related disease.

In order to determine whether the public anxiety over the current situation of asbestos materials in place in buildings was justified, the "Ontario Royal Commission on Matters of Health and Safety Arising for the Use of Asbestos in Ontario" was established in 1981. This three year study considered all aspects of the asbestos problem. After considering all available data, the Commission concluded in its final chapter (Chapter 9, Page 585) that:

> *…The risk to occupants from asbestos in buildings is a small fraction of the risks faced by workers exposed to asbestos under the 1.0 f/cc (fibre per cubic centimetre) airborne limit for chrysotile (the current exposure limit for industrial asbestos used in Ontario). It is less than 1/50 as great as the risk of commuting by car to and from those buildings. In concluding that this risk is insignificant, we conclude that the risk does not present a public health problem. While asbestos has caused serious health problems for workers and may present a problem for building maintenance, renovation, construction and demolition workers, we conclude that it does not pose a significant problem for the general occupants of a building, except in the three situations outlined in Section D of this chapter namely:*
>
> *I. The occupant is in the immediate vicinity of work that disturbs friable asbestos-containing insulation.*
>
> *II. The occupant is within the range of air circulation of work that disturbs friable asbestos-containing insulation.*
>
> *III. Significant quantities of friable asbestos-containing insulation have fallen onto building surfaces and are being disturbed.*

and in the overview to this section (Chapter 9, page 548):

> *We will conclude that it is rarely necessary to take corrective action in buildings containing asbestos insulation in order to protect the general occupants of those buildings. On the other hand, construction, demolition, renovation, maintenance and custodial workers in asbestos-containing buildings may be exposed to significant fibre levels and may, during their work, cause elevated fibre levels for nearby occupants.*

Note: The Ontario Occupational Exposure Limit (Time Weighted Average) for all types of Asbestos according to O.Reg. 278/05 is 0.1 f/cc.

The general conclusions of the Royal Commission have been supported by independent researchers, the Ontario Ministry of Labour, and authorities in other jurisdictions. Air

sampling has shown that the airborne asbestos levels in buildings, with sprayed asbestos, are no higher than outdoor levels, unless the friable asbestos or asbestos debris has been disturbed at the time. Airborne levels in buildings are not elevated even when the ceiling space containing the sprayed asbestos or asbestos mechanical insulation functions as an air plenum.

The Royal Commission's findings have been well received in the international community for its landmark work in investigating the risk to the public and to workers in buildings where asbestos is located. Although asbestos rightly deserves its reputation for causing a variety of diseases in workers using asbestos, it must be remembered that the conditions that lead to worker disease were extreme and would be absolutely unacceptable by current employment standards. Historically, working environments were extremely dusty, and floors were covered in asbestos such that simply walking kicked up large amounts of easily visible dust.

As with any toxic agent, reducing the dose reduces the chances of disease. At the trace levels of asbestos now seen in workplaces, even in buildings where it was installed, the degree of risk is so small, it cannot be measured with any degree of certainty. Therefore, what remains to be done is not so much a reduction in risk to health as it is to engage in practices which honour the philosophy of 'prudent avoidance' so that what risk to health that remains is managed to a very low level.

This document is designed to serve as the basis for an Asbestos Management Plan for the management and staff of the Township of Huron WSCB.

1.2 Regulatory Requirements

Each jurisdiction has its own regulations, guidelines or work practices to address asbestos and the associated risks. No explicit regulation for asbestos exists under the Canada Labour Code, but the principle of due diligence in the Code requires employers to provide appropriate programs to adequately address workplace hazards. Exposure to asbestos is controlled in two Ontario regulations under the Occupational Health and Safety Act (OHSA):

- Designated Substances (O.Reg. 490/09) - intended for industrial and mining workplaces, including manufacturing facilities where asbestos may be present
- Asbestos on Construction Projects and in Buildings and Repair Operations (O.Reg. 278/05) - applies to buildings which contain friable and non-friable asbestos-containing material (ACM) and regulates the process of repair, alteration or maintenance of those buildings

O.Reg. 278/05 requires asbestos removal or encapsulation in order to prevent significant exposure to airborne asbestos. It requires management of the asbestos in place to ensure that the day-to-day operation of the building is carried out in a manner that

minimizes the release of asbestos fibers into the air, and ensures that when asbestos fibres are released, either accidentally or intentionally, proper control and cleanup procedures are implemented.

Under O.Reg. 278/05, work on or near ACM is usually classified as Type 1, 2, or 3 operations, depending on the degree of risk to workers on the project or occupants of the building. Precautionary procedures for all three types of operations include signage, the safe removal of visible dust, wetting work surfaces, provisions for the capturing of falling materials, clean-up of the worksite, maintaining nearby areas free of contamination, medical intervention and personal protective equipment for workers. The three types of operations differ in the degree of effort and actions necessary to minimize exposure during the work.

The regulations and supporting guidelines for installed asbestos are known as 'procedural' in that they specify procedures to be followed when asbestos is present in a building and dictate how work will be conducted in and around the ACM. The procedures to be followed constitute an "Asbestos Management Plan" (AMP), often also known as an operations and maintenance (O&M) program. These programs can be identified as a formulated plan for training, work practices and surveillance to maintain existing ACM in good condition and minimize the potential for creating any airborne asbestos fibres.

In the regulation, an AMP must make provisions for:

- Maintaining records on the premises showing the location of friable and non-friable ACM
- Notifying the occupier of a building or space of the information in the record
- Advising employees hired by the owner of the information in the record if their work will directly disturb, or if they will work near disturbed, ACM
- Advising all workers (i.e., contractors) employed by the building owner of the information in the record if their work will directly disturb, or if they will work near disturbed, ACM
- Establishing and maintaining worker training programs (hazards, protective equipment and work practices) if their work will directly disturb, or if they will work near disturbed, ACM
- A re-inspection program to assess the condition of ACM at reasonable intervals and update the record at least annually and if new information is obtained
- Analyzing friable material which has fallen and is being disturbed so that exposure to the material is minimized
- Clean-up and removal of fallen ACM and repair, seal, remove or permanently enclose the friable fireproofing or insulation

The training and instruction program to be given to workers that may come in contact with the ACMs must include:

- Instruction on the hazards of asbestos exposure
- Instruction on personal hygiene and work practices
- Instruction on the use, cleaning and disposal of respirators and protective clothing

The instruction and training must be provided by a competent worker. A competent worker must be:

- Qualified because of his knowledge, training and experience to perform the work
- Familiar with the Act and with the provisions of the regulations that apply to the work
- Knowledgeable of all potential or actual danger to health or safety in the work

The WSCB's Joint Health and Safety Committee or representative must be advised when and where the training and instruction is to be carried out and shall be invited to attend.

2.0 WSCB Asbestos Survey

A Designated Substances and Hazardous Materials Survey (DSHMS) report for the WSCB was prepared by Burnside dated March 6, 2023. The report documented the identification of ACM throughout the facility. The ACMs identified in the report include vermiculite insulation within concrete block wall cavities, and caulking around the interior and exterior door frames as shown in Figure 2. The vermiculite contains 1% asbestos in the form of tremolite. The asbestos within the vermiculite is friable and was observed to be spilling out of the concrete block cavities in multiple locations throughout the WSCB. The caulking contains 8% asbestos in the form of chrysotile. The asbestos within the caulking is non-friable and contained within the compounds of caulking. The building is in use and is occasionally occupied by staff.

2.1 Program Management

- Formally establish the position of "Asbestos Management Coordinator" for the WSCB
- Ensure that a work order system is used to document all work involving the removal, repair or alteration of the vermiculite and caulking
- Perform annual audits of the Asbestos Management Plan
- Inform the Joint Health and Safety Committee (JHSC) about the program. The involvement and cooperation of the JHSC is considered an integral part of the program
- Advise existing and new employees of the information in the AMP if their work will disturb ACM or if they will work in the area where ACMs are being disturbed
- Advise all contractors and workers employed who will disturb or work in close proximity and may disturb ACM of the information in the AMP

- Establish and maintain appropriate worker training programs for employees (hazards, protective equipment, and work practices) charged with the management of the ACMs
- Retain a licensed and qualified Asbestos Abatement Contractor to complete all repair / removal work, if required

2.2 Reassessment Strategy

2.2.1 Existing ACM

On an annual basis, the ACMs should be re-inspected by the designated “Asbestos Management Coordinator”. The reassessment should examine all ACM originally noted and should document any signs of deterioration, delamination or disturbance by maintenance, renovation or occupant activity. The purpose of a reassessment is to evaluate and document changes that may have occurred since the last assessment was conducted.

A visual re-inspection of all ACM should be conducted at regular intervals as part of the AMP, combined with ongoing reports of changes in the condition of the ACM made by service workers. The re-inspection should ensure that any ACM damage or deterioration will be detected and corrective action taken. A person qualified to perform such an assessment will conduct a walkthrough survey in accessible areas of the building to re-inspect known or assumed ACM. The ACMs are assessed for their condition, friability and potential to become airborne.

An example table referred to as the Building Survey and Exposure Assessment Summary (Appendix B) is used for recording information during an ACM reassessment. Starting with the inventory of known ACM locations and incorporating any other ACM discovered during other activities. If suspected materials are identified during renovations to the building, the Asbestos Management Coordinator or designate should be available to examine the materials and collect samples as necessary. These results should be documented in an annual report prepared by the Asbestos Management Coordinator. In this case, the concrete block walls need to be examined for physical damage that could expose ACM.

2.2.2 Documentation and Notification of Results

As part of the AMP an annual report should be prepared and include:

- A list of all materials containing asbestos and a description of the condition and accessibility
- Original laboratory results of bulk sample analysis
- A plan or schedule showing the sample locations

- A plan or schedule showing the location and description of all asbestos containing material
- Summary of any materials requiring removal due to condition and/or accessibility
- Note of all materials tested (require at least three samples per suspected ACM) which did not contain asbestos
- A statement providing the limitation of the survey (for example: non-destructive, no roofing tested, no intrusive testing, etc.)
- Figures 1 and 2 and the Designated Substances and Hazardous Materials Survey report by Burnside, dated March 6, 2023, provide suitable information for the ACMs at the WSCB to meet this requirement

2.2.3 Evaluation for ACM

The Designated Substances and Hazardous Materials Survey report by Burnside, dated March 6, 2023, provides sufficient evaluation for the current condition of the building. No further evaluation is required at this time.

3.0 Program Management Responsibilities

3.1 The Asbestos Management Coordinator

In general, the Asbestos Management Coordinator must have the authority to oversee all asbestos related activities at the Township of North Huron WSCB including inspection, operations, management activities, and abatement actions. The Asbestos Management Coordinator will either train workers in operations and maintenance activities or ensure that worker training takes place, as necessary. In addition, he or she will be familiar with the operations of custodial and maintenance staff, contractors, tenants and outside service vendors with regard to all asbestos related activities.

The person assigned by the Township to manage the building and be responsible for administering this AMP is considered as the Asbestos Management Coordinator(s) who will be responsible for program implementation and record keeping, including but not limited to:

- Program management
- Notification of employees
- Assessment of asbestos containing materials and annual re-inspections thereafter
- Labeling of asbestos containing materials
- Training of staff to conduct maintenance, renovation or demolition activities involving asbestos containing materials
- Employee health and safety
- Emergency response procedures
- Periodic surveillance of asbestos containing materials
- Record keeping

- Air monitoring, as required
- Additional bulk sampling, as required
- Updating the Asbestos Management Program, as required

The Asbestos Management Coordinator or designate must have a thorough working knowledge of the pertinent legislation, training requirements, work practices and procedures and other elements needed to successfully manage the program. Any changes in the chain-of-command for the management of the AMP should be incorporated into the Program.

When the Township of North Huron hires contractors to work at the site, the Asbestos Management Coordinator will determine whether they are going to be working on or near asbestos. This will require determining whether the contractor's staff is qualified, trained and equipped to deal with the planned activities, if they occur in proximity to ACM. Alternatively, all activities contracted to outside agencies should contain the provision in the tender for adequate asbestos related training (along with proof supplied with the bids) so that the Township of North Huron can demonstrate its due diligence.

The Asbestos Management Coordinator should develop and maintain a work order system that permits work only when the presence and degree of disturbance of ACM is indicated on Work Order Forms. The Work Orders should stipulate the terms and conditions for asbestos work with regard to tenant facility alterations or construction. Sample work order forms are included in Appendix C.

In addition, the Asbestos Management Coordinator or a designate must be aware of any new asbestos entering the work site either as finished products or as new insulation material. Although now very uncommon, some non-friable asbestos containing products such as cement pipe / conduit, brake shoes and linings, gaskets, caulking and mastics, etc., are still manufactured. In most cases, the manufacturers who make products containing asbestos will clearly identify its packaging with warning labels. As noted, the various control options for ACM include repair, encapsulation, enclosure, encasement and removal of the ACM. The choice of which option to follow should be made by the Asbestos Management Coordinator, in consultation with those most affected.

3.1.1 Summary of Asbestos Management Coordinator Responsibilities

The extent of asbestos in the building determines the Asbestos Management Coordinator's responsibilities. The following is a summary of the responsibilities that would be expected to be carried out by an Asbestos Management Coordinator working for the Township of North Huron WSCB:

1. Ensure that a member of the Joint Health and Safety Committee is provided with the results of the Designated Substances and Hazardous Materials Survey.

2. Provide any occupants of the building (tenants) written notice of the location of all ACMs, if they will directly disturb or work in the area where asbestos might be disturbed.

3. Provide or arrange for awareness and procedural training for maintenance staff and supervisors who will actively disturb asbestos in their work, or may respond to spills, or damage.

4. Notify contractors who may disturb ACMs.

5. Ensure maintenance workers or contractors are aware of the locations of ACMs.

6. Maintain supplies and equipment required for asbestos work undertaken by building staff - not required if all work is contracted out.

7. Arrange for disposal of asbestos waste as required - not required if all work is contracted out.

8. Respond to reports of asbestos debris and/or deteriorated or damaged materials. Evaluate the condition and provide clean up and repair / enclosure / removal as appropriate.

9. Arrange for re-assessment of ACM on an annual basis to be performed by a competent person.

10. Update asbestos survey to reflect removal or repair work at least annually, review the findings with the Joint Health and Safety Committee, and update the written record.

11. Maintain Records of Asbestos Work Reports, copies of waste manifests, Notice of Project Forms, re-assessments, etc.

3.2 Qualifications of the Asbestos Management Coordinator

The Asbestos Management Coordinator will be the ‘point person’ for any inquiries regarding asbestos, its effects on health at the anticipated low exposure levels where it is likely to be found, control measures, procedures for working with or near ACM, Township of North Huron’s liability, regulatory requirements, other corporate policy documents, the Work Order system and asbestos, and any other aspects that the Asbestos Control Program acquires as it matures into a fully operational system.

The knowledge base described above can be obtained by advanced reading of documents supplied by the provincial or federal labour governing bodies, reading asbestos related occupational health literature, or by taking courses offered locally to those with interest or duties in managing asbestos management programs.

Through training courses (classroom style as well as hands on training), the information and experience can be passed on to those who will need it. The instruction imparted to staff should include recognition of possible ACM, the Work Order system, emergency response, and the appropriate actions required in each instance.

3.3 Management Support

The Asbestos Management Coordinator will have to work with management, maintenance, custodial, and general staff to develop activities that meet the intent of this program, which itself stems from due diligence requirements as well as statutory obligations.

3.4 Contractors

Contractors are not wholly independent of the Township of North Huron. The Township has the duty in law to advise contractors of the potential for the presence of ACM. Furthermore, some legal decisions put an onus on the Township to ensure that contractors have the necessary skills and resources to properly accommodate the presence of ACM. This may include ensuring that contractors have staff trained to deal appropriately with ACM when it is discovered during the work that the contractor was hired to do. In Ontario Regulation 278/05, for example, there are several requirements on the owner (i.e., Township of North Huron) to properly advise contractors (and thereby, any subcontractors) of the presence of ACM. Furthermore, the regulation has steps specified if previously unknown ACM is discovered during the course of the contractor's work. The Burnside 2023 Designated Substances and Hazardous Materials Survey report would fulfill this requirement.

3.5 Joint Occupational Health and Safety Committee

The Joint Health and Safety Committee (JHSC) is a cornerstone of most health and safety issues at companies. In a facility such as the Township of North Huron's WSCB where workers, maintenance and custodial staff might occasionally come into contact with ACM, the JHSC should be included in the implementation of the program.

The program will list the minimum requirements that proper precautionary procedures will require, but the actual performance of those procedures will need the input of the workers themselves since they will know best the problems faced in the performance of their duties and what amendments to the operating procedures will work best to ensure the program's success.

Discussions should be held with the JHSC to develop aspects of the Program, particularly as it applies to the actual performance of work. Management requires the outline of a Program and that the Program is followed.

3.6 Staff Resources

It is intended that the implementation of the Asbestos Management Program described herein and the full participation of workers in identifying ACM and locations where the condition of ACM is questionable will promote confidence in staff that the program is working to minimize their exposure and prevent the chances of adverse health effects in the future.

Training for working in areas on or near ACM should be seen as acquiring an added skill set. Since training all staff for all eventualities in working on or near ACM may be very expensive and time consuming, an alternative is available. Many large corporations opt for training a select few staff on the more advanced procedures (e.g., assessment, emergency clean-up, etc.).

The technical duties of the Asbestos Management Coordinator (including bulk sampling, air sampling, etc.) should be completed by an environmental consultant if the coordinator is not appropriately trained and experienced.

3.7 Reporting Procedures / Work Orders

Services in areas where ACM is present are typically completed by maintenance staff or outside contractors. A system of Work Orders should be created to deal with these types of situations as well as other ACM removal / repair operations. An example of a Work Order system is found in Appendix C.

4.0 Worker Training Requirements

The control of asbestos exposure to building maintenance workers can be achieved by following the correct safety procedures around their normal work. It is essential that all employees involved in doing work, both workers and supervisors be properly trained. Under O.Reg. 278/05 an owner is required to institute and maintain a training program for those workers employed by the owner who are likely to disturb asbestos containing material in the course of their work.

All employers, including building owners, must ensure that instruction and training is provided to their employees working in Type 1, Type 2 or Type 3 operations. If a worker is only involved in Type 1 operations (i.e., hand power removal of vinyl floor tile) there is no need to be familiar with a Type 2 removal operation. Typically, building maintenance staff will only perform Type 1 and possibly Type 2 work including glove bag use. In the case of Type 1 or Type 2 work, the training will cover:

- The hazards of asbestos exposure
- Personal hygiene and work practices
- The use, cleaning and disposal of respirators and protective clothing

The instruction must apply to every worker employed by the Township of North Huron who works at the WSCB and who is likely to work near asbestos containing materials that may be disturbed. This does not require that WSCB staff perform the actual instruction but does require that the instruction and training be provided by a competent person.

A competent person as defined in the Occupational Health and Safety Act means a person that who:

- is qualified because of knowledge, training and experience to organize the work and its performance
- is familiar with the provisions of the regulations that apply to the work
- has knowledge of any potential or actual danger to health or safety in the workplace

The JHSC must be advised when and where the training and instruction is to be carried out and shall be invited to attend.

Typical training requirements for workers consist of a one day session that will include respirator testing, hands on instruction and training relevant to both sprayed materials and mechanical insulation.

Maintenance workers and supervisors that work directly with asbestos materials should take basic asbestos training.

Once training is provided, workers should be given some proof of training. A list of trained workers with dates of training and respirator type is documented on a Certificate of Workers Training and maintained by the Asbestos Management Coordinator. A copy of the form is included in Appendix D.

4.1 Maintenance Personnel

The repair and maintenance personnel should receive asbestos awareness training. Repair and maintenance personnel are the most likely employees to come into direct contact with asbestos. Many routine maintenance activities involve potential disturbance of asbestos containing materials. Instruction for repair and maintenance workers should be provided annually if workers have occasion to work with or near asbestos containing material. It is recommended that the person responsible for maintenance and/or designate receive the Asbestos Training for Maintenance Workers.

4.2 Asbestos Management Coordinator

The Asbestos Management Coordinator has responsibility for nearly every decision regarding asbestos and therefore must receive the most comprehensive training. Because regulations and control practices are developing and changing, training should

be re-evaluated annually and, if necessary, updated. The training should include detailed information on the following:

- **Asbestos Regulations:** The Asbestos Management Coordinator should be made aware of all relevant regulations including those of the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) for occupant or worker exposure and those of the Ministry of the Environment, Conservation and Parks (MECP) for handling and disposal of asbestos containing waste and reporting requirements. The Asbestos Management Coordinator is responsible for protecting the employees and occupants under the regulations.
- **Guidelines & Policies:** The Asbestos Management Coordinator must also be aware of any policies of the Township of North Huron regarding handling of asbestos materials, as well as any other policies relating to worker health and safety.
- **Specifications for and Notification of Outside Contractors:** The Asbestos Management Coordinator may be required to hire outside contractors for renovation or maintenance work. Not only must the Asbestos Management Coordinator notify the contractor of the presence of asbestos but should also specify work practices to ensure that the renovation / maintenance activities do not result in exposures of building occupants or employees to asbestos containing materials.

4.3 Documentation of Training

Records or certificates for each employee trained should be kept on file with the Township of North Huron. These records should detail the trainer, date of training, the context of the training provided and evidence that the employee understands the material covered. These records should be used for scheduling refresher training and upgrades as needed. An example of a Certificate of Workers Training Form is provided in Appendix D.

4.4 Trainers

Where custodial and maintenance services are performed by a service company under contract, or where installations or repairs are performed by employees of trade or craft contractors and subcontractors, those workers will need to have training at the level appropriate to the work they will be performing. The Asbestos Management Coordinator must verify that these employees have received appropriate training before they begin any work. Although the Township of North Huron is not directly responsible for the training of contracted help, according to provincial case law the company must do “everything reasonable” in the circumstances for the protection of contracted employees. This condition should be satisfied if the Township of North Huron takes steps to ensure that all contractors have had all of their workers trained appropriately for the task.

4.5 New Hires and Language / Comprehension Issues

The Township's Human Resources department should be able to provide a list of all new employees who may require training. This would catch employees at the first possible opportunity to be trained on the requirements of the Asbestos Management Plan, Health and Safety, and any other policies and procedures required by the Township of North Huron. Language barriers may pose a problem when the workforce is comprised of many different nationalities. Workers hired by the Township of North Huron who may not have enough knowledge of the English language to learn what is required in an Asbestos Management Plan should be provided accommodations such as translation services.

4.6 Respirator Training and Use

The instruction for those who require the use of a respirator should cover the following:

- The selection of a respirator
- How to obtain and check for a proper fit
- Limitations of respirator use
- Procedures on the proper use, maintenance and storage

O.Reg 278/05 Section 13 clearly outlines the procedure for respirator use and issuance. After a respirator is chosen, a respirator program and written procedure must be set up to ensure proper maintenance and use of the respirator.

When there is any doubt about a worker's ability to work while wearing a respirator, the worker must seek the advice of a physician. The physician's examination should concentrate on conditions that affect the workers ability to breathe and may include heart problems.

5.0 Notifications and Reporting

5.1 Identification of ACM

A DSHMS was completed for the facility by Burnside in a report dated March 6, 2023, which details the nature, quantity and locations of ACM. A copy is included in Appendix A.

5.2 Labelling

A warning label must be posted immediately adjacent to any friable, non-friable, or suspected ACM. Warning labels should be prominently displayed and remain posted until the labelled ACM is removed. Signs can be purchased and adhered directly onto the material.

The warning label print should be readily visible, in large font and a bright colour. For example:

CAUTION

ASBESTOS
HAZARDOUS
DO NOT DISTURB WITHOUT PROPER TRAINING AND EQUIPMENT

If work is conducted on or adjacent to ACM, warning signs should be posted. Warning signs should also be posted in areas where the airborne fibre concentration might exceed the ambient background levels. Those signs may read:

DANGER

ASBESTOS

AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

Warning signs should also be placed in affected areas during minor episode removal and regular repair operations. These signs should be affixed to barriers to warn any bystanders of the potential danger in the area. These signs may read as follows:

POTENTIAL ASBESTOS HAZARD AREA

DO NOT ENTER

Since the Work Order system will be central to the integrity of the program, signs should be posted in locations where maintenance or repair personnel congregate. These signs will serve as reminders that a Work Order is required to be filled out before work commences. Draft wording might be:

WORK ORDERS
ARE REQUIRED FOR ALL WORK

HAVE YOU FILLED YOURS OUT YET?

Similar signage may be required to ensure that the Asbestos Control Program Work Reports are also filled out when necessary.

5.3 Information

Information sessions reinforce and clarify written notices and signs and provide an opportunity to answer questions. The Asbestos Management Coordinator should inform building workers and other occupants about the location and physical condition of the ACM that they might disturb and stress the need to avoid disturbing the material.

Workers should be notified for two reasons:

- Workers and occupants should be informed of any potential hazard in their vicinity
- Informed persons are less likely to unknowingly disturb the material and cause fibers to be released into the air

All employees likely to disturb ACM should be included in the notification program. The Asbestos Management Coordinator must inform new employees about the presence of ACM before they begin work. This may be included as part of the employee orientation process. New employees should receive the Asbestos Awareness Training, and if necessary, the advanced training. New employees should have the information required to understand signage in ACM areas, and in the main areas of congregation.

For existing employees, the notification about the presence of ACM and required operating procedures will be reinforced through training updates (as frequently as annually), abundant signage and, if necessary, the performance review process by employee managers. The auditing of asbestos management in a building by the Asbestos Management Coordinator should indicate whether employees are following the requirements of the program and help direct activities towards complete compliance.

Additional signs and information sessions in languages other than English will be necessary, if a significant number of workers or occupants are not able to read and understand English. It may be necessary to make special provisions for illiterate

workers, such as providing clear verbal information of signs about potential hazards of disturbing ACM and showing them where ACM is located.

The information given to building occupants and workers should contain the following:

- That ACM has been found in the building and is located in areas where the material could be disturbed
- The condition of the ACM, and the response which is appropriate for the condition
- Asbestos only presents a health hazard when fibers become airborne and are inhaled. The mere presence of ACM does not itself represent a health hazard
- The locations where ACM is found in the building
- Instruction to avoid and not disturb the ACM (e.g., do not push items against the ACM, do not damage thermal system)
- Instruction to report any evidence of disturbance or damage of ACM to the Asbestos Management Coordinator, including the location and personnel contact information and person reporting
- Instruction to report any dust or debris that might come from the ACM or suspect ACM, any change in the condition of the ACM, or any improper action (relative to ACM) of building personnel to (name, location, and phone number of Asbestos Management Coordinator)

5.4 Work Order System

An Asbestos Management and Control Program should include a system to control all work that could disturb ACM. Many employers have had success using a Work Permit program, which requires the person requesting the work to submit a Work Order Requisition Form (Appendix C) to the Asbestos Management Coordinator before commencement of work. The Work Order Requisition Form identifies the time and location of the requested work, the type of maintenance needed, and description of any ACM in the vicinity of the proposed work. The Contractor or other person authorized to perform the work should be identified, and the approval or denial of the work should be recorded on the Work Order Requisition Form. The completed Work Order Requisition Form should be copied to the Township's Maintenance Supervisor, the contractor, and the Asbestos Management Coordinator.

During the approved maintenance / repair work, the Township's maintenance supervisor (or staff member assigned to oversee work) should record observations on the Evaluation of Work Form (Appendix C) and submit to the Asbestos Management Coordinator at the end of the work plan. Observations should only be made from a safe distance from the ACM being worked on. If it's deemed necessary for the Maintenance Supervisor to enter the work area, they must be equipped with the necessary personal protective equipment required for the type of asbestos operation being completed. Any deviation from standard and approved work practices should be recorded immediately

on this form and the practices should be immediately corrected and reported to the Asbestos Management Coordinator.

6.0 Program Audit and Review

To maintain the AMP, an audit of all aspects of the AMP should be performed annually to ensure that there is complete compliance. The auditing of asbestos management in a building by the Asbestos Management Coordinator should indicate whether employees are following the requirement of the program and help direct activities towards compliance. This will involve a review of the program's requirements and discussion with the JHSC, maintenance staff, and employees to identify areas of concern to be addressed.

An audit summary should be prepared and kept together in a binder for easy inspection. If the audit reveals any aspect of the AMP which requires amendment, the details of any amendment are documented on the form Amendment to the Asbestos Management Plan in Appendix E.

During the audit, questions to be asked are:

- Is the signage and labeling still intact and effective? Are replacements or additional signs needed?
- Has the management of the asbestos program changed? Is it in need of change to be more effective?
- Is the Asbestos Management Plan performing adequately as intended and minimizing the potential for exposure to asbestos fibers?
- Has the training been effective? Do workers remember what they were taught? Is there a need for re-training?
- Are the workers obeying the requirements of the Asbestos Management Plan? If not, what must be done to get better compliance?
- Has the Work Order system been followed for all maintenance and repair work? If not, what must be done to get better compliance?
- Has there been any maintenance, repair, renovation or removal work done on ACM since last audit? Were these areas addressed in the Amendment to the Asbestos Management Plan?
- Have safe work practices been carried out by staff during any maintenance work completed near or on ACM? Has the applicable documentation been completed?

7.0 Asbestos Removal / Repair Procedures

All asbestos repair and / or removal work will be completed by a qualified asbestos removal contractor. Based on the quantity, type and condition of asbestos containing materials present at the Township of North Huron WSCB, it is anticipated that any

asbestos removal / repair work could be completed in accordance with O.Reg. 278/05 operations as follows:

Asbestos-containing caulking: Type 1 or Type 2 operations, depending on scope of work.

Asbestos-containing vermiculite insulation: Type 2 or Type 3 operations, depending on the size of the area being worked on, with Glove Bag procedure as deemed necessary.

A summary of procedures for use by the contractor in completing Type 1, Type 2 and Type 3 asbestos work is presented below. The Township of North Huron Work Order system shall stipulate the terms and conditions for ACM work with regard to facility alterations and construction.

For Type 1, Type 2, and Type 3 operations, the work should be performed when the area is unoccupied by regular staff and occupants. Caution tape and appropriate signs warning of the asbestos hazard will be used to prevent unauthorized access to the work area for the duration of the project.

Staff working in the area may be requested to remove and store various items prior to commencement of the work project. Polyethylene sheeting (6 mil) may be placed over large objects before the work begins if requested by the Township or the Consultant to protect horizontal surfaces from dust accumulation and to be used as a drop cloth.

7.1 Type 1 Operations – Ontario Regulation 278/05 Section 12(2)

The following section outlines the requirements listed in O.Reg. 278/05 which are to be followed by the Asbestos contractor while working at the WSCB.

Type 1 Operations (O.Reg. 278/05 Section 12(2)) or Low Risk Classification work would include:

1. Installing or removing ceiling tiles that are ACM, if the tiles cover an area less than 7.5 m^2 and are installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

2. Installing or removing non-friable ACM, other than ceiling tiles, if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

3. Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating non-friable ACM, such as caulking, if:

   i. The material is wetted to control the spread of dust or fibers

ii. The work is done only by means on non-powered hand-held tools

4. Removing less than one square metre of drywall in which joint-filling compounds that are ACM have been used.

7.1.1 Type 1 Operations – Measures and Procedures (O.Reg. 278/05 Section 14)

1. Before beginning work, visible dust shall be removed with a damp cloth or a HEPA vacuum from any surface in the work are, including the thing to be worked on, if the dust on that surface is likely to be disturbed.

2. The spread of dust from the work area shall be controlled by measures appropriate to the work to be done including the use of drop sheets of polyethylene or other suitable material that is impervious to asbestos.

3. In the case of removal of drywall with asbestos joint compound, the material shall be wetted before and kept wet during work to control the spread of dust or fibers, unless wetting would create a hazard or cause damage.

4. A wetting agent shall be added to water that is to be used to control the spread of dust and fibers.

5. Frequently and at regular intervals during the doing of work and immediately on completion of the work:

   i. Dust and waste shall be cleaned up and removed using a HEPA vacuum, or by damp mopping or wet sweeping, and placing in an asbestos waste container

   ii. Drop sheets shall be wetted and placed in an asbestos waste container

6. Drop sheets shall not be reused.

7. After the work is completed, polyethylene sheeting and similar materials used for barriers and enclosures shall not be reused but shall be wetted and placed in a container as described in paragraph 5 of section 15 as soon as practicable after paragraph 5 of this section has been complied with.

8. After the work is completed, barriers and portable enclosures that will be reused shall be cleaned, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable after paragraphs 5 and 7 have been complied with.

9. Barriers and portable enclosures shall not be reused unless they are rigid and can be cleaned thoroughly.

10. Compressed air shall not be used to clean up and remove dust from any surface.

11. Eating, drinking, chewing or smoking shall not be permitted in the work area.

12. If a worker requests that the employer provide a respirator to be used by the worker, the employer shall provide the worker with a NIOSH approved respirator in accordance with Table 2, and the worker shall wear and use the respirator.

13. If a worker requests that the employer provide protective clothing to be used by the worker, the employer shall provide the worker with protective clothing as described in paragraph 12 of section 15, and the worker shall wear the protective clothing.

14. A worker who is provided with protective clothing shall, before leaving the work area:

    i. Decontaminate his or her protective clothing by using a HEPA vacuum, or by damp wiping, before removing the protective clothing

    ii. If the protective clothing will not be reused, place it in an asbestos waste container

15. Facilities for the washing of hands and face shall be made available to workers and shall be used by every worker when leaving the work area.

7.2 Type 2 Operations – Ontario Regulation 278/05 Section 12(3)

The following section describes the requirements which are to be followed by an asbestos removal contractor while completing removal work at the WSCB.

Type 2 Operations (O.Reg. 278/05 Section 12(3)) or Moderate Risk classification work would include:

1. Removing all or part of a false ceiling to obtain access to a work area, the ACM is likely to be lying on the surface of the false ceiling.

2. The removal or disturbance of one square meter or less of friable ACM during the repair, alteration, maintenance or demolition of all or part of machinery or a building, aircraft, locomotive, railway car, vehicle or ship.

3. Enclosing friable ACM.

4. Applying tape or sealant or other covering to pipe or boiler insulation that has been identified as ACM.

5. Installing or removing ceiling tiles that are ACM, if the tiles cover an area of 7.5 m^2 or more and are installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

6. Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable ACM if:

   i. The material is not wetted to control the spread of dust or fibers

   ii. The work is done only by means of non-powered hand-held tools

7. Removing one square metre or more of drywall on which joint filling compounds that are ACM have been used.

8. Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable ACM if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.

9. Removing insulation that is ACM from a pipe, duct or similar structure using a glove bag.

10. Cleaning or removing filters used in air handling equipment in a building that has sprayed fireproofing that is ACM.

11. An operation that:

    i. Is not mentioned in any of the above paragraphs 1 to 10

    ii. May expose a worker to asbestos

    iii. Is not classified as Type 1 or Type 3 operation

7.2.1 Type 2 Operations – Measures and Procedures (O.Reg. 278/05 Section 15)

1. The work area shall be identified by clearly visible sign warning of an asbestos dust hazard.

2. Signs shall be posted in sufficient numbers to warn of the hazard and shall state in large clearly visible letters that:

   i. There is an asbestos dust hazard

   ii. Access to the work area is restricted to persons wearing protective clothing and equipment

3. A wetting agent shall be added to water that is to be used to control the spread of dust and fibers.

4. Eating, drinking, chewing or smoking shall not be permitted in the work area.

5. Containers for dust and waste (referred to as asbestos waste containers) shall be:

   i. Dust tight

   ii. Suitable for the type of waste

   iii. Impervious to asbestos

   iv. Identified as asbestos waste

   v. Cleaned with a damp cloth or HEPA vacuum immediately before being removed from the work area

   vi. Removed from the workplace frequently and at regular intervals

6. Frequently and at regular intervals during the doing of the work and immediately on completion of the work:

   i. Dust and waste shall be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in an asbestos waste container

   ii. Drop sheets shall be wetted and placed in an asbestos waste container

7. Drop sheets shall not be reused.

8. After the work is completed, polyethylene sheeting and similar materials used for barriers and enclosures shall not be reused but shall be wetted and placed in a container as described in paragraph 5 as soon as practicable after paragraph 6 has been complied with.

9. After the work is completed, barriers and portable enclosures that will be reused shall be cleaned, by using a vacuum equipped with a HEPA filter or by damp wiping, as soon as practicable after paragraphs 6 and 8 have been complied with.

10. Barriers and portable enclosures shall not be reused unless they are rigid and can be cleaned thoroughly.

11. The employer shall provide every worker who will enter the work area with a NIOSH approved respirator and the worker shall wear and use the respirator.

12. Protective clothing shall be provided by the employer and worn by every worker who enters the work area, and the protective clothing:

    i. Shall be made of a material that does not readily retain nor permit penetration of asbestos fibers

    ii. Shall consist of head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibers from reaching the garments and skin under the protective clothing

    iii. Shall include suitable footwear

    iv. Shall be repaired or replaced if torn

13. Compressed air shall not be used to clean up and remove dust from any surface.

14. Only persons wearing protective clothing and equipment shall enter a work area where there is an asbestos dust hazard.

7.2.2 Type 2 Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 16)

1. If the operation is one mentioned in paragraph 1 of subsection 12 (3), the friable material that is likely to be disturbed shall be cleaned up and removed by using a vacuum equipped with a HEPA filter when access to the work area is obtained.

2. Before commencing work that is likely to disturb friable asbestos-containing material that is crumbled, pulverized or powdered and that is lying on any surface, the friable material shall be cleaned up and removed by damp wiping or by using a vacuum equipped with a HEPA filter.

3. Friable ACM that is not crumbled, pulverized or powdered and that may be disturbed or removed during the work shall be thoroughly wetted before the work and kept wet during the work, unless wetting would create a hazard or cause damage.

4. Subject to paragraph 5, the spread of dust from a work area shall be controlled by measures appropriate to the work to be done, including the use of drop sheets of polyethylene or other suitable material that is impervious to asbestos.

5. If the operation is contaminated ceiling entry or minor removal and indoors, the spread of dust from the work area shall be prevented, if practicable by:

    i. Using an enclosure of polyethylene or other suitable materials that is impervious to asbestos, (including an opaque enclosure, one or more transparent window

areas to allow observation of the entire are from outside the enclosure), if the work area is not enclosed by walls

ii. Disabling the mechanical ventilation system serving the work area

iii. Sealing the ventilation ducts to and from the work area

6. Before leaving the work area, a worker shall:

   i. Decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing

   ii. If the protective clothing will not be reused, place it in a container as described in paragraph 5 of section 15

7. Facilities for the washing of hands and face shall be made available to workers and shall be used by every worker when leaving the work area.

7.2.3 Type 2 Operations – Glove Bag Procedures (O.Reg. 278/05 Section 17)

In addition to the measures and procedures prescribed by O.Reg. Sections 15 and 16, the following measures and procedures apply to Type 2 operations:

1. The work area shall be separated from the rest of the workplace by walls, barricades, fencing or other suitable means.

2. The spread of asbestos-containing material from the work area shall be prevented by disabling the mechanical ventilation system serving the work area and sealing all openings or voids, including ventilation ducts to and from the working area.

3. Surfaces below the work area shall be covered with drop sheets of polyethylene or other suitable material that is impervious to asbestos.

4. The glove bag shall be made of material that is impervious to asbestos and sufficiently strong to support the weight of material the bag will hold.

5. The glove bag shall be equipped with:

   i. Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period

   ii. Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure

   iii. A tool pouch with a drain

iv. A seamless bottom and a means of sealing off the lower portion of the bag

v. A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation

6. A glove bag shall not be used to remove insulation from a pipe, duct or similar structure if:

   i. It may not be possible to maintain a proper seal for any reason including, without limitation

      A. The condition of the insulation
      B. The temperature of the pipe, duct or similar structure

   ii. the bag could become damaged for any reason including, without limitation

      A. The type of jacketing
      B. The temperature of the pipe, duct or similar structure

7. Immediately before the glove bag is attached, the insulation jacketing or coating shall be inspected for damage or defects, and if any damage or defect is present, it shall be repaired.

8. The glove bag shall be inspected for damage or defects

   i. Immediately before it is attached to the pipe, duct or other similar structure

   ii. At regular intervals during its use

9. If damage or defects are observed when the glove bag is inspected under subparagraph 8 i, the glove bag shall not be used and shall be disposed of.

10. If damage or defects are observed when the glove bag is inspected under subparagraph 8 ii or at any other time:

   i. The use of the glove bag shall be discontinued

   ii. The inner surface of the glove bag and the contents, if any, shall be thoroughly wetted

   iii. The glove bag and the contents, if any, shall be removed and placed in a container as described in paragraph 5 of section 15

   iv. The work area shall be cleaned by vacuuming with a vacuum equipped with a HEPA filter before removal work is resumed

11. When the removal work is completed:

    i. The inner surface of the glove bag and the waste inside shall be thoroughly wetted and the air inside the bag shall be removed through an elasticized valve, by means of a vacuum equipped with a HEPA filter

    ii. The pipe, duct or similar structure shall be wiped down and sealed with a suitable encapsulant

    iii. The glove bag, with the waste inside, shall be placed in a container as described in paragraph 5 of section 15

    iv. The work area shall be cleaned by damp wiping or by cleaning with a vacuum equipped with a HEPA filter

7.3 Type 3 Operations – Ontario Regulation 278/05 Section 12 (4)

The following section describes the requirements which are to be followed by an asbestos removal contractor while completing removal work at the WSCB.

Type 3 Operations (O.Reg. 278/05 Section 12(4)) or High Risk classification work would include:

1. The removal or disturbance of more than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of all or part of a building, aircraft, ship, locomotive, railway car or vehicle or any machinery or equipment.

2. The spray application of a sealant to friable asbestos-containing material.

3. Cleaning or removing air handling equipment, including rigid ducting but not including filters, in a building that has sprayed fireproofing that is asbestos-containing material.

4. Repairing, altering or demolishing all or part of a kiln, metallurgical furnace or similar structure that is made in part of refractory materials that are asbestos-containing materials.

5. Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material, if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

6. Repairing, altering or demolishing all or part of any building in which asbestos is or was used in the manufacture of products, unless the asbestos was cleaned up and removed before March 16, 1986.

7.3.1 Type 3 Operations – Measures and Procedures (O.Reg. 278/05 Section 15)

1. The work area shall be identified by clearly visible sign warning of an asbestos dust hazard.

2. Signs shall be posted in sufficient numbers to warn of the hazard and shall state in large clearly visible letters that:

   i. There is an asbestos dust hazard

   ii. Access to the work area is restricted to persons wearing protective clothing and equipment

3. A wetting agent shall be added to water that is to be used to control the spread of dust and fibers.

4. Eating, drinking, chewing or smoking shall not be permitted in the work area.

5. Containers for dust and waste (referred to as asbestos waste containers) shall be:

   i. Dust tight

   ii. Suitable for the type of waste

   iii. Impervious to asbestos

   iv. Identified as asbestos waste

   v. Cleaned with a damp cloth or HEPA vacuum immediately before being removed from the work area

   vi. Removed from the workplace frequently and at regular intervals

6. Frequently and at regular intervals during the doing of the work and immediately on completion of the work:

   i. Dust and waste shall be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in an asbestos waste container

   ii. Drop sheets shall be wetted and placed in an asbestos waste container

7. Drop sheets shall not be reused.

8. After the work is completed, polyethylene sheeting and similar materials used for barriers and enclosures shall not be reused but shall be wetted and placed in an asbestos waste container.

9. After the work is completed, barriers and portable enclosures that will be reused shall be cleaned, by using a vacuum equipped with a HEPA filter or by damp wiping.

10. Barriers and portable enclosures shall not be reused unless they are rigid and can be cleaned thoroughly.

11. The employer shall provide every worker who will enter the work area with a NIOSH approved respirator and the worker shall wear and use the respirator.

12. Protective clothing shall be provided by the employer and worn by every worker who enters the work area, and the protective clothing:

    i. Shall be made of a material that does not readily retain nor permit penetration of asbestos fibers

    ii. Shall consist of head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibers from reaching the garments and skin under the protective clothing

    iii. Shall include suitable footwear

    iv. Shall be repaired or replaced if torn

13. Compressed air shall not be used to clean up and remove dust from any surface.

14. Only persons wearing protective clothing and equipment shall enter a work area where there is an asbestos dust hazard.

7.3.2 Type 3 Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 18(1,2)

In addition to the measures and procedures prescribed by O.Reg. 278/05 Section 15, the following measures and procedures apply to Type 3 operations (summarized):

Section 18 (1):

1. The work area shall be separated from the rest of the workplace by walls, the placing of barricades or fencing or other suitable means.

Section 18 (2) In the case of an operation mentioned in paragraph 5 of subsection 12 (4), the following measures and procedures also apply:

1. The spread of dust from the work area shall be prevented by:

    i. Using enclosures of polyethylene or other suitable material that is impervious to asbestos (including, if the enclosure material is opaque, one or more transparent window areas to allow observation of the entire work area from outside the enclosure), if the work area is not enclosed by walls

    ii. Using curtains of polyethylene sheeting or other suitable material that is impervious to asbestos, fitted on each side of each entrance or exit from the work area

2. Unless the operation is carried on outdoors, or inside a building that is to be demolished and will not be entered by any person except the workers involved in the operation and the workers involved in the demolition, the spread of dust from the work area shall also be prevented by:

    i. Creating and maintaining within the enclosed area, by installing a ventilation system equipped with a HEPA filtered exhaust unit, a negative air pressure of 0.02 inches of water, relative to the area outside the enclosed area

    ii. Ensuring that replacement air is taken from outside the enclosed area and is free from contamination with any hazardous dust, vapour, smoke, fume, mist or gas

    iii. Using a device, at regular intervals, to measure the difference in air pressure between the enclosed area and the area outside it

3. The ventilation system referred to in subparagraph 2 i shall be inspected and maintained by a competent worker before each use to ensure that there is no air leakage, and if the filter is found to be damaged or defective, it shall be replaced before the ventilation system is used.

4. Before leaving the work area, a worker shall:

    i. Decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing

    ii. If the protective clothing will not be reused, place it in a container as described in paragraph 5 of section 15

5. Facilities for the washing of hands and face shall be made available to workers and shall be used by every worker when leaving the work area.

7.3.3 Type 3 Outdoor Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 18(3))

In the case of an operation that is carried on outdoors, the following measures and procedures also apply:

1. If practicable, any asbestos-containing material to be removed shall be thoroughly wetted before and during removal, unless wetting would create a hazard or cause damage.

2. Dust and waste shall not be permitted to fall freely from one work level to another.

3. If practicable, the work area shall be washed down with water after completion of the clean-up and removal described in paragraph 6 of section 15.

4. Temporary electrical power distribution systems for tools and equipment involved in wet removal operations shall be equipped with ground fault circuit interrupters.

5. A decontamination facility shall be located as close as practicable to the work area and shall consist of:

   i. A room suitable for changing into protective clothing and for storing contaminated protective clothing and equipment

   ii. A shower room as described in paragraph 7 of subsection (4)

   iii. a room suitable for changing into street clothes and for storing clean clothing and equipment

6. The rooms described in subparagraphs 5 i, ii and iii shall be arranged in sequence and constructed so that any person entering or leaving the work area must pass through each room.

7. When leaving the work area, a worker shall enter the decontamination facility and shall, in the following order:

   i. Decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing

   ii. If the protective clothing will not be reused, place it in a container as described in paragraph 5 of section 15

   iii. Shower

   iv. Remove and clean the respirator. O. Reg. 278/05, s. 18 (3)

7.3.4 Type 3 Indoor Operations – Additional Measures and Procedures (O.Reg. 278/05 Section 18(4))

In the case of an operation that is carried on indoors, the following measures and procedures also apply:

1. Friable asbestos-containing material that is crumbled, pulverized or powdered and that is lying on any surface in the work area shall be cleaned up and removed using a vacuum equipped with a HEPA filter or by damp wiping and everything shall be removed from the work area or covered with polyethylene sheeting or other suitable material that is impervious to asbestos.

2. The spread of dust from the work area shall be prevented by an enclosure of polyethylene or other suitable material that is impervious to asbestos, if the work area is not enclosed by walls, and by a decontamination facility consisting of a series of interconnecting rooms including:

   i. A room suitable for changing into protective clothing and for storing contaminated protective clothing and equipment

   ii. A shower room as described in paragraph 7

   iii. A room suitable for changing into street clothes and for storing clean clothing and equipment

   iv. Curtains of polyethylene sheeting or other suitable material that is impervious to asbestos, fitted to each side of the entrance or exit to each room

3. The rooms described in subparagraphs 2 i, ii and iii shall be arranged in sequence and constructed so that any person entering or leaving the work area must pass through each room.

4. The mechanical ventilation system serving the work area shall be disabled and all openings or voids, including ventilation ducts to or from the work area, shall be sealed by tape or other appropriate means.

5. Unless the operation is carried on inside a building that is to be demolished and will not be entered by any person except the workers involved in the operation and the workers involved in the demolition, the spread of dust from the work area shall also be prevented by:

   i. Creating and maintaining within the enclosed area, by installing a ventilation system equipped with a HEPA filtered exhaust unit, a negative air pressure of 0.02 inches of water, relative to the area outside the enclosed area

ii. Ensuring that replacement air is taken from outside the enclosed area and is free from contamination with any hazardous dust, vapour, smoke, fume, mist or gas

iii. Using a device, at regular intervals, to measure the difference in air pressure between the enclosed area and the area outside it

6. The ventilation system referred to in subparagraph 5 i shall be inspected and maintained by a competent worker before each use to ensure that there is no air leakage, and if the filter is found to be damaged or defective, it shall be replaced before the ventilation system is used.

7. The shower room in the decontamination facility shall:

i. Be provided with hot and cold water or water of a constant temperature that is not less than 40° Celsius or more than 50° Celsius

ii. Have individual controls inside the room to regulate water flow and, if there is hot and cold water, individual controls inside the room to regulate temperature

iii. Be capable of providing adequate supplies of hot water to maintain a water temperature of at least 40° Celsius

iv. Be provided with clean towels

8. When leaving the work area, a worker shall enter the decontamination facility and shall, in the following order:

i. Decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing

ii. If the protective clothing will not be reused, place it in a container as described in paragraph 5 of section 15

iii. Shower

iv. Remove and clean the respirator

9. If practicable, existing electrical power distribution systems that are not water-tight shall be de-energized and locked out where wet removal operations are to be carried out.

10. Temporary electrical power distribution systems for tools and equipment involved in wet removal operations shall be equipped with ground fault circuit interrupters.

11. Friable asbestos-containing material shall be thoroughly wetted before and during removal, unless wetting would create a hazard or cause damage.

12. The work area shall be inspected by a competent worker for defects in the enclosure, barriers and decontamination facility:

    i. At the beginning of each shift

    ii. At the end of a shift if there is no shift that begins immediately after the first-named shift

    iii. At least once each day on days when there are no shifts

13. Defects observed during an inspection under paragraph 12 shall be repaired immediately and no other work shall be carried out in the work area until the repair work is completed.

14. If practicable, dust and waste shall be kept wet.

15. On completion of the work:

    i. Negative air pressure shall be maintained if required by subparagraph 5 i

    ii. The inner surface of the enclosure and the work area inside the enclosure shall be cleaned by a thorough washing or by vacuuming with a vacuum equipped with a HEPA filter

    iii. Equipment, tools and other items used in the work shall be cleaned with a damp cloth or by vacuuming with a vacuum equipped with a HEPA filter or they shall be placed in a container as described in paragraph 5 of section 15 before being removed from the enclosure

    iv. A visual inspection shall be conducted by a competent worker to ensure that the enclosure and the work area inside the enclosure are free from visible dust, debris or residue that may contain asbestos

16. Once the work area inside the enclosure is dry after the steps set out in subparagraphs 15 ii, iii and iv have been completed, clearance air testing shall be conducted by a competent worker in accordance with subsection (5), unless the operation is carried on inside a building that is to be demolished and will not be entered by any person except the workers involved in the operation and the workers involved in the demolition.

17. The barriers, enclosure and decontamination facility shall not be removed or dismantled until:

    i. Cleaning has been done as described in paragraph 15

    ii. If clearance air testing is required, it has been completed and the work area inside the enclosure has passed the clearance air test

7.3.5 Type 3 Operations – Air Testing (O.Reg. 278/05 Section 18(5,6,7,8,9))

Section 18 (5) The following rules apply to clearance air testing:

1. Sample collection and analysis shall be done,

    i. Using the phase contrast microscopy method, in accordance with subsection (6)

    ii. Using the transmission electron microscopy method, in accordance with subsection (7)

2. If the work area inside the enclosure fails the clearance air test, the steps set out in subparagraphs 15 ii, iii and iv of subsection (4) shall be repeated and the work area shall be allowed to dry before a further test is carried out, unless paragraph 6 of subsection (6) applies. O. Reg. 278/05, s. 18 (5).

Section 18 (6) Clearance air testing using the phase contrast microscopy method shall be carried out in accordance with U.S. National Institute of Occupational Safety and Health Manual of Analytical Methods, Method 7400, Issue 2: Asbestos and other Fibres by PCM (August 15, 1994), using the asbestos fibre counting rules, and shall comply with the following requirements:

1. Testing shall be based on samples taken inside the enclosure.

2. Forced air shall be used, both before and during the sampling process, to ensure that fibers are dislodged from all surfaces inside the enclosure before sampling begins and are kept airborne throughout the sampling process.

3. At least 2,400 litres of air shall be drawn through each sample filter, even though the standard mentioned above provides for a different amount.

4. The number of air samples to be collected shall be in accordance with Table 3.

5. The work area inside the enclosure passes the clearance air test only if every air sample collected has a concentration of fibers that does not exceed 0.01 fibers per cubic centimeters of air.

6. If the work area inside the enclosure fails a first test that is done using the phase contrast microscopy method, the samples may be subjected to a second analysis using transmission electron microscopy in accordance with the standard mentioned in subsection (7).

7. When a second analysis is done as described in paragraph 6, the work area inside the enclosure passes the clearance air test only if every air sample collected has a concentration of asbestos fibers that does not exceed 0.01 fibers per cubic centimeter of air.

Section 18 (7) Clearance air testing using the transmission electron microscopy method shall be carried out in accordance with U.S. National Institute of Occupational Safety and Health Manual of Analytical Methods, Method 7402, Issue 2: Asbestos by TEM (August 15, 1994), and shall comply with the following requirements:

1. Testing shall be based on samples taken inside the enclosure and samples taken outside the enclosure but inside the building.

2. Forced air shall be used inside the enclosure, both before and during the sampling process, to ensure that fibers are dislodged from all surfaces before sampling begins and are kept airborne throughout the sampling process.

3. At least 2,400 litres of air shall be drawn through each sample filter, even though the standard mentioned above provides for a different amount.

4. At least five air samples shall be taken inside each enclosure and at least five air samples shall be taken outside the enclosure but inside the building.

5. Sampling inside and outside the enclosure shall be conducted concurrently.

6. The work area inside the enclosure passes the clearance air test if the average concentration of asbestos fibers in the samples collected inside the enclosure is statistically less than the average concentration of asbestos fibers in the samples collected outside the enclosure, or if there is no statistical difference between the two average concentrations.

Section 18 (8) Within 24 hours after the clearance air testing results are received:

(a) The owner and the employer shall post a copy of the results in a conspicuous place or places
    (i) At the workplace
    (ii) If the building contains other workplaces, in a common area of the building
(b) A copy shall be provided to the joint health and safety committee or the health and safety representative, if any, for the workplace and for the building

Section 18 (9) The owner of the building shall keep a copy of the clearance air testing results for at least one year after receiving them.

7.4 Dust Control Measures

Generation of dust must be controlled to minimize the amount that becomes airborne. Once dust is generated, steps must be taken to control its spread beyond the work area. Workers must also take precautions to control their exposure within the work area. The generation of airborne asbestos fibres can most easily be controlled using wet methods, preferably using water that has been amended and applied with a spray bottle. Amended water aids in the penetration of ACM and probability of wetting individual fibers. Use of dishwater detergent (1 cup in 30 gallons of water) can be used but commercial asbestos wetting agents are also available.

Containment of asbestos dust is best performed through the use of washing facilities, good work practices and protective clothing. Worker exposures to asbestos are best controlled through the use of respiratory protection. While not always required for Type 1 operations, respiratory protection should be worn by all Contractor employees and authorized visitors during Type 2 and Type 3 operations removal activities.

7.5 Personal Protective Equipment

All workers within enclosures shall wear a disposable suit with attached head cover. Disposable suits must be worn at all times with head cover in position. Suits may be vacuumed (with HEPA filter equipped vacuum) or wet wiped clean for re-use but should be discarded when necessary, as asbestos waste. Suit and head cover shall remain in place until the worker leaves or dismantles enclosures.

Non-powered half-face or full-face air purifying respirators with HEPA filters (or better) should be worn by all personnel entering a Type 1, 2, or 3 work area. The respiratory protection and protective clothing is not normally required for non-friable asbestos containing materials, such as the removal of caulking, floor tiles or boiler gaskets, unless handled in such fashion as to become friable. A respirator is strongly advised for work on sheet flooring, ceiling tiles and for any other work performed overhead. Respirators must be used in accordance with the procedures supplied by the manufacturer and augmented by the Township of North Huron’s management. No facial hair which may interfere with the seal between the respirator and the skin is permitted. Once a worker has entered the work zone and started the work, the respirator shall remain on while in the work area. Filter cartridges must be replaced after 24 hours or sooner if breathing resistance occurs.

7.6 Equipment Requirements

The performance of Type 1, Type 2, Type 3, and Glove Bag work can be accomplished with tools normally in a building maintenance department supplemented by the following asbestos-related equipment:

Respirator:	Half-face piece respirator equipped with high efficiency (P100) canister filters or full-face respirators with the same filters for contaminated ceiling entry and containment entry.
Respirator Test Kit:	Stannic Chloride type irritant smoke, Bitrex, banana oil or Saccharine test kit. Kit available from respirator suppliers.
Disposable Coveralls:	Coveralls with attached head cover. Cuff, wrists and head cover must be elasticized to provide sealed fit.
Vacuum:	Vacuum equipped with HEPA filter and all brushes, fittings.
Glove Bag:	PVC bag with integral OVC gloves and port for water sprayer. Bag must have double pull double throw zipper and be in correct configuration and sizes to pipe insulation.
Securing Straps:	Re-usable nylon straps with metal buckle for sealing ends of glove bag to pipe insulation.
Disposal Bags:	6 mil minimum with label identifying Asbestos Waste.
Water Sprayer:	Garden reservoir type. capable of producing mist or spray.
Wetting Agent:	Non-ionic, non-subsiding type surface active agent to be diluted with water.

7.7 Cleaning Up and Waste Removal

On leaving the work area, a worker shall proceed to the washroom provided and wash all exposed skin on hands and face.

Cleaning of the work area and removal of asbestos containing waste shall be performed on a frequent basis using wet methods and/or a HEPA vacuum. Asbestos containing waste shall be kept wet to minimize the chance of generating airborne dust. The HEPA vacuum must only be opened in an enclosure following Type 2 procedures.

Containers used for asbestos waste must be:

- Dust tight
- Suitable for asbestos-containing materials
- Impervious to asbestos containing material
- Properly identified and labelled

All bagged waste should be removed from the work area, at least, by the end of each workday. Drop sheets and barriers shall be cleaned with HEPA vacuum and disposed of as asbestos containing waste. If necessary, bagged waste can be stored in drums for transport to the approved disposal facility.

Place waste into asbestos labelled disposal bag, seal with tape, clean the bag, and place into a second clean bag, also to be sealed with tape. Use a barrel, drum, cardboard or wooden box in place of a second bag when the asbestos waste material is likely to tear the inner bag. Seal the outer container.

Provide storage area for holding minor amounts of asbestos waste in sealed containers. Containers shall be labelled and assigned exclusively for asbestos waste.

When waste is removed from site, collect the completed waste transportation manifests from the disposal firm. The generator (Township of North Huron) is responsible for completing Part A of the form. The contractor may be delegated by the Asbestos Management Coordinator to complete the form on behalf of the Township of North Huron. All forms must be retained by the Asbestos Management Coordinator.

7.7.1 Washing Facilities

Washing facilities will be required for all Contractor employees and authorized visitors to the work site. They must be used by every person leaving the work area. For Type 1 and Type 2 operations, standard washroom facilities should be adequate for this purpose. For Type 3 operations, a decontamination facility is required, which includes a contained room for removing and storing contaminated protective clothing, a shower room with hot and cold water as well as clean towels, a clean room for storing and changing into street clothes.

Air-purifying respirators shall be washed and, if necessary, disposable cartridges removed and replaced. Any used and spent cartridges shall be disposed of as asbestos contaminated waste.

7.8 Transport and Disposal Standards

7.8.1 Federal Regulations

The transport of asbestos waste is covered by Federal Regulations, namely, the Transportation of Dangerous Goods Act (TDGA). The TDGA requires that every shipment of most hazardous wastes be accompanied by Shipping Documents. The regulation classes asbestos waste as “Class 9: Miscellaneous Dangerous Goods” under two UN numbers (United Nations Committee of Experts on the Transport of Dangerous Goods) which provide further classification for waste types. Each group of asbestos waste has prescribed characteristics and handling parameters, summarized as:

- UN2212
  - Asbestos, Amphibole (actinolite, amosite, anthophyllite, crocidolite, tremolite), when not fixed in a natural or artificial binder material or included in a manufactured product
  - Packing Group II (more hazardous)
  - Limited Quantity Index: 1 kg
  - Forbidden on passenger vehicles
- UN2590
  - Asbestos, Chrysotile, when not fixed in a natural or artificial binder material or included in a manufactured product
  - Packing Group III (less hazardous)
  - Limited Quantity Index: 5 kg
  - Maximum 200 kg allowed on passenger vehicles

7.8.2 Provincial Regulations

The disposal of asbestos waste is covered under Provincial Regulations. All provincial regulations are similar and define the requirements for packaging, transporting, and disposing of asbestos waste. Ontario considers asbestos a controlled waste that requires disposal at a licensed landfill that is authorized to accept asbestos waste. It is important to check the status of the provincial regulation as several provinces have published proposed amendments for the disposal of asbestos waste. The Ontario Regulation 347 under the Environmental Protection Act Section 17 (1) to (16) Management of Asbestos Waste is typical of most provincial disposal regulations.

Listed below is the relevant information for the building owner:

Ontario Regulation 347 Section 17 (Paragraph 1 to 6) outlines that no person shall manage asbestos waste except in accordance with the following:

1. No person shall cause or permit asbestos waste to leave the location at which it is generated except for the purpose of transporting it to a waste disposal site, the operator of which has agreed to accept it and has been advised as to its anticipated time of arrival.

2. Asbestos waste transported to a waste disposal site shall,

   i. Be in a rigid, impermeable, sealed container of sufficient strength to accommodate the weight and nature of the waste

   ii. Where the asbestos waste is being transported in bulk, be transported by means of a waste management system that is subject to an environmental compliance approval that specifically authorizes the transportation of asbestos waste in bulk

3. Where a container referred to in subparagraph i of paragraph 2 is a cardboard box, the waste must be sealed in a six-mil polyethylene bag placed within the box.

4. Every container referred to in subparagraph i of paragraph 2 must be free from punctures, tears or leaks.

5. The external surfaces of every container referred to in subparagraph i of paragraph 2 and of every vehicle or vessel used for the transport of asbestos waste must be free from asbestos waste.

6. Both sides of every vehicle used for the transportation of asbestos waste and every container referred to in subparagraph i of paragraph 2 must display thereon in large, easily legible letters that contrast in colour with the background the word “CAUTION” in letters not less than ten centimeters in height and the words:

CONTAINS ASBESTOS FIBRES

Avoid Creating Dust and Spillage

Asbestos May be Harmful To Your Health

Wear Approved Protective Equipment.

7.9 Checklist for Type 1 or Type 2

The following visual inspection points will allow personnel to ensure compliance with Type 1 or Type 2 work:

Type 1

1. Visible dust removed from the work area by damp wiping or vacuuming with HEPA vacuum

2. Friable ACM removed from surfaces in work area by damp wiping HEPA vacuum

3. Drop sheets (or other measure) to control spread of dust

4. Signs posted warning of asbestos dust hazard

Type 2

1. Mechanical ventilation system serving work area disabled and sealed

2. Work area enclosed by walls or other enclosure

3. Friable material removed from the surface of false ceiling when access obtained

Work Practices

1. No eating, drinking, chewing or smoking in work area
2. Compressed air not used to clean up or remove dust from any surface
3. Wetting agent added to water for dust control
4. All friable material that may be disturbed is to be wetted, unless wetting would create hazard or cause damage
5. Asbestos dust and waste cleaned up at regular intervals
6. Waste in dust-tight containers identified as containing asbestos
7. Drop sheets and barriers that will be reused to be cleaned by damp wiping or HEPA vacuum
8. Drop sheets and barriers that will not be reused to be wetted and disposed of as asbestos waste
9. Protective clothing and equipment worn by all persons in work area
10. Protective clothing provided by employer made of material that does not readily retain or permit penetration of asbestos fibers
11. Footwear and head covering included as protective clothing
12. Protective clothing repaired and replaced if torn
13. Protective clothing decontaminated by damp wiping or with HEPA vacuum before leaving work area
14. Protective clothing that will not be reused must be decontaminated and disposed of as asbestos waste
15. Non-powered HEPA filtered air purifying dust respirators suitable for asbestos provided by employer
16. Respirators cleaned, disinfected and inspected after use in each shift
17. Respirators in good state of repair
18. Respirators fitted with an effective seal. Workers wearing respirators have no facial hair that affects a good seal

19. Written procedures for respirator use, care and selection

20. Instruction provided on the use and care or respirators

21. Clean, convenient and sanitary location for respirator storage

22. Washing facilities for hands and face provided and used by workers

23. Instruction and training provided (hazards, protective measures and work practices)

24. Asbestos work records properly generated and updated

7.10 Emergency Response in Type 2 or Type 3 Work Site

7.10.1 Medical Emergency Notification Response

In the event of a medical emergency during asbestos removal or repair operations, the following steps should be taken by Township of North Huron staff or contractors:

- Dial 911 and identify that the emergency involves a patient in an asbestos contaminated zone.
- Stop all work immediately and evacuate non-essential personnel following appropriate decontamination procedures.
- Advise Asbestos Management Coordinator that there is a medical emergency within the asbestos removal area.
- The contractors' work crew will await arrival of the medical responders and will provide them with necessary protective gear to access the work area.
- Although medical personnel will wear personal protective gear, the medical equipment and/or the ambulance unit may require decontamination of any equipment, devices, or things. The asbestos consultant provided by the contractor will be available to assist in the decontamination of any equipment or facilities involved and to certify that the equipment or facility is safe, prior to its return to service.

8.0 Asbestos Removal / Repair Procedures: Contract Work

8.1 Contractors

The contractor when hired will be responsible for coordinating the overall work of the project, including, but not limited to, the following general requirements.

- Maintain proper scheduling, manpower and equipment to ensure timely completion of the project, and coordinate with the Asbestos Management Coordinator and other contractors to minimize interference with the Township of North Huron's operations or personnel. Schedules for the various departments will be made available from the

Asbestos Management Coordinator. The Contractor may have to perform some of the asbestos removal or repair operations during periods when an area is shut-down (e.g., ventilation, electrical, water) and isolated from the public.

- Ensure that reasonable protective measures are implemented during abatement activities to protect workers, building occupants, and building components. This may include the staging of scaffolding, safety lines, shutting down steam lines, restricted access to various work areas, safety training, etc.
- Comply with any and all applicable federal and provincial regulations, guidelines and Management Plans.
- Make arrangements for personnel and equipment access to work areas inside the site to ensure efficient day-to-day operations.
- Make arrangements with Asbestos Management Coordinator and maintenance staff to shutdown building electrical or mechanical services when necessitated by a project.
- Notify Asbestos Management Coordinator of any unusual conditions created by, or encountered, during this project.
- Coordinate with Asbestos Management Coordinator concerning any demolition or alteration work required, as necessary, to accomplish this project.
- Maintain cleanliness in all facilities that are used by the asbestos abatement workers.
- The contractor shall not use welding or gas cutting equipment onsite without prior approval of Asbestos Management Coordinator. Storage of flammable materials is prohibited.
- Provide the Asbestos Management Coordinator with a daily progress report of the project(s).

8.2 General Safety

Asbestos work activities can involve a variety of safety and health concerns. A summary of common work related hazards are listed below.

- Potential Electrical Safety Hazards – result from contact with power distribution conductors, close work proximity to electrical conductors, from use of various electrical tools and lighting, and the widespread use of water for the control of asbestos containing dust.
- Potential Slips, Trips and Falls – Many factors contribute to this problem including elevated equipment and piping, poor scaffold design and construction, inadequate lighting, tripping hazards such as hoses, cords, hand tools, waste, wet surfaces, and poor traction and footing.
- Potential Hazard Causing Cuts, Lacerations and Eye Injuries – are the most common injuries during an asbestos control project. Numerous causes include puncture and cut wounds while removing pipe insulation, chicken wire insulation, suspended ceiling grids or when cutting sheet metal, the use of razor or hook knives, and eye injuries when debris falls into workers eyes when not wearing full-face respirator.

- Potential Material Handling Safety Hazards (waste handling) – common injuries involve muscular strains resulting from improper lifting.
- Potential Fire Safety Hazards – A combination of factors contribute to this potential hazard that include large amounts of flammable polyethylene sheeting, temporary plywood walls, fire suppression and detection systems which are disabled during this type of work, and numerous ignition sources which are present including temporary wiring, lighting and air filtration units.
- Confined Space – develop and implement a Confined Space Procedure that includes identifying and posting known confined space areas, provide training for all employees who may be required to enter confined spaces, and develop a standardized permit program.
- Health Considerations (Non-asbestos) – Chemical exposure and Heat Stress.

9.0 Requirements for Asbestos Removal/Repair Contractors

All asbestos repair and removal work will be completed by the asbestos removal contractor.

The word “Owner”, when used in this Asbestos Management Plan, refers to: the Township of North Huron.

The word “Consultant” in this Asbestos Management Plan refers to the qualified consulting firm (R.J. Burnside & Associates Limited) retained to complete asbestos survey and consulting services during all asbestos related removal / repair projects.

The word “Contractor” in this Asbestos Management Plan refers to the asbestos contractor retained to perform removal/repair of asbestos containing materials and all associated work described in this document and related documents.

These specifications also pertain to the emergency clean-up of asbestos materials damaged or dislodged during everyday operations.

9.1 Duties of the Owner’s Environmental Consultant

The Township of North Huron’s asbestos consultant (i.e., R.J. Burnside & Associates Limited) shall:

- Advise the Township of North Huron on matters related to the appropriate asbestos standards, guidelines or policies.
- Monitor the Contractor’s compliance with any specifications for asbestos removal / repair, the applicable asbestos standards, and all related contract documents.
- Perform, at the specific request of the Township of North Huron final clearance monitoring of the removal / repair areas prior to re-occupancy by the Township of North Huron’s employees and occupants.

- Report routinely to the Township of North Huron concerning the status of the particular project.
- Revise / upgrade drawings regarding changes to asbestos containing caulking and vermiculite insulation throughout the project. Drawings will indicate locations of asbestos containing materials and will be posted in the entrance way of the area of each ACM.
- Act on the owner's behalf to suspend an asbestos abatement project and recommend corrective action to the Contractor if non-compliance activities or non-clearance results are observed. Communicate all such actions to the Township of North Huron whenever possible before acting. In cases which require immediate action, in the opinion of the Consultant, the Consultant will notify the Asbestos Management Coordinator.

9.2 Duties of the Owner

The Township of North Huron will:

- Supply necessary utilities to the contractor, including electricity and water.
- Remove all necessary equipment or items from the immediate work area.
- Provide the Contractor with instructions regarding any safety requirements inside the Township of North Huron's WSCB.
- Permit all necessary arrangements for personnel and equipment access to the work area.
- Make arrangements necessary to obtain a securable workstation for the Consultant within reasonable proximity to the removal / repair area.

9.3 Duties of the Asbestos Management Contractor

The Contractor shall be responsible for: (1) complying with all applicable legislated standards and regulations, (2) the performance of all work specified in this document and in all related contract documents, and (3) all labour, materials and equipment necessary to complete the work. All asbestos abatement work, construction, safety and maintenance activities shall be performed according to standard practices, the procedures outlined in this document and in accordance with all legislation. The contractor will make the work area accessible to trades people.

The Contractor shall comply with the Asbestos Management Coordinator's requirement regarding project phasing, building access, and facility use to ensure that interference with the Township of North Huron's operations and personnel is kept to a minimum. The Contractor shall ensure that all employees are aware of these requirements and comply with all regulations.

The Contractor shall be responsible for protecting asbestos building components and finished surfaces during removal/repair operations. Any damage occurring during the

performance of the abatement activities, with the exception of superficial items such as nail holes or paint damage, shall be repaired by the Contractor at no additional cost to the Township of North Huron. The Contractor shall identify those building components likely to sustain damage during the project and notify the Asbestos Management Coordinator in writing prior to start of work.

The Contractor shall develop a construction schedule for the specific project based on the Township of North Huron's requirements for completion dates. The schedule shall detail all activities necessary for timely completion of the contract, including project phasing and coordination with the Township of North Huron's operations or other contractor work. The Contractor shall provide all personnel and equipment necessary to maintain the construction schedule.

9.3.1 Notification

The Contractor shall be fully responsible to notify all necessary authorities that may include the Ministry of Labour Immigration, Training and Skills Development (MLITSD); the Ministry of Transportation (MTO); and/or the Ministry of the Environment, Climate and Parks (MECP).

Before starting the work:

Notification to the MLITSD is required for all Type 3 operations, and some Type 1 and Type 2 operations:

- **Type 3 Asbestos Removal Operations** always require a Notice of Project (NOP) completed online through the MLITSD website https://www.ontario.ca/page/file-work-notice. Oral notification (via telephone or email, if accepted) to the MLITSD office nearest where the work is being completed is required. A copy of the NOP must be posted at the worksite in a conspicuous location and must be available for review by MLITSD inspectors.
- **Type 2 Asbestos Removal Operations** involving Glove Bag operations to remove more than 1 m^2 of ACM require a Notice of Project (NOP) completed online through the MLITSD website https://www.ontario.ca/page/file-work-notice. Oral notification (via telephone or email, if accepted) to the MLITSD office nearest where the work is being completed is required. A copy of the NOP must be posted at the worksite in a conspicuous location and must be available for review by MLITSD inspectors.
- Oral notification (telephone or email, if accepted) to MLITSD is required for all Type 1 and Type 2 asbestos work when the value of the entire project exceeds $50,000.00.
- Asbestos waste must be registered in the Hazardous Waste Program Registry managed by the Resource Productivity and Recovery Authority (RPRA) and tracked using a digital manifest from the point of origin to disposal.

9.4 Criteria for Temporary Suspension of Abatement

9.4.1 Work Practices

The following practices will form the basis to temporarily suspend contractor work (approval by the Asbestos Management Coordinator is necessary prior to any suspension of work):

- Work practices which are not in accordance with Provincial or federal requirements, or with those outlined in this document.
- Work practices not specifically prohibited in this document, but which are judged to be unsafe upon consultation between the Asbestos Management Coordinator and the Consultant.

Abatement shall resume only upon mutual agreement between the Asbestos Management Coordinator, the Consultant, and the Contractor.

9.5 Asbestos Control Procedures

The following subsections stipulate the minimum requirements for asbestos control procedures that must be addressed by the Contractor when conducting abatement work at the Township of North Huron WSCB.

9.5.1 Contractor Employee Training

Training requirements shall follow the guidelines required by the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD).

9.5.2 Personal Protective Equipment

9.5.2.1 Respiratory Protection

All respiratory protection shall be provided to workers in accordance with the Contractor's submitted written respiratory protection program. Workers shall be provided with personally issued and individually identified respirators. The workers shall undertake a medical examine to determine acceptability to wearing the respirators and will be fit-tested to ensure an adequate respirator seal.

9.5.2.2 Protective Clothing

Full-body disposable protective clothing, including head, body and foot covers consisting of material impenetrable to asbestos fibres (Tyvek) shall be provided to all workers and authorized visitors. This clothing shall be provided in a size adequate to accommodate movement without tearing. Torn clothing shall be immediately repaired or replaced. Disposable clothing shall be adequately sealed to the footwear to prevent body

contamination. Safety shoes and or rubber safety boots will be worn in conjunction with the footwear to minimize potential of slip, trip and fall hazards.

9.5.3 Asbestos Removal Projects

All appropriate asbestos control procedures involving any Type 1, 2, 3 and Glove Bag procedures will be spelled out in detail in the removal specifications that would be required prior to any removal project commencing.

10.0 Medical Surveillance

Medical surveillance is required by the O.Reg. 278/05 Section 13 for all workers involved in Type 2 and 3 operations. This plan requires that all asbestos removal work be conducted by a qualified Contractor. Accordingly, medical surveillance for employees is not required.

If a medical surveillance program is to be established by the Asbestos Management Coordinator and apply to maintenance staff that work within or near ACM, Regulations require the completion of an Asbestos Work Report form (MLITSD Form, shown in Appendix F) for the worker at least once per year and immediately on termination of employment of the worker. The employer must forward the completed asbestos work report to a Physician of the Ministry and give a copy to the worker.

11.0 Summary and Recommendations

This Asbestos Management Plan applies to the Township of North Huron Wingham Standpipe Control Building (WSCB) facility located at 199 John Street East, Wingham, Ontario. The location of the WSCB is displayed in Figure 1.

Two asbestos-containing materials (ACM) were identified in the WSCB, including vermiculite insulation within concrete block wall cavities throughout the building, and white caulking around the interior and exterior door frame. The location of the door frame and concrete block is shown in Figure 2.

The building may remain in use. The inspection and maintenance of the door frame caulking and concrete block wall vermiculite insulation, due to their ACM composition, should be in accordance with this plan.

Asbestos Management Coordinator should be designated to oversee the AMP. The person and any other staff should be appropriately trained.

Inform the Joint Health and Safety Committee (JHSC) about the AMP. The involvement and cooperation of the JHSC is considered an integral part of the AMP.

A warning label must be posted immediately adjacent to any friable, non-friable, or suspected ACM. Warning labels should be prominently displayed and remain posted until the labelled ACM is removed. Signs can be adhered directly onto the material.

This plan must be reviewed annually.

A copy of this plan should be available at the WSCB for use by staff and contractors that may come into contact with the ACM.

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

Figures



LEGEND

APPROXIMATE SITE BOUNDARY



N

0 5.0 10.0 20.0 30.0 40.0

Metres

BURNSIDE

Client

TOWNSHIP OF NORTH HURON
WINGHAM STANDPIPE - 199 JOHN STREET

Figure Title

ASBESTOS MANAGEMENT PLAN
WINGHAM STANDPIPE CONTROL BUILDING

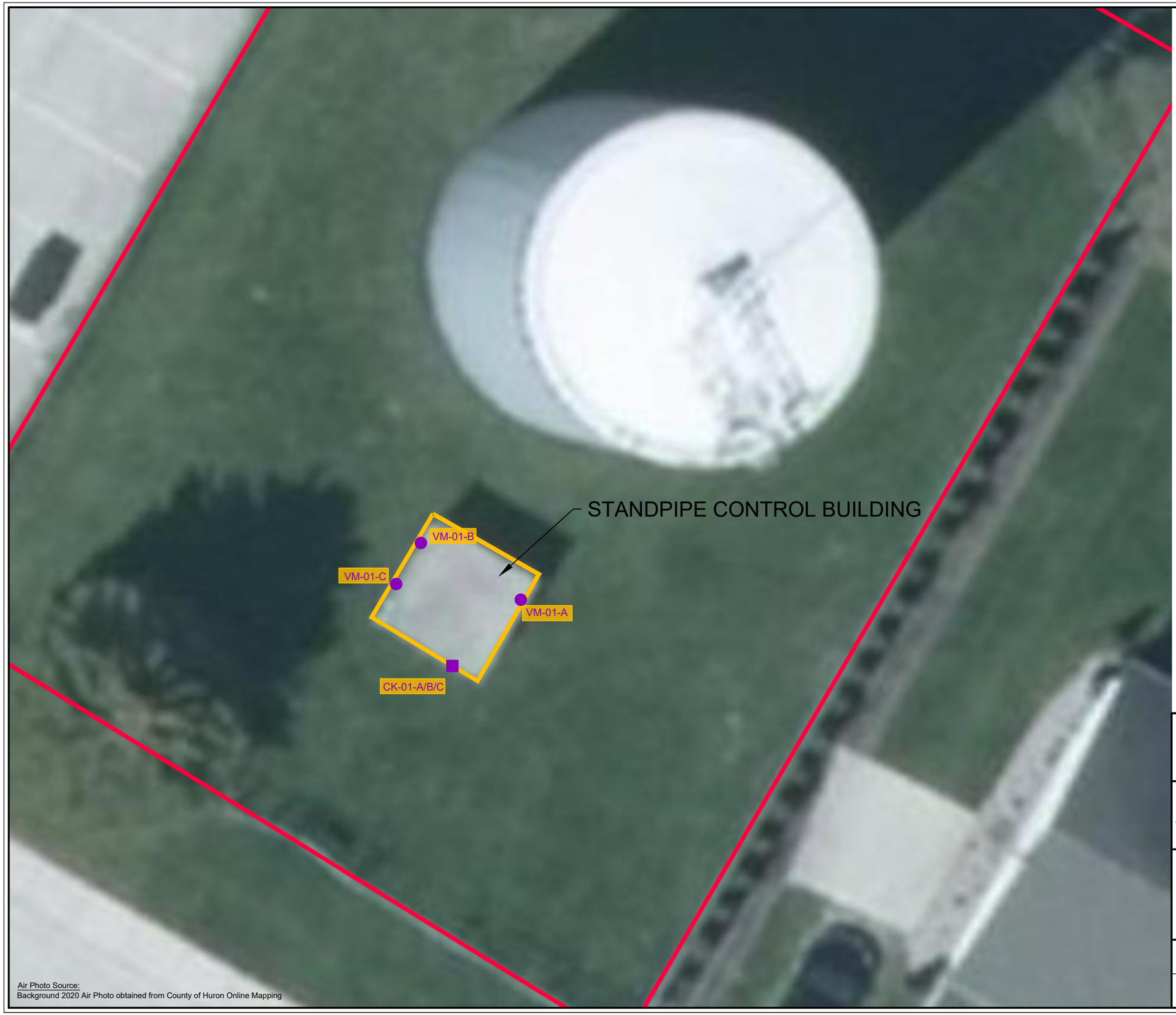
SITE PLAN

Drawn	Checked	Date	Figure No.
SK	PW	September 2025	1
Scale		Project No.	
1:500		300053193.0002	

Air Photo Source:
Background 2018 Air Photo obtained from Google Earth Professional / DigitalGlobe © Google Earth, use of products are subject to the Terms and Conditions of Licensed Google Earth Software.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID

File: e:\mo\shared work areas\X:\053193 Wingham DSS\02_Production\053193 Asbestos Management Figures.dwg Date Plotted: September 3, 2025 - 12:42 PM



Air Photo Source:
Background 2020 Air Photo obtained from County of Huron Online Mapping

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- ASBESTOS DETECTED - VERMICULITE INSULATION
- ASBESTOS DETECTED - WHITE CAULKING
- ASBESTOS CONTAINING MATERIAL (ACM)

N

0 2.0 4.0 6.0 8.0
Metres

BURNSIDE

Client
TOWNSHIP OF NORTH HURON
WINGHAM STANDPIPE - 199 JOHN STREET

Figure Title
ASBESTOS MANAGEMENT PLAN
WINGHAM STANDPIPE CONTROL BUILDING

ACM LOCATION PLAN

Drawn	Checked	Date	Figure No.
SK	PW	September 2025	2
Scale		Project No.	
1:500		300053193.0000	

File: e:\mo\shared work areas\X:\053193 Wingham DSS\02_Production\053193 Asbestos Management Figures.dwg Date Plotted: September 10, 2025 - 9:50 AM

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Designated Substances and Hazardous Materials Report

BURNSIDE

Designated Substances and Hazardous Materials Survey
Wingham Standpipe
199 John Street East
Wingham, Ontario

Township of North Huron
274 Josephine Street
Wingham, Ontario N0G 2W0

Designated Substances and Hazardous Materials Survey
Wingham Standpipe
199 John Street East
Wingham, Ontario

Township of North Huron
274 Josephine Street
Wingham, Ontario N0G 2W0

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA

March 6, 2023
300053193.0000

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
-	Yes	Yes	Township of North Huron – Chip Wilson

Record of Revisions

Revision	Date	Description
-	March 6, 2023	Submission to the Township of North Huron

R.J. Burnside & Associates Limited

Report Prepared By:



Angela Mason, M.Sc., P.Geo., QP_{ESA}
Hydrogeologist
AM:cl

Report Reviewed By:



Jim Walls, P.Geo., QP_{ESA}
Senior Geoscientist
JW:cl

Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by the Township of North Huron (Township) to conduct a Designated Substances Survey and Hazardous Materials Survey (DSHMS) of the standpipe structure and control building at the property located at 199 John Street East in Wingham, Ontario (herein referred to as the Site; Figure 1). The standpipe structure is proposed for demolition, requiring a DSHMS. The control building was also included in the DSHMS for repair/maintenance work or potential future demolition.

The DSHMS included a visual inspection of the buildings and structures to identify the presence or potential presence of substances designated by the Occupational Health and Safety Act (OHSA) and other hazardous materials that may require special handling. Building material samples suspected to contain asbestos and/or lead were collected and submitted for laboratory analysis. The findings of the DSHMS are summarized below:

- **Asbestos** was identified in the following materials:
  - **Vermiculite insulation (1.00% Tremolite Asbestos)** – This material was identified within cinderblock wall cavities of the control building. The block walls surround the 3 m x 3 m (10’ x 10’) building, approximately 2.4 m (8’) in height. The vermiculite insultation is considered a friable material under O. Reg. 278/05, and was observed to be falling from perforations in the block walls onto the floor and work bench within the building. The presence of loose vermiculite insulation in the building is considered a health hazard to workers in the building.
  - **Caulking, white (8% Chrysotile Asbestos)** – This material was identified as caulking around the interior and exterior door frame, with a total linear amount of about 10 m. The white caulking material was observed in fair to poor condition and is not considered a friable material under O. Reg. 278/05.
- **Lead-containing paints** (1,000 to 5,000 ppm) were identified as follows:
  - **Grey paint on the control building door and frame (1,200 ppm)** – This paint was identified on the interior and exterior door and frame of the control building. The grey paint was observed to be in fair condition.
  - No samples were identified as lead-based (>5,000 ppm) paints.
- **Mercury** was identified the fluorescent lamp tubes within the control building.
- **PCBs** were identified in the fluorescent lamp ballast within the control building.
- **Silica** was identified as a component of concrete, cement, and brick.
- **Benzene** was identified as a component of diesel, gasoline and oil fuel.

No other designated substances or hazardous materials were identified or suspected.

Soil and subsurface sampling were not included as part of the DSHMS. This report does not evaluate environmental impacts to soil, sediment or groundwater related to fuel storage tanks or other surface contaminant sources.

The recommendations included:

1. Friable asbestos-containing vermiculite insulation falling out of wall cavities is considered a health hazard to workers and out of compliance with regulations. Workers working in the building or in close proximity to the material must be advised of the presence of asbestos-containing materials [vermiculite insulation (1% Tremolite, friable) and door frame caulking (8% Chrysotile, non-friable).

    a) Workers should avoid disturbance to asbestos-containing material. Workers should not attempt to clean up the material (e.g., by sweeping, vacuuming, etc.) as this could cause the material to become airborne.

    b) Respirator use is recommended in accordance with O. Reg. 278/05 for building entry until the exposed asbestos has been cleaned up and sealed.

    c) All workers (including subcontractors) must be notified prior to building entry.

    d) Signage is required within the building.

2. The fallen vermiculite insulation must be cleaned up and removed, and the wall openings sealed such that material will not continue to fall out. Work on asbestos-containing materials must be conducted in accordance with the requirements in O. Reg. 278/05. Operations that may expose a worker to asbestos are classified as Type 1, Type 2 and Type 3 operations.

    The asbestos-containing vermiculite insulation identified within the cinderblock wall cavities of the control building is considered a friable material. Cleanup and repair work involving this material would be considered at Type 2 operation under O. Reg. 278/05. We recommend that this work be completed by a qualified abatement contractor.

    The asbestos-containing caulking material identified around the control building door frame is considered a non-friable material. If the material is disturbed or removed, the following abatement procedures are applicable to non-friable asbestos-containing materials:

    a) O. Reg. 278/05 Type 1 operations are used for the removal of non-friable asbestos-containing material if:

        – the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated; or

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is wetted to control the spread of dust/fibers and the work is done only by means of non-powered hand-held tools.

b) O. Reg. 278/05 Type 2 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is not wetted to control the spread of dust/fibres and the work is done only by means of non-powered hand-held tools; or
- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.

c) O. Reg. 278/05 Type 3 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

3. If the asbestos containing materials are to remain in the building an Asbestos Management Plan is required for the Site. The Plan must be prepared in accordance with O. Reg. 278/05 and include the associated labelling of the asbestos containing materials and worker training.

4. Removal of lead-containing materials must be conducted in accordance with the Ontario Ministry of Labour, Immigration, Training and Skills Development (MOL) guideline “Lead on Construction Projects.” Operations that may expose a worker to lead are classified as Type 1, Type 2 and Type 3 operations. The operations are based on the concentration of airborne lead. The following abatement procedures would be applicable to the removal of lead-containing paints identified at the Site:

d) Type 1 MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating is removed with a chemical gel or paste and fibrous laminated cloth wrap; or
- the coating or material is removed using non-powered hand tools, other than manual scraping or sanding; or
- the coating or material is removed using power tools equipped dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3.

e) Type 2a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed by scraping or sanding using non-powered hand tools; or
- lead-painted walls or building components are demolished by striking with a sledgehammer or similar tool.

f) Type 3a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed using power tools without dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3; or
- an operation that may expose a worker to lead, dust, fume or mist that is not a Type 1, Type 2 or Type 3b MOL lead-containing construction operation.

5. Appropriate worker precautions should be taken as per the OHSA when handling PCB-containing fluorescent lamp ballasts, mercury-containing fluorescent light bulbs, and fuel containers or equipment containing fuel/benzene.

6. Appropriate worker precautions should be taken as per the OHSA when cutting, coring or breaking up silica containing concrete, brick and masonry materials.

7. Handling and disposal of building materials and hazardous waste including, but not limited to the designated substances and hazardous materials identified within this DSHMS, should be conducted as per the requirements of O. Reg. 347.

8. A copy of this report should be provided to contractors involved in renovations and demolition at the Site.

9. New or undocumented suspect materials discovered in currently inaccessible areas (behind concrete walls or in plenum spaces) should be sampled prior to removal to ensure worker safety and compliance with regulatory requirements.

Table of Contents

1.0 Introduction 1
2.0 Site Description 1
2.1 Standpipe 1
2.2 Control Building 1
3.0 Scope of Work and Legislative Requirements 2
4.0 Survey Methods and Results 3
4.1 Asbestos 3
4.2 Lead 5
4.3 Mercury 6
4.4 Silica 6
4.5 Acrylonitrile 7
4.6 Arsenic 7
4.7 Benzene 7
4.8 Coke Oven Emissions 7
4.8.1 Ethylene Oxide 7
4.8.2 Isocyanates 7
4.8.3 Vinyl Chloride Monomer 8
4.9 Other Substances of Potential Environmental Concern 8
4.9.1 Polychlorinated Biphenyls (PCBs) 8
4.9.2 Ozone Depleting Substances 8
4.9.3 Radioactive Materials 9
4.9.4 Urea Formaldehyde Foam Insulation (UFFI) 9
4.9.5 Mould 9
4.9.6 Other Materials and Conditions 9
5.0 Conclusions 10
6.0 Recommendations 11
7.0 Limitations and Use of Report 14
8.0 References 15

Tables

Table 1: Asbestos Sampling Descriptions, Locations and Analytical Results 4
Table 2: Lead Sampling Descriptions, Locations and Analytical Results 5
Table 3: PCB Inspection Descriptions and Locations 8

Figures

Figure 1 Site Plan
Figure 2 Sample Location Plan

Appendices

Appendix A Photographs
Appendix B Laboratory Certificates of Analysis

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by Township of North Huron (Township) to conduct a Designated Substances Survey and Hazardous Materials Survey (DSHMS) of the property located at 199 John Street East in Wingham, Ontario (herein referred to as the Site). Buildings proposed for demolition, and included in the DSHMS, include the existing standpipe and control building (Figure 2).

The work was conducted to evaluate the potential presence of designated substances and hazardous materials within the buildings/structures proposed for demolition.

This report should be provided to contractors and workers who will be conducting demolition or renovation of the buildings included in the DSHMS.

2.0 Site Description

The Site is located at 199 John Street East in Wingham, Ontario and includes a standpipe structure and control building. The Site is roughly rectangular in shape with a total area of approximately 0.07 hectares and is known as the Wingham Standpipe. The Site is located on the north side of John Street East between Carling Terrace and Madill Drive in the community of Wingham, Township of North Huron (Figure 1).

No information or documentation regarding the presence of designated substances or hazardous materials was available prior to conducting the work.

2.1 Standpipe

The standpipe structure was constructed in 1974 and is 8.53 m (28 ft) in diameter and 20.56 m (100.25 ft) in height. The standpipe has cast-in-place concrete walls surrounded by a 19 mm (¾") layer of shotcrete. Based on the 2015 assessment report completed by Burnside, major upgrades were completed to the standpipe in 1984, including concrete replacement at construction joints, patching cracks with Cappar Cap Patch, and new coated wire strands. Cappar Niklepoxy Concrete Sealer was also added as an exterior coating and Cappar Product 215 Epoxy was used as an interior coating.

2.2 Control Building

The control building was constructed around the same time as the standpipe in 1974. The control building is approximately 3 m x 3 m (10' x 10') with a 2.4 m (8') high ceiling. Building construction consists of a poured concrete foundation with underground pump "basement" and block walls surrounding the ground floor portion of the building. The building has a concrete slab roof underlain by interior aluminum. The block walls are

painted on the interior and exterior. The pump "basement" is considered a confined space and accessible via a permanent ladder structure within the building. In addition to the pump, the control building contains electrical and supervisory control and data acquisition (SCADA) equipment.

3.0 Scope of Work and Legislative Requirements

In accordance with Section 30 of the Ontario Occupational Health and Safety Act (OHSA) "Duty of Project Owners", the owner of a property must provide to any renovation/demolition contractor(s) and/or subcontractor(s) a list of any or all designated substances present on the Site, regardless of whether the owner intends to demolish or retain the existing building(s). Proposed renovations and/or demolition of any part of the structure(s) are subject to this section. There are currently eleven designated substances that must be assessed as part of the DSHMS:

- Asbestos
- Mercury
- Benzene
- Acrylonitrile
- Lead
- Ethylene Oxide
- Arsenic
- Isocyanates
- Silica
- Vinyl Chloride
- Coke Oven Emissions

The Site was also inspected for additional items that, under Provincial or Federal regulations, may require special handling and/or disposal during or after renovation and/or demolition of the buildings including:

- Polychlorinated biphenyls (PCBs) in transformers and/or light ballasts;
- Ozone depleting substances (ODS) commonly found in older air conditioning and/or refrigeration equipment;
- Radioactive devices and equipment;
- Urea formaldehyde foam insulation (UFFI);
- Miscellaneous chemicals and waste materials that may require special handling or disposal; and
- Mould, gross amounts which would require special handling during renovations or demolition.

The objectives of this survey were as follows:

- To comply with the requirements of Section 30 of the OHSA;
- To identify designated substances and/or hazardous materials within surveyed areas of the Site;
- To document, the type, location, condition, and quantity of designated substances and hazardous materials identified during the survey; and
- To provide applicable management considerations for each designated substance and/or hazardous material identified.

It was assumed for the purposes of this DSHMS that all process chemicals, materials and equipment that were used as part of daily operations and not permanently affixed to the structures would be removed prior to any reconstruction activities and were not included in this DSHMS.

The inspection consisted of the following:

- A review of existing background information, as available;
- A survey of all accessible areas;
- Sampling and testing of suspect materials (e.g., suspected asbestos-containing and lead-containing materials);
- Submission of samples to an accredited laboratory for analysis;
- Interpretation of analytical data and identification of designated substances and hazardous materials; and
- Preparation of site-specific management considerations and recommendations.

Site access and information about the history of the buildings surveyed was provided by the Township of North Huron. The field work for the DSHMS was conducted on February 7, 2023 by Angela Mason, M.Sc., P.Geo., QP_{ESA} of Burnside. Angela has attended the Asbestos Hazard Emergency Response Act (AHERA) Building Inspector training course approved by the United States Environmental Protection Agency (US EPA).

4.0 Survey Methods and Results

4.1 Asbestos

Asbestos is the one designated substance specifically governed by two regulations under the Act – Ontario Regulation (O. Reg.) 490/09 and O. Reg. 278/05 “Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.” O. Reg. 278/05 includes, but is not limited to, governance of ongoing asbestos management in buildings, information for workers, owner and employer responsibilities, types of abatement operations and their measures and procedures, applicable respirator usages, instruction and training requirements, asbestos work reports and workers register, provision of equivalent measures, notice to inspector requirements and bulk and air sampling requirements.

A total of 18 samples of suspect asbestos-containing material were collected and submitted to EMSL Canada Inc. for analysis of asbestos by polarized light microscopy (PLM). A minimum of three samples of each material were obtained in accordance with O. Reg. 278/05. Sample descriptions and results are summarized in Table 1 and photographs are included in Appendix A. The sample locations are presented on Figure 2.

Table 1: Asbestos Sampling Descriptions, Locations and Analytical Results

Samples Analyzed	Material	Location	Asbestos Concentration
VM-01-A VM-01-B VM-01-C	Vermiculite insulation	Control Building – within cinderblock walls	1.00% Tremolite NA - Positive Stop NA – Positive Stop
CK-01-A CK-01-B CK-01-C	Caulking, white	Control Building – exterior door frame	8% Chrysotile NA - Positive Stop NA – Positive Stop
CK-02-A CK-02-B CK-02-C	Caulking, white	Standpipe – exterior access panel	<0.5% <0.5% <0.5%
FS-01-A FS-01-B FS-01-C	Firestop caulking, grey/clear	Control Building – wire penetrations through exterior walls	<0.5% <0.5% <0.5%
RF-01-A RF-01-B RF-01-C	Roof flashing, black	Control Building – exterior roof flashing	<0.5% <0.5% <0.5%
CON-01-A CON-01-B CON-01-C	Concrete	Standpipe – exterior concrete	<0.5% <0.5% <0.5%

Under O. Reg. 278/05 Section 1.0, “asbestos-containing material” is defined as material that contains 0.5% or more asbestos by dry weight. The samples were analyzed using “positive stop” analysis (i.e., the laboratory stops analysis of other samples in a series when asbestos is detected in one sample). Laboratory results confirm the presence of asbestos in the following materials:

- **Vermiculite insulation (1.00% Tremolite Asbestos)** – This material was identified within cinderblock wall cavities of the control building. The block walls surround the 3 m x 3 m (10’ x 10’) building, approximately 2.4 m (8’) in height. The vermiculite insultation is considered a friable material under O. Reg. 278/05, and was observed to be falling from perforations in the block walls onto the floor and work bench within the building. The presence of loose vermiculite insulation in the building is considered a health hazard to workers in the building.

- **Caulking, white (8% Chrysotile Asbestos)** – This material was identified as caulking around the interior and exterior door frame, with a total linear amount of about 10 m. The white caulking material was observed in fair to poor condition and is not considered a friable material under O. Reg. 278/05.

Asbestos was not detected (<0.5%) within any other samples analyzed. Laboratory certificates of analysis are included in Appendix B.

Burnside notes that some items, such as pipe gaskets and sealants could contain asbestos; however, these components could not be sampled as pipes were sealed. It is expected that gaskets and sealants would be removed as a component within the valves and piping during renovation or demolition. Precautions should be taken when dismantling these components.

4.2 Lead

In Ontario, industrial organizations such as the Environmental Abatement Council of Canada (EACC) have developed guidelines for lead concentrations in paint. The EACC Lead Guideline (2014) provides a good due diligence approach.

For the purposes of this DSHMS, we consider:

- Paint containing less than 1,000 ppm (µg/g) lead (less than 0.1% lead) is considered "low-level lead paint";
- Paint containing from 1,000 ppm (µg/g) to 5,000 ppm (µg/g) lead (0.1 to 0.5% lead) is considered "lead-containing paint"; and
- Paint containing in excess of 5,000 ppm (µg/g) lead (more than 0.5% lead) is considered "lead-based paint".

Although all paints that contain lead must be given consideration when there is worker exposure, it is the lead-based paints that are of most concern to workers and specifically identified as an item of concern when assessing the results of a DSHMS.

A total of six samples of suspect lead containing materials were collected from painted surfaces on the interior and exterior of the buildings and submitted to EMSL Canada Inc. for analysis of lead. Sample descriptions and results are summarized in Table 2 and photographs are included in Appendix A. The sample locations are presented on Figure 2.

Table 2: Lead Sampling Descriptions, Locations and Analytical Results

Samples Analyzed	Material	Location	Lead Concentration	EACC Guideline
PB-01	White paint	Control building – interior walls	<81 ppm	Low-level lead paint
PB-02	Grey paint	Control building – door and frame	1,200 ppm	Lead-containing paint
PB-03	Grey paint	Control building – ceiling	<80 ppm	Low-level lead paint
PB-04	Grey paint	Control building – wood floor	120 ppm	Low-level lead paint

Samples Analyzed	Material	Location	Lead Concentration	EACC Guideline
PB-05	White paint	Control building – exterior walls	<80 ppm	Low-level lead paint
PB-06	Grey paint	Control building – exterior roof	<81 ppm	Low-level lead paint

Based on the EACC Lead Guideline the following were identified as lead-containing (1,000 to 5,000 ppm) paints:

- **Grey paint on the control building door and frame (1,200 ppm)** – This paint was identified on the interior and exterior door and frame of the control building. The grey paint was observed to be in fair condition.

No samples were identified as lead-based (>5,000 ppm) paints based on the EACC Lead Guideline.

Laboratory certificates of analysis are included in Appendix B.

4.3 Mercury

Mercury is most commonly present in buildings as a liquid in thermostats, switches and switchgears, pressure and/or temperature gauges, flow relays, and pressure transmitter units. Compact fluorescent light (CFL) bulbs contain a small amount of mercury sealed within the glass tubing.

The following mercury containing materials were identified in the control building:

- Fluorescent lamp tubes (assume all contain a small amount of mercury vapour).

4.4 Silica

Free crystalline silica in the form of silica sand is commonly used in the construction of concrete blocks, poured concrete, brick and masonry products within structures. Many silica containing materials were identified at the Site such as concrete blocks and poured cement, including the standpipe material.

Coring, sawing, or breaking up the materials containing silica should be completed only with appropriate dust suppression methods, proper respiratory protection, and general worker safety precautions as outlines in the Occupational Health and Safety Act.

4.5 Acrylonitrile

Acrylonitrile may be present in stable form within paints, adhesives, and piping (i.e., black plumbing piping known as ABS – Acrylonitrile Butadiene Styrene). If present onsite in adhesives or as piping, these stable forms of acrylonitrile would not be expected to be a source of concern during demolition work related to any portion of the buildings. Should acrylonitrile be present within the materials, it is not expected that it would become airborne at concentrations above regulatory limits. Bulk acrylonitrile/acronitrile was not observed.

4.6 Arsenic

Arsenic would not be expected in the building or building materials and was not noted during the inspection.

4.7 Benzene

Benzene is a component in petroleum-based products such as hydraulic oils and fuels (gasoline, diesel, fuel oil).

Benzene may be present in roofing materials. Should benzene be present within the roofing materials, it is not expected that it would become airborne at concentrations above regulatory limits.

No suspected benzene containing materials were noted that required laboratory confirmatory analysis. Benzene concentrations in fuel products can be found in the Safety Data Sheets (SDS) for the products.

4.8 Coke Oven Emissions

Coke oven emissions would not be expected related to the structure and no evidence was noted during the inspection.

4.8.1 Ethylene Oxide

Ethylene oxide would not be expected in the structure and no evidence was noted during the inspection.

4.8.2 Isocyanates

Free isocyanate compounds would not be expected except for the possible inclusion of small amounts in paint finishes. Should isocyanate compounds be present within the materials, they would not be expected to become airborne at concentrations above regulatory limits. No bulk or significant amounts of isocyanates were suspected or noted.

4.8.3 Vinyl Chloride Monomer

Vinyl chloride monomer is typically a component of PVC piping and conduits. Should vinyl chloride monomer compounds be present within the materials, they would not be expected to become airborne at concentrations above regulatory limits. Vinyl chloride monomer would not be expected in these buildings and was not noted in any form during the inspection.

4.9 Other Substances of Potential Environmental Concern

4.9.1 Polychlorinated Biphenyls (PCBs)

Fluorescent light ballasts and transformers are a potential source of PCBs. Ballasts containing PCBs were phased out by manufacturers prior to July 1980. Based on the age of the building PCBs may be present. It is expected that during renovation or demolition, any electrical equipment would be removed as a whole component without dismantling.

The fluorescent light ballasts inspected for the presence of PCBs are summarized in Table 3 and photographs are included in Appendix A.

Table 3: PCB Inspection Descriptions and Locations

Description	Location	Manufacturer / Product Code	PCB Containing
Fluorescent Lamp Ballast within 2-bulb fluorescent light fixture	Control building	Universal Therm-O-Matic 446-LR-TC-P	Yes (assumed)

The fluorescent light ballast located in the control building is expected to be PCB containing.

It is noted that Burnside staff were unable to access the basement due to confined space restrictions, and available photos of the basement area did not show any light fixtures. If additional fluorescent light fixtures are present within the control building they should be assumed as PCB containing unless determined otherwise.

No suspected PCB containing materials were identified that required confirmatory sampling to determine if the content met regulatory requirements.

4.9.2 Ozone Depleting Substances

Older air conditioning units or systems may use ODS as refrigerant. No suspected ozone depleting substances were noted.

4.9.3 Radioactive Materials

Ionization smoke detectors use a small amount of radioactive material to make the air within the sensing chamber conduct electricity. Prior to any construction activities involving ionization smoke detectors, these devices should be removed.

Smoke detectors were not identified during the site inspection.

4.9.4 Urea Formaldehyde Foam Insulation (UFFI)

A visual assessment is conducted for the potential presence of urea formaldehyde foam insulation (UFFI). This will involve the inspection of exterior and interior walls for evidence of repaired openings (i.e., nozzle holes) made to facilitate the installation of the insulation. Although the inspection will be non-intrusive, wherever possible, an inspection of wall cavities through existing openings will be made.

Construction after 1980 did not use UFFI and it was rare in industrial/commercial buildings. The hazard associated with UFFI was related to formaldehyde outgassing during the curing phase, which typically lasted for a period of a few months up to a few years, and UFFI installations prior to 1980 would be highly unlikely to emit any detectable formaldehyde gas at present time even during building renovation or demolition activities.

No suspect UFFI containing materials were identified during the site inspection.

4.9.5 Mould

Although mould is not a designated substance, it is included as an additional component of Burnside's DSHMS as it can be a significant workplace issue and is important to owners. Typically, the mould of concern at a workplace is gross amounts that have the potential to impact the air quality and is indicative of a serious moisture control problem.

Gross mould is typically long-term growth that covers or penetrates a substrate fueled by constant moisture and air temperatures conducive to growth. Minor mould is defined as surficial, in a limited area, and a result of limited moisture and growth potential such as along the edge of a window that lacks caulking.

No significant amounts of mould (in gross amounts) or significant mould related issues were observed during the inspection. No sampling of suspected mould containing materials or air quality testing was deemed necessary.

4.9.6 Other Materials and Conditions

Except for a small portable generator within the control building no hazardous materials were stored on the property.

No significant evidence of an environmental impact such as leaks, or spills were noted or suspected.

Wastes were managed appropriately and no impacts from waste management were observed or suspected.

5.0 Conclusions

A DSHMS was conducted at the buildings and structures proposed for demolition/repair at the Site on February 7, 2023. The buildings and Site were inspected to determine if any of the 11 designated substances, as designated by the OHSA and regulations, were present or potentially present. The inspection included other items that may also require special handling during renovations or demolition.

The key findings of the DSHMS are:

- **Asbestos** was identified in the following materials:
  - **Vermiculite insulation (1.00 % Tremolite Asbestos)** – This material was identified within cinderblock wall cavities of the control building. The block walls surround the 3 m x 3 m (10' x 10') building, approximately 2.4 m (8') in height. The vermiculite insultation is considered a friable material under O. Reg. 278/05, and was observed to be falling from perforations in the block walls onto the floor and work bench within the building. The presence of loose vermiculite insulation in the building is considered a health hazard to workers in the building and is out of compliance with regulations.
  - **Caulking, white (8% Chrysotile Asbestos)** – This material was identified as caulking around the interior and exterior door frame, with a total linear amount of about 10 m. The white caulking material was observed in fair to poor condition and is not considered a friable material under O. Reg. 278/05.
- **Lead-containing paints** (1,000 to 5,000 ppm) were identified as follows:
  - **Grey paint on the control building door and frame (1,200 ppm)** – This paint was identified on the interior and exterior door and frame of the control building. The grey paint was observed to be in fair condition.
  - No samples were identified as lead-based (>5,000 ppm) paints.
- **Mercury** was identified the fluorescent lamp tubes within the control building.
- **PCBs** were identified in the fluorescent lamp ballast within the control building.
- **Silica** was identified as a component of concrete, cement, and brick.
- **Benzene** was identified as a component of diesel, gasoline and oil fuel.

No other designated substances or hazardous materials were identified or suspected.

The presence of asbestos containing materials without an Asbestos Management Plan is out of compliance with O. Reg. 278/05.

Soil and subsurface sampling were not included as part of the DSHMS. This report does not evaluate environmental impacts to soil, sediment or groundwater related to fuel storage tanks or other surface contaminant sources.

6.0 Recommendations

Based on the findings of the DSHMS, the following recommendations are provided:

1. Friable asbestos-containing vermiculite insulation falling out of wall cavities is considered a health hazard to workers and out of compliance with regulations. Workers working in the building or in close proximity to the material must be advised of the presence of asbestos-containing materials [vermiculite insulation (1% Tremolite, friable) and door frame caulking (8% Chrysotile, non-friable)].

    a) Workers should avoid disturbance to asbestos-containing material. Workers should not attempt to clean up the material (e.g., by sweeping, vacuuming, etc.) as this could cause the material to become airborne.

    b) Respirator use is recommended in accordance with O. Reg. 278/05 for building entry until the exposed asbestos has been cleaned up and sealed.

    c) All workers (including subcontractors) must be notified prior to building entry.

    d) Signage is required within the building.

2. The fallen vermiculite insulation must be cleaned up and removed, and the wall openings sealed such that material will not continue to fall out. Work on asbestos-containing materials must be conducted in accordance with the requirements in O. Reg. 278/05. Operations that may expose a worker to asbestos are classified as Type 1, Type 2 and Type 3 operations.

    The asbestos-containing vermiculite insulation identified within the cinderblock wall cavities of the control building is considered a friable material. Cleanup and repair work involving this material would be considered at Type 2 operation under O. Reg. 278/05. We recommend that this work be completed by a qualified abatement contractor.

    The asbestos-containing caulking material identified around the control building door frame is considered a non-friable material. If the material is disturbed or removed, the following abatement procedures are applicable to non-friable asbestos-containing materials:

    a) O. Reg. 278/05 Type 1 operations are used for the removal of non-friable asbestos-containing material if:

- the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated; or
- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is wetted to control the spread of dust/fibers and the work is done only by means of non-powered hand-held tools.

b) O. Reg. 278/05 Type 2 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is not wetted to control the spread of dust/fibres and the work is done only by means of non-powered hand-held tools; or
- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.

c) O. Reg. 278/05 Type 3 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

3. If the asbestos containing materials are to remain in the building an Asbestos Management Plan is required for the Site. The Plan must be prepared in accordance with O. Reg. 278/05 and include the associated labelling of the asbestos containing materials and worker training.

4. Removal of lead-containing materials must be conducted in accordance with the Ontario Ministry of Labour, Immigration, Training and Skills Development (MOL) guideline “Lead on Construction Projects.” Operations that may expose a worker to lead are classified as Type 1, Type 2 and Type 3 operations. The operations are based on the concentration of airborne lead. The following abatement procedures would be applicable to the removal of lead-containing paints identified at the Site:

a) Type 1 MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating is removed with a chemical gel or paste and fibrous laminated cloth wrap; or
- the coating or material is removed using non-powered hand tools, other than manual scraping or sanding; or

- the coating or material is removed using power tools equipped dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3.

b) Type 2a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed by scraping or sanding using non-powered hand tools; or
- lead-painted walls or building components are demolished by striking with a sledgehammer or similar tool.

c) Type 3a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed using power tools without dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3; or
- an operation that may expose a worker to lead, dust, fume or mist that is not a Type 1, Type 2 or Type 3b MOL lead-containing construction operation.

5. Appropriate worker precautions should be taken as per the OHSA when handling PCB-containing fluorescent lamp ballasts, mercury-containing fluorescent light bulbs, and fuel containers or equipment containing fuel/benzene.

6. Appropriate worker precautions should be taken as per the OHSA when cutting, coring or breaking up silica containing concrete, brick and masonry materials.

7. Handling and disposal of building materials and hazardous waste including, but not limited to the designated substances and hazardous materials identified within this DSHMS, should be conducted as per the requirements of O. Reg. 347.

8. A copy of this report should be provided to contractors involved in renovations and demolition at the Site.

9. New or undocumented suspect materials discovered in currently inaccessible areas (behind concrete walls or in plenum spaces) should be sampled prior to removal to ensure worker safety and compliance with regulatory requirements.

7.0 Limitations and Use of Report

R.J. Burnside & Associates Limited (Burnside) has conducted this study in accordance with generally accepted standards and field practices.

The conclusions in this report are professional opinions based upon visual observations of the Site conditions and data existing at the time of our assessment. Burnside does not guarantee the accuracy and reliability of the information provided by other persons or agencies and does not claim responsibility for undisclosed or non-visible environmental concerns that may result in costs for environmental clean-up or remediation.

This report was prepared for the exclusive use of the Township of North Huron and its contractors and consultants. Any use of reliance on or decisions based on this report by a third party are the responsibility of such third parties. Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. Reports or memoranda resulting from this assignment are not to be used, in whole or in part, outside the client's organization without prior written permission.

8.0 References

Environmental Abatement Council of Canada, Canadian Chapter of the EIA. EACC Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014).

Environmental Abatement Council of Ontario. Mould Abatement Guidelines (2004 – Edition 1).

Huron County. 2023. GIS Services, Interactive Mapping. Online. Available: https://www.huroncounty.ca/gis-services/interactive-mapping/ (Accessed 01 Mar 2023).

Ontario Ministry of Labour, Immigration, Training and Skills Development: Lead on Construction Projects (Issued September 2004, Content last reviewed April 2011).

Ontario Occupational Health and Safety Act, R.S.O. 1990, c. O.1 (updated July 1, 2022).

Ontario Regulation 278/05: Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.

Ontario Regulation 347: General – Waste Management.

Ontario Regulation 463/10: Ozone Depleting Substances and Other Halocarbons.

Ontario Regulation 490/09: Designated Substances, under the Occupational Health and Safety Act, R.S.O. 1990, C. O. 1 (updated January 1, 2020).

PCB Regulations (SOR/2008-273), under the Canadian Environmental Protection Act, 1999 (last amended October 31, 2021).

Chemical & Engineering News Archive 1976 54 (31), 7-8.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Figures



LEGEND

APPROXIMATE SITE BOUNDARY



N

0 5.0 10.0 20.0 30.0 40.0

Metres

Air Photo Source:
Background 2018 Air Photo obtained from Google Earth Professional / DigitalGlobe © Google Earth, use of products are subject to the Terms and Conditions of Licensed Google Earth Software.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID

BURNSIDE

Client

TOWNSHIP OF NORTH HURON
WINGHAM STANDPIPE - 199 JOHN STREET

Figure Title

DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY
SITE PLAN

Drawn	Checked	Date	Figure No.
CD	AM	February 2023	1
Scale		Project No.	
1:500		300053193.0000	

File: \\gue-dfs-v-02\Shared Work Areas\053193 Wingham DSS\02_Production\053193 DSS Figures.dwg Date Plotted: February 23, 2023 - 5:07 PM



Air Photo Source:
Background 2020 Air Photo obtained from County of Huron Online Mapping

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- ASBESTOS SAMPLE LOCATION - INTERIOR WALL
- ASBESTOS SAMPLE LOCATION - EXTERIOR WALL
- ASBESTOS SAMPLE LOCATION - ROOF / CEILING
- LEAD SAMPLE LOCATION - WALL
- LEAD SAMPLE LOCATION - FLOOR
- LEAD SAMPLE LOCATION - ROOF / CEILING
- LEAD CONTAINING PAINT (1,000 TO 5,000 ppm)
- LEAD BASED PAINT (>5,000 ppm)
- ASBESTOS CONTAINING MATERIAL

N

0 2.0 4.0 6.0 8.0
Metres

BURNSIDE

Client
TOWNSHIP OF NORTH HURON
WINGHAM STANDPIPE - 199 JOHN STREET

Figure Title
DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY
SAMPLE LOCATION PLAN

Drawn	Checked	Date	Figure No.
CD	AM	February 2023	2
Scale		Project No.	
1:100		300053193.0000	

File: \\gue-dfs-v-02\Shared Work Areas\053193 Wingham DSS\02_Production\053193 DSS Figures.dwg Date Plotted: March 1, 2023 - 9:54 AM

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Photographs



Photo 1: Exterior site view, showing control building and standpipe behind, facing north.



Photo 2: View of the upper standpipe structure, facing northwest from beside the control building.



Photo 3: Interior view of the control building from the front door, showing a portable generator and fuel container, electrical equipment, a workbench, and the ladder to the pump area in the basement with “Confined space enter by permit only” sign. Grey paint on ceiling (sample PB-03, low-level lead paint).

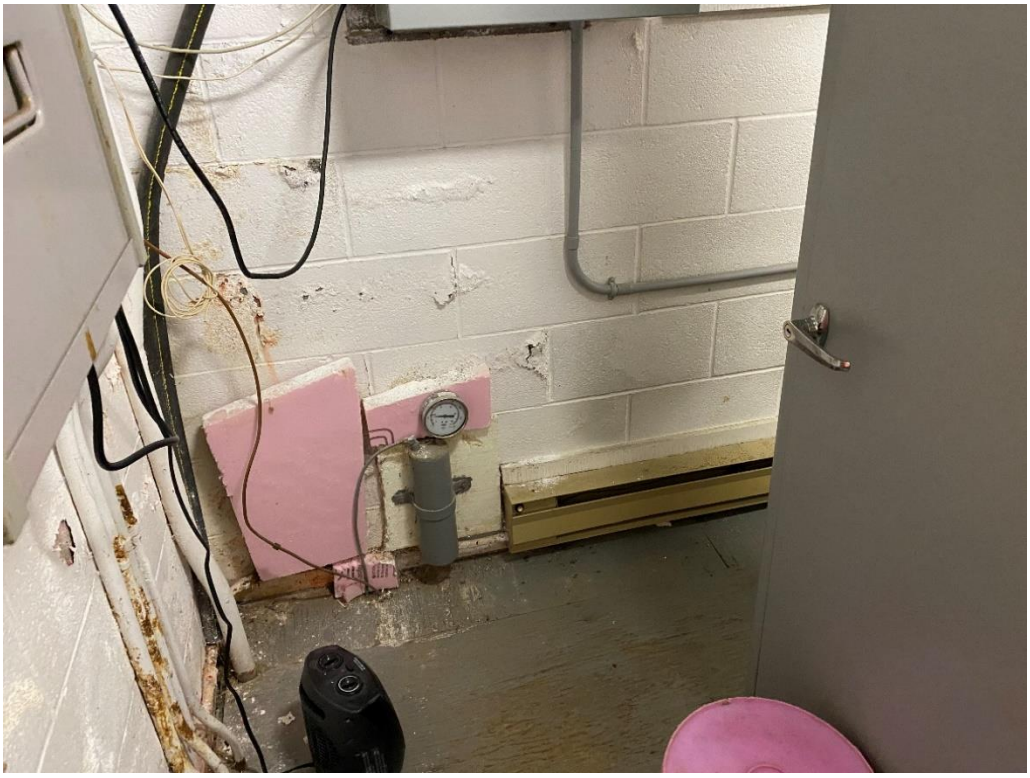


Photo 4: Interior view of control building showing electric baseboard and portable heaters and electrical equipment. White paint on walls (sample PB-01, low-level lead paint) and grey paint on wood floor (sample PB-04, low-level lead paint).

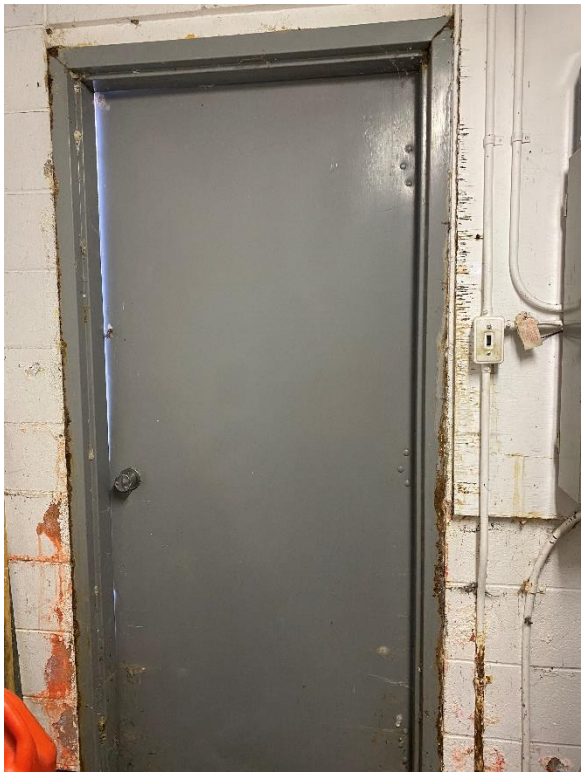


Photo 5: Interior view of control building door. Grey paint on door (sample PB-02, lead-containing paint), white paint on walls (sample PB-01, low-level lead paint).

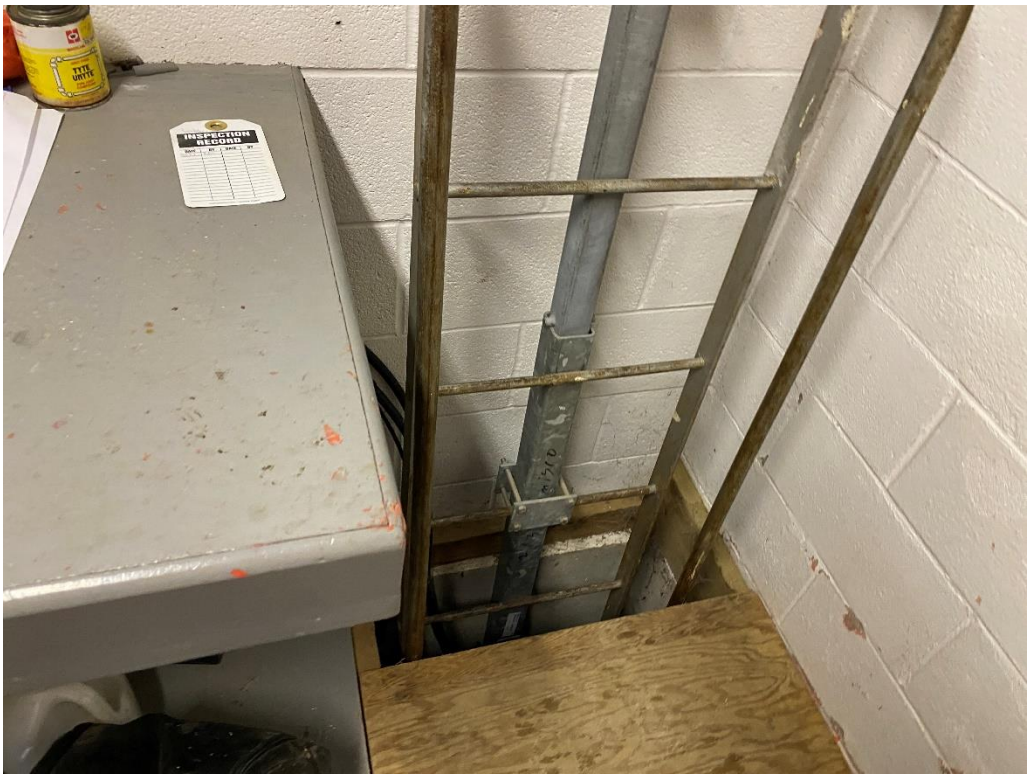


Photo 6: Interior control building, ladder to basement confined space area.



Photo 7: Control building basement, showing ladder, concrete walls and floors (photo taken by Wingham staff).

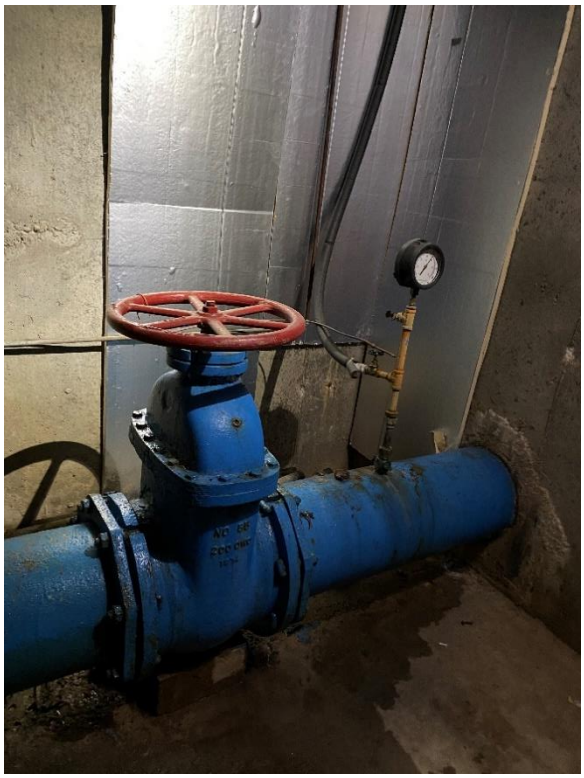


Photo 8: Control building basement, showing water control equipment. Floor and walls are poured concrete, partially covered with thermal foam boards (photo taken by Wingham staff).

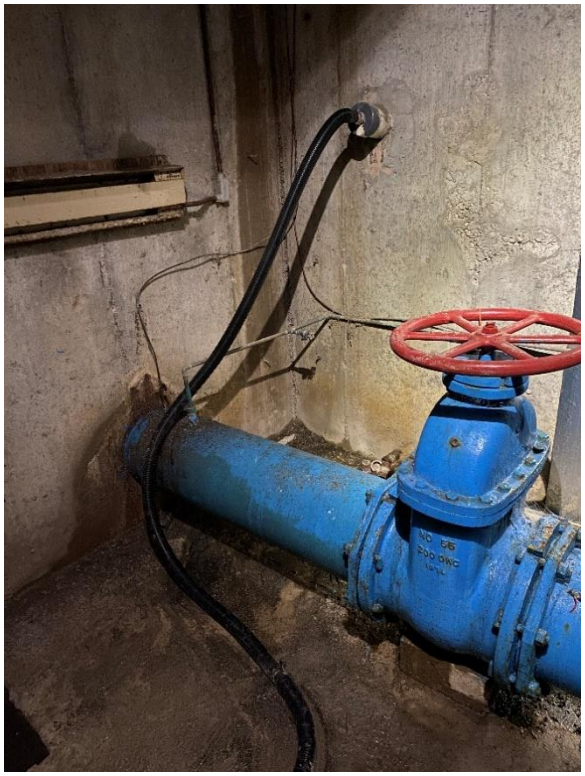


Photo 9: Control building basement, showing water control equipment and electric baseboard heater. Floor and walls are poured concrete.



Photo 10: Control building workbench, showing fallen asbestos-containing vermiculite insulation on workbench surface (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 11: Control building workbench, showing close-up view of fallen asbestos-containing vermiculite insulation (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 12: Control building wall above workbench, showing conduit penetration with asbestos-containing vermiculite insulation visible within penetration (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 13: Control building, base of block wall, showing asbestos-containing vermiculite insulation spilling from base of wall cavity (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 14: Control building, base of block wall, showing asbestos-containing vermiculite insulation spilling from base of wall cavity under baseboard heater (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 15: Control building, base of block wall, showing close-up view of asbestos-containing vermiculite insulation at base of wall cavity (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 16: Control building, base of block wall, showing asbestos-containing vermiculite insulation spilling from base of wall cavity (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).

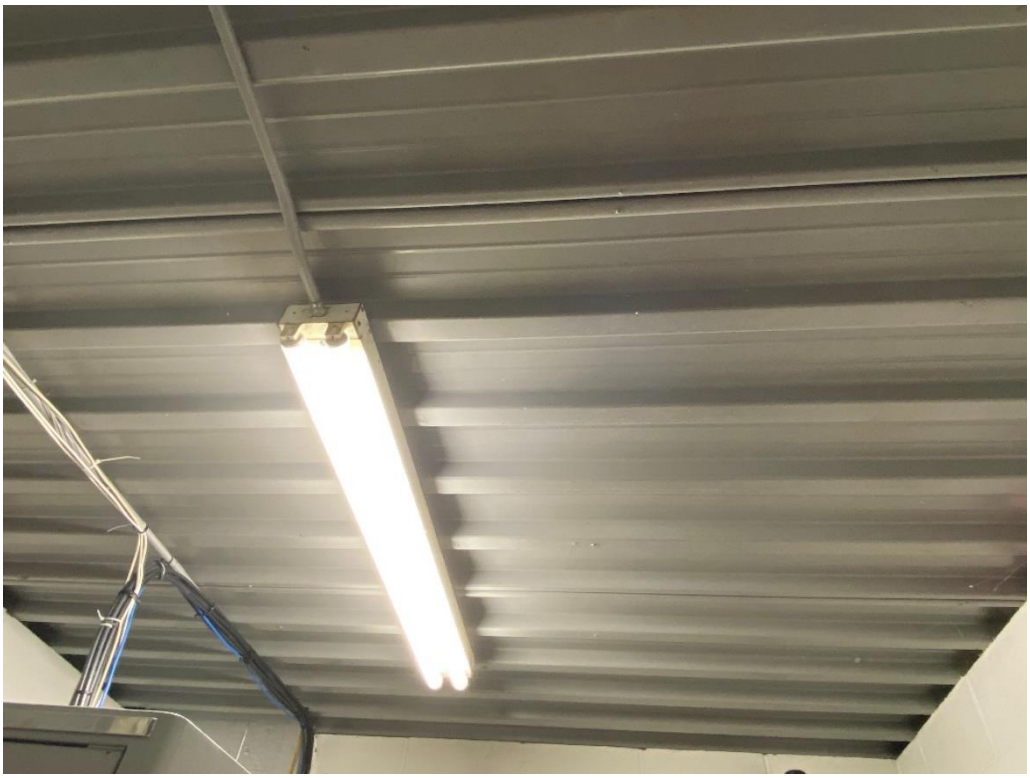


Photo 17: Control building ceiling, showing fluorescent light (tube bulbs assumed to contain small amounts of mercury vapour).



Photo 18: Control building ceiling, showing ballast (PCB-containing) within fluorescent light fixture.



Photo 19: Control building exterior door frame, showing asbestos-containing white caulking around door frame (sample CK-01-A/B/C, 8% Chrysotile).



Photo 20: Control building exterior, showing roof flashing material (sample RF-01-A/B/C, <0.5% asbestos), grey paint on flashing (sample PB-06, low-level lead paint) and white paint on exterior block walls (sample PB-05, low-level lead paint).



Photo 21: Control building exterior, showing firestop caulking on conduit penetrations (sample FS-01-A/B/C, <0.5% asbestos) and white paint on exterior block walls (sample PB-05, low-level lead paint).



Photo 22: Standpipe exterior access panel, showing white caulking above panel (sample CK-02-A/B/C, <0.5% asbestos).



Photo 23: Standpipe base showing area with broken foam insulation and exposed concrete (sample CON-01-A/B/C, <0.5% asbestos).

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Laboratory Certificates of Analysis

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552301889
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Attn: Angela Mason
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Phone: (519) 941-5331
Fax: (519) 941-8120
Collected:
Received: 2/09/2023
Analyzed: 2/23/2023

Proj: 300053193.0000 (Phase 1500)

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: CK-01-A **Lab Sample ID:** **552301889-0001**
Sample Description: White caulking, control room exterior door frame

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White/Beige	0.0%	92.0%	**8% Chrysotile**	

Client Sample ID: CK-01-B **Lab Sample ID:** **552301889-0002**
Sample Description: White caulking, control room exterior door frame

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023			Positive Stop (Not Analyzed)		

Client Sample ID: CK-01-C **Lab Sample ID:** **552301889-0003**
Sample Description: White caulking, control room exterior door frame

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023			Positive Stop (Not Analyzed)		

Client Sample ID: CK-02-A **Lab Sample ID:** **552301889-0004**
Sample Description: White caulking, standpipe access panel

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: CK-02-B **Lab Sample ID:** **552301889-0005**
Sample Description: White caulking, standpipe access panel

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: CK-02-C **Lab Sample ID:** **552301889-0006**
Sample Description: White caulking, standpipe access panel

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: FS-01-A **Lab Sample ID:** **552301889-0007**
Sample Description: Grey firestop caulking - control room exterior walls at wire/conduit penetrations

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Gray	2.0%	98.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552301889
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: FS-01-B ***Lab Sample ID:*** **552301889-0008**

Sample Description: Grey firestop caulking - control room exterior walls at wire/conduit penetrations

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Gray	2.0%	98.0%	None Detected	

Client Sample ID: FS-01-C ***Lab Sample ID:*** **552301889-0009**

Sample Description: Grey firestop caulking - control room exterior walls at wire/conduit penetrations

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Gray	0.0%	100.0%	None Detected	

Client Sample ID: RF-01-A ***Lab Sample ID:*** **552301889-0010**

Sample Description: Black roof flashing material - underside of control room exterior roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Black	15.0%	85.0%	None Detected	

Client Sample ID: RF-01-B ***Lab Sample ID:*** **552301889-0011**

Sample Description: Black roof flashing material - underside of control room exterior roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Black	15.0%	85.0%	None Detected	

Client Sample ID: RF-01-C ***Lab Sample ID:*** **552301889-0012**

Sample Description: Black roof flashing material - underside of control room exterior roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Black	15.0%	85.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

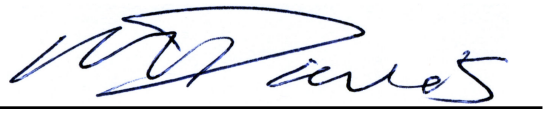
EMSL Canada Order 552301889
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Analyst(s):

Marzan Regaspi	PLM (3)
Vanessa Gallego	PLM (7)

Reviewed and approved by:



Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This is a summary report; official reports are available on LabConnect or upon request and relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 02/23/202316:00:54

OrderID: 552301889

Asbestos Chain of Custody (Air, Bulk, Soil, Water)

EMSL Order Number / Lab Use Only: 552301889

EMSL CANADA, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL Canada, Inc
2756 Slough Street
Mississauga ON L4T 1G3

PHONE (289) 997-4602
EMAIL: TorontoLab@EMSL.com

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information

Customer ID:	
Company Name:	R J. Burnside & Associates Ltd
Contact Name:	Angela Mason
Street Address:	292 Speedvale Avenue West, Unit #20
City, Province, Postal Code:	Guelph, Ontario N1H 1C4
Country:	Canada
Phone:	226-314-2129
Email(s) for Report:	angela mason@rjburnside com

Billing Information

Billing ID:	
Company Name:	
Billing Contact:	
Street Address:	
City, Province, Postal Code:	
Country:	
Phone:	
Email(s) for Invoice:	

Project Information

Project Name/No:	300053193.0000 (Phase 1500)
Purchase Order:	
EMSL LIMS Project ID: (If applicable, EMSL will provide)	
US State where samples collected:	N/A
Sampled By Name:	Angela Mason
Sampled By Signature:	
No. of Samples in Shipment	12

Turn-Around-Time (TAT)

☐ 3 Hour[1] ☐ 4-4.5 Hour[1] AHERA Only ☐ 6 Hour[1] ☐ 24 Hour ☐ 32 Hour[2] ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☑ 2 Week

[1]Premium Service Charge applies for 3 Hour TEM AHERA or EPA Level II TAT. TEM Air 3-6 Hour, please call ahead to schedule. [2]32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

Test Selection

PCM Air
- ☐ NIOSH 7400
- ☐ IRSST PCM

PLM - Bulk (reporting limit)
- ☑ PLM EPA 600/R-93/116 (<1%)
  - ☐ 400 PTCT (<0.25%)
  - ☐ Conditional 400 PTCT (<0.25%)
  - ☐ 1000 PTCT (<0.1%)
- ☐ PLM EPA NOB(<1%)
  - ☐ 400 PTCT (<0.25%) ☐ 1000 PTCT (<0.1%)
- ☐ IRSST PLM
- ☐ NIOSH 9002 (<1%)
- ☐ Other

TEM - Air
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ IRSST TEM (NYS 198.4)

TEM - Settled Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480

TEM - Water
- ☐ EPA 100.2 (All fibre sizes)
- ☐ EPA 100.2 (Fibres >10µm)

Soil - Rock - Vermiculite (reporting limit)*
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.25%)
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.01%)
- ☐ ASTM D7521 Sieve Method
- ☐ TEM Qualitative via Filtration Prep
- ☐ TEM Qualitative via Drop Mount Prep
- ☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM*
  *(required for vermiculite in BC and NS)

Asphalt
- ☐ PLM EPA Gravimetric with milling prep (<0.25%)

Stop At First Positive *(clearly identify homogenous areas below)*

*Please call with your project-specific requirements.

☑ **Positive Stop - Clearly Identified Homogeneous Areas (HA)** | **Filter Pore Size (Air Samples)** ☐ 0.8um ☐ 0.45um

Sample Number	Sample Location / Description	Volume, Area or Homogeneous Area	Date / Time Sampled (Air Monitoring Only)
CK-01-A/B/C	White caulking, control room exterior door frame		
CK-02-A/B/C	White caulking, standpipe access panel		
FS-01-A/B/C	Grey firestop caulking - control room exterior walls at wire/conduit penetrations		
RF-01-A/B/C	Black roof flashing material - underside of control room exterior roof		

RECEIVED EMSL CANADA INC. TORONTO 2023 FEB 9 A 9:54

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by: Angela Mason	Date/Time: 2023/02/07	Received by: LAB 55 / INC	Date/Time: 2/9/23 @ 9:54 Am
Relinquished by:	Date/Time:	Received by	Date/Time

Controlled Document - COC-05-CAN Asbestos R11 04/15/21

☑ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Canada, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance an Page 1 Of 1 **tions by Customer**

IC

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order: 552301893
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Attention: Angela Mason
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Project: 300053193.0000 (Phase 1500)

Phone: (226) 314-2129
Fax: (519) 941-8120
Received: 02/09/2023 9:56 AM
Analysis Date: 02/23/2023
Collected: 02/07/2023

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy and Milling Prep. Quantitation using 400 Point Count Procedure.

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
VM-01-A *552301893-0001*	Vermiculite insulation - control room, cinderblock wall cavitites	Beige Non-Fibrous Homogeneous		99.0% Non-fibrous (Other)	**1.00% Tremolite**
VM-01-B *552301893-0002*	Vermiculite insulation - control room, cinderblock wall cavitites				**Positive Stop (Not Analyzed)**
VM-01-C *552301893-0003*	Vermiculite insulation - control room, cinderblock wall cavitites				**Positive Stop (Not Analyzed)**

Analyst(s)

Vanessa Gallego (1)

Matthew Davis or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 “Interim Method”) but augmented with procedures outlined in the 1993 (”final”) version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. EMSL suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 02/23/2023 16:11:20

OrderID: 552301893

EMSL CANADA, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody (Air, Bulk, Soil, Water)

EMSL Order Number / Lab Use Only

552301893

EMSL Canada, Inc.
2756 Slough Street
Mississauga, ON L4T 1G3

PHONE: (289) 997-4602
EMAIL: TorontoLab@EMSL.com

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information		Billing Information	
Customer ID:		Billing ID:	
Company Name	R.J. Burnside & Associates Ltd.	Company Name:	
Contact Name:	Angela Mason	Billing Contact:	
Street Address:	292 Speedvale Avenue West Unit #20	Street Address:	
City, Province, Postal Code:	Guelph, Ontario N1H 1C4 — Country: Canada	City, Province, Postal Code:	Country:
Phone:	226-314-2129	Phone:	
Email(s) for Report:	angela.mason@rjburnside.com	Email(s) for Invoice:	

Project Information

Project Name/No: 300053193.0000 (Phase 1500)	Purchase Order:
EMSL LIMS Project ID: (If applicable EMSL will provide)	US State where samples collected: N/A
Sampled By Name: Angela Mason	Sampled By Signature: [signature] — No. of Samples in Shipment: 3

Turn-Around-Time (TAT)

☐ 3 Hour[1] ☐ 4-4.5 Hour[1] AHERA Only ☐ 6 Hour[1] ☐ 24 Hour ☐ 32 Hour[2] ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☑ 2 Week

[1]Premium Service Charge applies for 3 Hour TEM AHERA or EPA Level II TAT. TEM Air 3-6 Hour, please call ahead to schedule. [2]32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

Test Selection

PCM Air
- ☐ NIOSH 7400
- ☐ IRSST PCM

PLM - Bulk (reporting limit)
- ☐ PLM EPA 600/R-93/116 (<1%)
  - ☐ 400 PTCT (<0.25%)
  - ☐ Conditional 400 PTCT (<0.25%)
  - ☐ 1000 PTCT (<0.1%)
- ☐ PLM EPA NOB(<1%)
  - ☐ 400 PTCT (<0.25%) ☐ 1000 PTCT (<0.1%)
- ☐ IRSST PLM
- ☐ NIOSH 9002 (<1%)
- ☐ Other

TEM - Air
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ IRSST TEM (NYS 198.4)

TEM - Settled Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480

TEM - Water
- ☐ EPA 100.2 (All fibre sizes)
- ☐ EPA 100.2 (Fibres >10µm)

Soil - Rock - Vermiculite (reporting limit)*
- ☑ PLM EPA 600/R-93/116 with milling prep (<0.25%)
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.01%)
- ☐ ASTM D7521 Sieve Method
- ☐ TEM Qualitative via Filtration Prep
- ☐ TEM Qualitative via Drop Mount Prep
- ☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM* *(required for vermiculite in BC and NS)

Asphalt
- ☐ PLM EPA Gravimetric with milling prep (<0.25%)

Stop At First Positive ***(clearly identify homogenous areas below)***

**Please call with your project-specific requirements.*

☑ **Positive Stop - Clearly Identified Homogeneous Areas (HA)** — **Filter Pore Size (Air Samples)** ☐ **0.8um** ☐ **0.45um**

Sample Number	Sample Location / Description	Volume, Area or Homogeneous Area	Date / Time Sampled (Air Monitoring Only)
VM-01-A/B/C	Vermiculite insulation - control room, cinderblock wall cavitites		2023/02/07 11:00

RECEIVED
EMSL CANADA, INC.
TORONTO
2023 ... 9:56

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by: Angela Mason [signature]	Date/Time: 2023/02/07	Received by: LAB SS/NC	Date/Time: 2/9/23 @ 9:56AM
Relinquished by:	Date/Time:	Received by:	Date/Time:

Controlled Document - COC-05-CAN Asbestos R11 04/15/21

☑ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Canada, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc constitutes acceptance and a... s by Customer

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552302818
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Attn: Angela Mason
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Phone: (519) 941-5331
Fax: (519) 941-8120
Collected:
Received: 2/27/2023
Analyzed: 3/02/2023

Proj: 300053193.0000 (Phase 1500)

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: CON-01-A ***Lab Sample ID:*** **552302818-0001**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	Gray	0.0%	100.0%	None Detected	

Client Sample ID: CON-01-B-Block Fill ***Lab Sample ID:*** **552302818-0002**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: CON-01-B-Mortar ***Lab Sample ID:*** **552302818-0002A**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	Gray	0.0%	100.0%	None Detected	

Client Sample ID: CON-01-C ***Lab Sample ID:*** **552302818-0003**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	Gray	0.0%	100.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

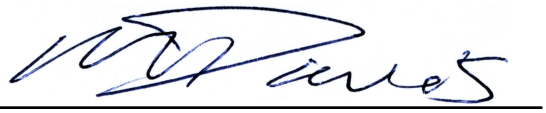
EMSL Canada Order 552302818
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Analyst(s):

Natalie D'Amico	PLM (3)
Vanessa Gallego	PLM (1)

Reviewed and approved by:



Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This is a summary report; official reports are available on LabConnect or upon request and relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 03/02/202312:30:26

OrderID: 552302818

Asbestos Chain of Custody (Air, Bulk, Soil, Water)

EMSL Order Number / Lab Use Only: 552302818

EMSL CANADA, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL Canada, Inc.
2756 Slough Street
Mississauga, ON L4T 1G3
PHONE: (289) 997-4602
EMAIL: TorontoLab@EMSL.com

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information		Billing Information	
Customer ID		Billing ID:	
Company Name	R.J. Burnside & Associates Ltd.	Company Name:	
Contact Name	Angela Mason	Billing Contact:	
Street Address	292 Speedvale Avenue West, Unit #20	Street Address:	
City, Province, Postal Code	Guelph, Ontario N1H 1C4	City, Province, Postal Code	
Country	Canada	Country:	
Phone	226-314-2129	Phone:	
Email(s) for Report:	angela.mason@rjburnside.com	Email(s) for Invoice:	

Project Information

Project Name/No:	300053193.0000 (Phase 1500)
Purchase Order:	
EMSL LIMS Project ID. (If applicable, EMSL will provide)	
US State where samples collected:	N/A
Sampled By Name:	Josh Stewart
Sampled By Signature:	
No. of Samples in Shipment	3

Turn-Around-Time (TAT)

☐ 3 Hour[1] ☐ 4-4 5 Hour[1] AHERA Only ☐ 6 Hour[1] ☐ 24 Hour ☐ 32 Hour[2] ☐ 48 Hour ☑ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

[1]Premium Service Charge applies for 3 Hour TEM AHERA or EPA Level II TAT. TEM Air 3-6 Hour, please call ahead to schedule. [2]32 Hour TAT available for select tests only, samples must be submitted by 11:30am.

Test Selection

PCM Air
- ☐ NIOSH 7400
- ☐ IRSST PCM

PLM - Bulk (reporting limit)
- ☑ PLM EPA 600/R-93/116 (<1%)
  - ☐ 400 PTCT (<0.25%)
  - ☐ Conditional 400 PTCT (<0.25%)
  - ☐ 1000 PTCT (<0.1%)
- ☐ PLM EPA NOB(<1%)
  - ☐ 400 PTCT (<0.25%) ☐ 1000 PTCT (<0.1%)
- ☐ IRSST PLM
- ☐ NIOSH 9002 (<1%)
- ☐ Other

TEM - Air
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ IRSST TEM (NYS 198 4)

TEM - Settled Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480

TEM - Water
- ☐ EPA 100.2 (All fibre sizes)
- ☐ EPA 100 2 (Fibres >10µm)

Soil - Rock - Vermiculite (reporting limit)*
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.25%)
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.01%)
- ☐ ASTM D7521 Sieve Method
- ☐ TEM Qualitative via Filtration Prep
- ☐ TEM Qualitative via Drop Mount Prep
- ☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM*
  *(required for vermiculite in BC and NS)

Asphalt
- ☐ PLM EPA Gravimetric with milling prep (<0.25%)

Stop At First Positive *(clearly identify homogenous areas below)*

*Please call with your project-specific requirements

☑ **Positive Stop - Clearly Identified Homogeneous Areas (HA)** | **Filter Pore Size (Air Samples)** ☐ 0.8um ☐ 0.45um

Sample Number	Sample Location / Description	Volume, Area or Homogeneous Area	Date / Time Sampled (Air Monitoring Only)
CON-01-A/B/C	Concrete		

RECEIVED EMSL CANADA, INC. TORONTO 2023 FEB 24 AM 9:42

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment		Sample Condition Upon Receipt:	
Relinquished by: Josh Stewart	Date/Time: 2023/02/24	Received by: LAB 55/NC	Date/Time: 2/27/23 @ 9:42 AM
Relinquished by: J. Stewart	Date/Time:	Received by:	Date/Time

Controlled Document - COC-05-CAN Asbestos R11 04/15/21

☑ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Canada, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and a Page 1 Of 1 **is by Customer**

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552301880
CustomerID:	55BNSD42
CustomerPO:	300053193.0000
ProjectID:	

Attn: **Angela Mason**
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Phone: (519) 941-5331
Fax: (519) 941-8120
Received: 2/9/2023 09:52 AM
Collected: 2/7/2023

Project: **300053193.0000 (Phase 1500)**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
PB-01	2/7/2023	2/9/2023	0.2475 g	81 ppm	<81 ppm
552301880-0001	Site: Control building interior walls, white paint				
PB-02	2/7/2023	2/9/2023	0.2466 g	81 ppm	1200 ppm
552301880-0002	Site: Control building door and frame, grey paint				
PB-03	2/7/2023	2/9/2023	0.2530 g	80 ppm	<80 ppm
552301880-0003	Site: Control building ceiling, grey paint				
PB-04	2/7/2023	2/9/2023	0.2000 g	100 ppm	120 ppm
552301880-0004	Site: Control building wood floor, grey paint				
PB-05	2/7/2023	2/9/2023	0.2506 g	80 ppm	<80 ppm
552301880-0005	Site: Control building exterior walls, white paint				
PB-06	2/7/2023	2/9/2023	0.2484 g	81 ppm	<81 ppm
552301880-0006	Site: Control building exterior roof flashing, grey paint				

Rowena Fanto, Lead Supervisor
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
* Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA LAP, LLC-ELLAP Accredited #196142

Initial report from 02/24/2023 08:22:20

OrderID: 552301880

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

552301880

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: CinnaminsonLeadLab@emsl.com

Customer Information		Billing Information	
Customer ID:		Billing ID	
Company Name:	R.J. Burnside & Associates Ltd.	Company Name:	
Contact Name	Angela Mason	Billing Contact:	
Street Address	292 Speedvale Avenue West, Unit #20	Street Address	
City, State, Zip:	Guelph, Ontario N1H 1C4	City, State, Zip	
Country	Canada	Country:	
Phone:	226-314-2129	Phone	
Email(s) for Report	angela.mason@rjburnside.com	Email(s) for Invoice:	

Project Information

Project Name/No: 300053193.0000 (Phase 1500)		Purchase Order:
EMSL LIMS Project ID: (If applicable, EMSL will provide)	US State where samples collected: N/A	State of Connecticut (CT) must select project location. ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)
Sampled By Name: Angela Mason	Sampled By Signature: AM	No. of Samples in Shipment: 6

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 32 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☑ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

MATRIX	METHOD	INSTRUMENT	REPORTING LIMIT	SELECTION
CHIPS ☐ % by wt. ☑ ppm (mg/kg) ☐ mg/cm²	SW 846-7000B	Flame Atomic Absorption	0.008% (80ppm)	☑
*Reporting Limit based on a minimum 0.25g sample weight	SW 846-6010D*	ICP-OES	0.0004% (4ppm)	☐
AIR	NIOSH 7082	Flame Atomic Absorption	4µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-OES	0.5µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-MS	0.05µg/filter	☐
WIPE ☐ ASTM ☐ NON-ASTM	SW 846-7000B	Flame Atomic Absorption	10µg/wipe	☐
*If no box is checked, non-ASTM Wipe is assumed	SW 846-6010D*	ICP-OES	1.0µg/wipe	☐
TCLP	SW 846-1311 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1311 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
SPLP	SW 846-1312 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1312 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
TTLC	22 CCR App. II, 7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	22 CCR App II, SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
STLC	22 CCR App. II, 7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	22 CCR App II, SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
Soil	SW 846-7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
Wastewater	SM 3111B / SW 846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
Unpreserved ☐ / Preserved with HNO3 ☐ PH<2	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	☐
Drinking Water	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	☐
Unpreserved ☐ / Preserved with HNO3 ☐ PH<2	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	☐
Other:				☐

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
PB-01	Control building interior walls, white paint		2023/02/07 10:30
PB-02	Control building door and frame, grey paint		2023/02/07 10:45
PB-03	Control building ceiling, grey paint		2023/02/07 11:00
PB-04	Control building wood floor, grey paint		2023/02/07 11:15
PB-05	Control building exterior walls, white paint		2023/02/07 11:30

Method of Shipment:		Sample Condition Upon Receipt	
Relinquished by: Angela Mason AM	Date/Time: 2023/02/07	Received by: LAB 55 / NC	Date/Time: 2/9/23 @ 9:52 Am
Relinquished by:	Date/Time	Received by:	Date/Time

Controlled Document - COC-25 Lead R16 4/19/2021

*6010C Available Upon Request

Purolator: 339640437361C

☑ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

OrderID: 552301880

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: CinnaminsonLeadLab@emsl co

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
PB-06	Control building exterior roof flashing, grey paint		2023/02/07 12:00

RECEIVED
EMSL CANADA, INC.
TORONTO
2023 FEB 8 A 9:52

Method of Shipment:		Sample Condition Upon Receipt.	
Relinquished by: Angela Mason	Date/Time: 2023/02/07	Received by.	Date/Time
Relinquished by:	Date/Time:	Received by.	Date/Time

Controlled Document - COC-25 Lead R16 4/19/2021

☑ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Building Survey and Exposure Reassessment

BUILDING SURVEY AND EXPOSURE REASSESSMENT SUMMARY

This inspection should encompass all factors originally noted regarding asbestos-containing materials (ACM) and concentrate on any signs of deterioration, delamination, or disturbance by maintenance, renovation, or occupant activity. Note any locations where ACM was removed and update the survey record. Document findings on Table 3: Building Survey Reassessment Summary.

Name of Surveyor: _____ Date: _____

Building: _____

Location: _____

Floor or Area: _____

Description of Work Activity: _____

Type of Material to Contain Known ACM or Suspect ACM

_____

_____

Type of Known Asbestos and Percent: _____

Friable or Non-Friable: _____

Total Area (linear ft or ft_2): _____

Condition of ACM: _____

ACCESSIBILITY	CONDITION			
	GOOD	FAIR	POOR	DEBRIS
A (all occupants)				
B (maintenance)				
C (ladder or scaffold)				
D (inaccessible)				

Recommendations: _____

_____

Table 3: Building Survey Reassessment Summary – Asbestos Containing Material

Material	Location	Condition Accessibility	Friable or Non-friable

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Sample Work Order Forms

WORK ORDER REQUISITION FORM

An application must be submitted for all maintenance work in all areas where asbestos materials may be affected. An authorization must then be received before any work can proceed. Submit form to the Asbestos Management Coordinator for authorization.

Note: Asbestos survey records to confirm presence or absence of asbestos are maintained by the Asbestos Management Coordinator.

Name of Requestor: _____ Date: _____

Telephone No.: _____ Job No.: _____

Requested Starting Date: _____ Anticipated Finish Date: _____

Location: (detailed description of area, room, or building where work is to be performed)

_____

_____

Description of Work: (include description of ACM that might be disturbed)

_____

_____

Name and phone number of Contact Person: _____

Name and phone number of Supervisor: _____

Submit this application to: _____
(Asbestos Management Coordinator)

Granted: Job No. _____ Denied _____ *With Conditions _____

*Conditions

_____

_____

EVALUATION OF WORK FORM

This Evaluation covers the following maintenance work:

Location of work (Address, building, room number(s), or general description):

Date(s) of work: _____ Job No.: _____

Description of work:

Evaluation of work practices employed to minimize disturbance of asbestos:

Evaluation of work practices employed to contain released fibers and to clean up the work area:

Evaluation of equipment and procedures used to protect workers:

Handling or storage of ACM waste:

SIGNATURE: _____ DATE: _____

(Asbestos Management Coordinator)

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix D

Certificate of Workers Training

CERTIFICATE OF WORKERS TRAINING

TRAINING COURSE: I have been trained in the dangers inherent in handling asbestos, asbestos dust hazards, proper work procedures, and personal protective measures. The topics covered in the training exercise included the following:

- Physical characteristics of asbestos
- Health hazards associated with asbestos
- Respiratory protection
- Use of protective equipment
- Personal decontamination procedures

DATE: _____ TRAINER: _____

RESPIRATOR PROTECTION: I have been supplied with a respirator and received training for its proper use including qualitative fit testing. I understand that I must be free of any facial hair which may interfere with the seal of the respirator to my face.

RESPIRATOR MANUFACTURER: _____ SIZE: _____

DATE: _____ TRAINER: _____

MEDICAL EXAMINATIONS: Since I will not be participating in any asbestos removal / repair operations, medical examinations are not necessary. If I do become involved in any repair / removal Type 2 or Type 3 operations, I understand I will have to undergo the necessary medical tests.

ASBESTOS WORK REPORT: If I do participate in asbestos removal / repair Type 2 or Type 3 operations, I will undergo any medical examinations as required and complete the Asbestos Work Report.

EMPLOYEE NAME: _____

SIGNATURE: _____ DATE: _____

ASBESTOS MANAGEMENT COORDINATOR NAME:

_____

SIGNATURE: _____ DATE: _____

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix E

Amendment to Asbestos Management Plan Form

Amendment to Asbestos Management Plan (AMP)

Provide details which will be used to update existing Asbestos Management Plan.

Company Name	
Building Address	
Date of Amendment	
Prepared By	
Reviewed By	
Reason for Amendment	☐ New ACM identified ☐ Change in condition ☐ Renovation planned ☐ Updated inspection ☐ Other (specify):

1. Summary of Changes – Previously Documented ACM

Location of ACM	Material	Type (Friable/Non-Friable)	Change in Condition

2. Updated ACM Record – Newly Identified ACM

Location of ACM	Material	Type (Friable/Non-Friable)	Condition

3. Risk Assessment

3.1 Exposure Potential

Location	Activity	Likelihood of Disturbance	Worker/Public Exposure Risk

3.2 Control Measures

Engineering Controls	[e.g., Enclosure, Ventilation]
Administrative Controls	[e.g., Restricted Access, Signage]
PPE Requirements	

4. Notifications

Occupants Notified	☐ Yes ☐ No (reason):
Employers Notified	☐ Yes ☐ No (reason):
Workers Notified	☐ Yes ☐ No (reason):
Training Updated	☐ Yes ☐ No (reason):

5. Inspection Schedule

Next Inspection Due	
Inspection Frequency	

6. Supporting Documents

Lab Testing Results	☐ Attached
Consultant Reports	☐ Attached
Photos	☐ Attached

7. Signature

Asbestos Management Coordinator	
Title	
Signature	
Date	

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix F

Ministry of Labour Project Notification Forms

Ontario

Ministry of Labour, Immigration, Training and Skills Development

Asbestos work report

This form is required under Section 21 of the Regulation for Asbestos on Construction Projects and in Buildings and Repair Operations. Provide one copy to the employee when complete.

Employer information

Employer operating name	Business number

Employer legal name

Unit number	Street number	Street name	Street type	Street direction	Postal code

P.O. Box	City/town	Province	Telephone number	Extension	Fax number

Employee information

Last name	First name

Middle name

Home address

Unit number	Street number	Street name	Street type	Street direction	Rural route

P.O. Box	City/town	Province	Postal code	Date of birth (yyyy/mm/dd)

Hours of work in asbestos type 2 or type 3 operations

Start date (yyyy/mm/dd)	End date (yyyy/mm/dd)

Hours of work type 2	Hours of work type 3

Acknowledgement

☐ **I confirm that I am authorized to complete and submit this form.**
I hereby certify that the information provided is true and correct to the best of my knowledge.

Last name of person completing this form	First name of person completing this form

Position	Date (yyyy/mm/dd)
	2025/09/05

Email address

Notice of indirect collection of personal information

The information on this form is being provided by your Employer to the Provincial Physician at the Ministry of Labour, Immigration, Training and Skills Development to monitor your exposure to asbestos in the workplace. The personal information on this form is collected pursuant to the Occupational Health and Safety Act, O. Reg. 278/05, section 21(1)(a) Regulation for Asbestos on Construction Projects and in Buildings and Repair Operations. The collection of this information from your Employer is in compliance with section 29(1)(h) of the Freedom of Information and Protection of Privacy Act (FIPPA). Questions about the Asbestos Workers Registry may be directed to the Provincial Physician:

Ministry of Labour, Immigration, Training and Skills Development
Health Care and Occupational Medicine Unit
505 University Ave, 19th Floor
Toronto ON M7A 1T7

Questions about privacy matters related to the collection, use and disclosure of personal information can be directed to:

Ministry of Labour, Immigration, Training and Skills Development
Freedom of Information and Privacy Office
400 University Ave, 10th Floor
Toronto ON M7A 1T7

© King's Printer for Ontario, 2023

Ontario

Ministry of Labour, Immigration, Training and Skills Development

Notice of asbestos removal work

Notification number eA -

Pursuant to section 11 of the Asbestos on Construction Projects and in Buildings and Repair Operations Regulation made under the Occupational Health and Safety Act, "Before commencing a Type 3 operation and certain Type 2 operations, the constructor, in the case of a project, and the employer, in any other case, shall notify, orally and in writing, an inspector at the office of the Ministry of Labour, Immigration, Training and Skills Development nearest the workplace of the operation." This e-notification satisfies the notification requirements.

☐ Constructor information ☐ Employer information

Operating name | Business number

Legal name

Constructor or employer address

Unit number | Street number | Street name | Street type | Street direction | Postal code

P.O. Box | City/town | Province | Telephone number | Extension | Fax number

Owner information

Owner operating name

Owner legal name

Owner address

Unit number | Street number | Street name | Street type | Street direction | Postal code

P.O. Box | City/town | Province | Telephone number | Extension | Fax number

Address of the building

☐ Address of the building is the same as the owner address

Unit number | Street number | Street name | Street type | Street direction | Postal code

City/town | Province ON | Workplace telephone number

Ministry of Labour, Immigration, Training and Skills Development office

Is this work part of a construction project? ☐ No ☐ Yes Notice of Project number

Description of the work that will be carried out

Start date (yyyy/mm/dd) | End date (yyyy/mm/dd) | Time ☐ Day ☐ Night ☐ Day and night | Anticipated number of workers ☐ 1 - 5 ☐ 6 - 19 ☐ 20 - 49 ☐ 50 +

Supervisor work address ☐ Supervisor work address is the same as address of constructor or employer completing this form

Unit number | Street number | Street name | Street type | Street direction | Postal code

P.O. Box | City/town | Province | Telephone number | Extension | Fax number

© King's Printer for Ontario, 2023

Supervisor name

Last name	First name

Are you applying a variance? ☐ No ☐ Yes

Project type	Asbestos type
☐ Asbestos Removal Type 2 ☐ Asbestos Removal Type 3	☐ Chrysotile ☐ Amosite ☐ Crocidolite ☐ Other

Acknowledgement

☐ I confirm that I am authorized to complete and submit this form.
I certify that the information provided is true and correct to the best of my knowledge.

Last name of person completing this form	First name of person completing this form
Position	Date (yyyy/mm/dd) 2025/09/05

Email address

© King's Printer for Ontario, 2023

R.J. Burnside & Associates Limited

BURNSIDE

Designated Substances and Hazardous Materials Survey
Wingham Standpipe
199 John Street East
Wingham, Ontario

Township of North Huron
274 Josephine Street
Wingham, Ontario N0G 2W0

Designated Substances and Hazardous Materials Survey
Wingham Standpipe
199 John Street East
Wingham, Ontario

Township of North Huron
274 Josephine Street
Wingham, Ontario N0G 2W0

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA

March 6, 2023
300053193.0000

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
-	Yes	Yes	Township of North Huron – Chip Wilson

Record of Revisions

Revision	Date	Description
-	March 6, 2023	Submission to the Township of North Huron

R.J. Burnside & Associates Limited

Report Prepared By:



Angela Mason, M.Sc., P.Geo., QP_{ESA}
Hydrogeologist
AM:cl

Report Reviewed By:



Jim Walls, P.Geo., QP_{ESA}
Senior Geoscientist
JW:cl

Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by the Township of North Huron (Township) to conduct a Designated Substances Survey and Hazardous Materials Survey (DSHMS) of the standpipe structure and control building at the property located at 199 John Street East in Wingham, Ontario (herein referred to as the Site; Figure 1). The standpipe structure is proposed for demolition, requiring a DSHMS. The control building was also included in the DSHMS for repair/maintenance work or potential future demolition.

The DSHMS included a visual inspection of the buildings and structures to identify the presence or potential presence of substances designated by the Occupational Health and Safety Act (OHSA) and other hazardous materials that may require special handling. Building material samples suspected to contain asbestos and/or lead were collected and submitted for laboratory analysis. The findings of the DSHMS are summarized below:

- **Asbestos** was identified in the following materials:
  - **Vermiculite insulation (1.00% Tremolite Asbestos)** – This material was identified within cinderblock wall cavities of the control building. The block walls surround the 3 m x 3 m (10’ x 10’) building, approximately 2.4 m (8’) in height. The vermiculite insultation is considered a friable material under O. Reg. 278/05, and was observed to be falling from perforations in the block walls onto the floor and work bench within the building. The presence of loose vermiculite insulation in the building is considered a health hazard to workers in the building.
  - **Caulking, white (8% Chrysotile Asbestos)** – This material was identified as caulking around the interior and exterior door frame, with a total linear amount of about 10 m. The white caulking material was observed in fair to poor condition and is not considered a friable material under O. Reg. 278/05.
- **Lead-containing paints** (1,000 to 5,000 ppm) were identified as follows:
  - **Grey paint on the control building door and frame (1,200 ppm)** – This paint was identified on the interior and exterior door and frame of the control building. The grey paint was observed to be in fair condition.
  - No samples were identified as lead-based (>5,000 ppm) paints.
- **Mercury** was identified the fluorescent lamp tubes within the control building.
- **PCBs** were identified in the fluorescent lamp ballast within the control building.
- **Silica** was identified as a component of concrete, cement, and brick.
- **Benzene** was identified as a component of diesel, gasoline and oil fuel.

No other designated substances or hazardous materials were identified or suspected.

Soil and subsurface sampling were not included as part of the DSHMS. This report does not evaluate environmental impacts to soil, sediment or groundwater related to fuel storage tanks or other surface contaminant sources.

The recommendations included:

1. Friable asbestos-containing vermiculite insulation falling out of wall cavities is considered a health hazard to workers and out of compliance with regulations. Workers working in the building or in close proximity to the material must be advised of the presence of asbestos-containing materials [vermiculite insulation (1% Tremolite, friable) and door frame caulking (8% Chrysotile, non-friable).

    a) Workers should avoid disturbance to asbestos-containing material. Workers should not attempt to clean up the material (e.g., by sweeping, vacuuming, etc.) as this could cause the material to become airborne.

    b) Respirator use is recommended in accordance with O. Reg. 278/05 for building entry until the exposed asbestos has been cleaned up and sealed.

    c) All workers (including subcontractors) must be notified prior to building entry.

    d) Signage is required within the building.

2. The fallen vermiculite insulation must be cleaned up and removed, and the wall openings sealed such that material will not continue to fall out. Work on asbestos-containing materials must be conducted in accordance with the requirements in O. Reg. 278/05. Operations that may expose a worker to asbestos are classified as Type 1, Type 2 and Type 3 operations.

    The asbestos-containing vermiculite insulation identified within the cinderblock wall cavities of the control building is considered a friable material. Cleanup and repair work involving this material would be considered at Type 2 operation under O. Reg. 278/05. We recommend that this work be completed by a qualified abatement contractor.

    The asbestos-containing caulking material identified around the control building door frame is considered a non-friable material. If the material is disturbed or removed, the following abatement procedures are applicable to non-friable asbestos-containing materials:

    a) O. Reg. 278/05 Type 1 operations are used for the removal of non-friable asbestos-containing material if:

        – the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated; or

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is wetted to control the spread of dust/fibers and the work is done only by means of non-powered hand-held tools.

b) O. Reg. 278/05 Type 2 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is not wetted to control the spread of dust/fibres and the work is done only by means of non-powered hand-held tools; or
- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.

c) O. Reg. 278/05 Type 3 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

3. If the asbestos containing materials are to remain in the building an Asbestos Management Plan is required for the Site. The Plan must be prepared in accordance with O. Reg. 278/05 and include the associated labelling of the asbestos containing materials and worker training.

4. Removal of lead-containing materials must be conducted in accordance with the Ontario Ministry of Labour, Immigration, Training and Skills Development (MOL) guideline “Lead on Construction Projects.” Operations that may expose a worker to lead are classified as Type 1, Type 2 and Type 3 operations. The operations are based on the concentration of airborne lead. The following abatement procedures would be applicable to the removal of lead-containing paints identified at the Site:

d) Type 1 MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating is removed with a chemical gel or paste and fibrous laminated cloth wrap; or
- the coating or material is removed using non-powered hand tools, other than manual scraping or sanding; or
- the coating or material is removed using power tools equipped dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3.

e) Type 2a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed by scraping or sanding using non-powered hand tools; or
- lead-painted walls or building components are demolished by striking with a sledgehammer or similar tool.

f) Type 3a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed using power tools without dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3; or
- an operation that may expose a worker to lead, dust, fume or mist that is not a Type 1, Type 2 or Type 3b MOL lead-containing construction operation.

5. Appropriate worker precautions should be taken as per the OHSA when handling PCB-containing fluorescent lamp ballasts, mercury-containing fluorescent light bulbs, and fuel containers or equipment containing fuel/benzene.

6. Appropriate worker precautions should be taken as per the OHSA when cutting, coring or breaking up silica containing concrete, brick and masonry materials.

7. Handling and disposal of building materials and hazardous waste including, but not limited to the designated substances and hazardous materials identified within this DSHMS, should be conducted as per the requirements of O. Reg. 347.

8. A copy of this report should be provided to contractors involved in renovations and demolition at the Site.

9. New or undocumented suspect materials discovered in currently inaccessible areas (behind concrete walls or in plenum spaces) should be sampled prior to removal to ensure worker safety and compliance with regulatory requirements.

Table of Contents

1.0 Introduction 1
2.0 Site Description 1
2.1 Standpipe 1
2.2 Control Building 1
3.0 Scope of Work and Legislative Requirements 2
4.0 Survey Methods and Results 3
4.1 Asbestos 3
4.2 Lead 5
4.3 Mercury 6
4.4 Silica 6
4.5 Acrylonitrile 7
4.6 Arsenic 7
4.7 Benzene 7
4.8 Coke Oven Emissions 7
4.8.1 Ethylene Oxide 7
4.8.2 Isocyanates 7
4.8.3 Vinyl Chloride Monomer 8
4.9 Other Substances of Potential Environmental Concern 8
4.9.1 Polychlorinated Biphenyls (PCBs) 8
4.9.2 Ozone Depleting Substances 8
4.9.3 Radioactive Materials 9
4.9.4 Urea Formaldehyde Foam Insulation (UFFI) 9
4.9.5 Mould 9
4.9.6 Other Materials and Conditions 9
5.0 Conclusions 10
6.0 Recommendations 11
7.0 Limitations and Use of Report 14
8.0 References 15

Tables

Table 1: Asbestos Sampling Descriptions, Locations and Analytical Results 4
Table 2: Lead Sampling Descriptions, Locations and Analytical Results 5
Table 3: PCB Inspection Descriptions and Locations 8

Figures

Figure 1 Site Plan
Figure 2 Sample Location Plan

Appendices

Appendix A Photographs
Appendix B Laboratory Certificates of Analysis

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by Township of North Huron (Township) to conduct a Designated Substances Survey and Hazardous Materials Survey (DSHMS) of the property located at 199 John Street East in Wingham, Ontario (herein referred to as the Site). Buildings proposed for demolition, and included in the DSHMS, include the existing standpipe and control building (Figure 2).

The work was conducted to evaluate the potential presence of designated substances and hazardous materials within the buildings/structures proposed for demolition.

This report should be provided to contractors and workers who will be conducting demolition or renovation of the buildings included in the DSHMS.

2.0 Site Description

The Site is located at 199 John Street East in Wingham, Ontario and includes a standpipe structure and control building. The Site is roughly rectangular in shape with a total area of approximately 0.07 hectares and is known as the Wingham Standpipe. The Site is located on the north side of John Street East between Carling Terrace and Madill Drive in the community of Wingham, Township of North Huron (Figure 1).

No information or documentation regarding the presence of designated substances or hazardous materials was available prior to conducting the work.

2.1 Standpipe

The standpipe structure was constructed in 1974 and is 8.53 m (28 ft) in diameter and 20.56 m (100.25 ft) in height. The standpipe has cast-in-place concrete walls surrounded by a 19 mm (¾") layer of shotcrete. Based on the 2015 assessment report completed by Burnside, major upgrades were completed to the standpipe in 1984, including concrete replacement at construction joints, patching cracks with Cappar Cap Patch, and new coated wire strands. Cappar Niklepoxy Concrete Sealer was also added as an exterior coating and Cappar Product 215 Epoxy was used as an interior coating.

2.2 Control Building

The control building was constructed around the same time as the standpipe in 1974. The control building is approximately 3 m x 3 m (10' x 10') with a 2.4 m (8') high ceiling. Building construction consists of a poured concrete foundation with underground pump "basement" and block walls surrounding the ground floor portion of the building. The building has a concrete slab roof underlain by interior aluminum. The block walls are

painted on the interior and exterior. The pump "basement" is considered a confined space and accessible via a permanent ladder structure within the building. In addition to the pump, the control building contains electrical and supervisory control and data acquisition (SCADA) equipment.

3.0 Scope of Work and Legislative Requirements

In accordance with Section 30 of the Ontario Occupational Health and Safety Act (OHSA) "Duty of Project Owners", the owner of a property must provide to any renovation/demolition contractor(s) and/or subcontractor(s) a list of any or all designated substances present on the Site, regardless of whether the owner intends to demolish or retain the existing building(s). Proposed renovations and/or demolition of any part of the structure(s) are subject to this section. There are currently eleven designated substances that must be assessed as part of the DSHMS:

- Asbestos
- Mercury
- Benzene
- Acrylonitrile
- Lead
- Ethylene Oxide
- Arsenic
- Isocyanates
- Silica
- Vinyl Chloride
- Coke Oven Emissions

The Site was also inspected for additional items that, under Provincial or Federal regulations, may require special handling and/or disposal during or after renovation and/or demolition of the buildings including:

- Polychlorinated biphenyls (PCBs) in transformers and/or light ballasts;
- Ozone depleting substances (ODS) commonly found in older air conditioning and/or refrigeration equipment;
- Radioactive devices and equipment;
- Urea formaldehyde foam insulation (UFFI);
- Miscellaneous chemicals and waste materials that may require special handling or disposal; and
- Mould, gross amounts which would require special handling during renovations or demolition.

The objectives of this survey were as follows:

- To comply with the requirements of Section 30 of the OHSA;
- To identify designated substances and/or hazardous materials within surveyed areas of the Site;
- To document, the type, location, condition, and quantity of designated substances and hazardous materials identified during the survey; and
- To provide applicable management considerations for each designated substance and/or hazardous material identified.

It was assumed for the purposes of this DSHMS that all process chemicals, materials and equipment that were used as part of daily operations and not permanently affixed to the structures would be removed prior to any reconstruction activities and were not included in this DSHMS.

The inspection consisted of the following:

- A review of existing background information, as available;
- A survey of all accessible areas;
- Sampling and testing of suspect materials (e.g., suspected asbestos-containing and lead-containing materials);
- Submission of samples to an accredited laboratory for analysis;
- Interpretation of analytical data and identification of designated substances and hazardous materials; and
- Preparation of site-specific management considerations and recommendations.

Site access and information about the history of the buildings surveyed was provided by the Township of North Huron. The field work for the DSHMS was conducted on February 7, 2023 by Angela Mason, M.Sc., P.Geo., QP_{ESA} of Burnside. Angela has attended the Asbestos Hazard Emergency Response Act (AHERA) Building Inspector training course approved by the United States Environmental Protection Agency (US EPA).

4.0 Survey Methods and Results

4.1 Asbestos

Asbestos is the one designated substance specifically governed by two regulations under the Act – Ontario Regulation (O. Reg.) 490/09 and O. Reg. 278/05 “Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.” O. Reg. 278/05 includes, but is not limited to, governance of ongoing asbestos management in buildings, information for workers, owner and employer responsibilities, types of abatement operations and their measures and procedures, applicable respirator usages, instruction and training requirements, asbestos work reports and workers register, provision of equivalent measures, notice to inspector requirements and bulk and air sampling requirements.

A total of 18 samples of suspect asbestos-containing material were collected and submitted to EMSL Canada Inc. for analysis of asbestos by polarized light microscopy (PLM). A minimum of three samples of each material were obtained in accordance with O. Reg. 278/05. Sample descriptions and results are summarized in Table 1 and photographs are included in Appendix A. The sample locations are presented on Figure 2.

Table 1: Asbestos Sampling Descriptions, Locations and Analytical Results

Samples Analyzed	Material	Location	Asbestos Concentration
VM-01-A VM-01-B VM-01-C	Vermiculite insulation	Control Building – within cinderblock walls	1.00% Tremolite NA - Positive Stop NA – Positive Stop
CK-01-A CK-01-B CK-01-C	Caulking, white	Control Building – exterior door frame	8% Chrysotile NA - Positive Stop NA – Positive Stop
CK-02-A CK-02-B CK-02-C	Caulking, white	Standpipe – exterior access panel	<0.5% <0.5% <0.5%
FS-01-A FS-01-B FS-01-C	Firestop caulking, grey/clear	Control Building – wire penetrations through exterior walls	<0.5% <0.5% <0.5%
RF-01-A RF-01-B RF-01-C	Roof flashing, black	Control Building – exterior roof flashing	<0.5% <0.5% <0.5%
CON-01-A CON-01-B CON-01-C	Concrete	Standpipe – exterior concrete	<0.5% <0.5% <0.5%

Under O. Reg. 278/05 Section 1.0, “asbestos-containing material” is defined as material that contains 0.5% or more asbestos by dry weight. The samples were analyzed using “positive stop” analysis (i.e., the laboratory stops analysis of other samples in a series when asbestos is detected in one sample). Laboratory results confirm the presence of asbestos in the following materials:

- **Vermiculite insulation (1.00% Tremolite Asbestos)** – This material was identified within cinderblock wall cavities of the control building. The block walls surround the 3 m x 3 m (10’ x 10’) building, approximately 2.4 m (8’) in height. The vermiculite insultation is considered a friable material under O. Reg. 278/05, and was observed to be falling from perforations in the block walls onto the floor and work bench within the building. The presence of loose vermiculite insulation in the building is considered a health hazard to workers in the building.

- **Caulking, white (8% Chrysotile Asbestos)** – This material was identified as caulking around the interior and exterior door frame, with a total linear amount of about 10 m. The white caulking material was observed in fair to poor condition and is not considered a friable material under O. Reg. 278/05.

Asbestos was not detected (<0.5%) within any other samples analyzed. Laboratory certificates of analysis are included in Appendix B.

Burnside notes that some items, such as pipe gaskets and sealants could contain asbestos; however, these components could not be sampled as pipes were sealed. It is expected that gaskets and sealants would be removed as a component within the valves and piping during renovation or demolition. Precautions should be taken when dismantling these components.

4.2 Lead

In Ontario, industrial organizations such as the Environmental Abatement Council of Canada (EACC) have developed guidelines for lead concentrations in paint. The EACC Lead Guideline (2014) provides a good due diligence approach.

For the purposes of this DSHMS, we consider:

- Paint containing less than 1,000 ppm (µg/g) lead (less than 0.1% lead) is considered "low-level lead paint";
- Paint containing from 1,000 ppm (µg/g) to 5,000 ppm (µg/g) lead (0.1 to 0.5% lead) is considered "lead-containing paint"; and
- Paint containing in excess of 5,000 ppm (µg/g) lead (more than 0.5% lead) is considered "lead-based paint".

Although all paints that contain lead must be given consideration when there is worker exposure, it is the lead-based paints that are of most concern to workers and specifically identified as an item of concern when assessing the results of a DSHMS.

A total of six samples of suspect lead containing materials were collected from painted surfaces on the interior and exterior of the buildings and submitted to EMSL Canada Inc. for analysis of lead. Sample descriptions and results are summarized in Table 2 and photographs are included in Appendix A. The sample locations are presented on Figure 2.

Table 2: Lead Sampling Descriptions, Locations and Analytical Results

Samples Analyzed	Material	Location	Lead Concentration	EACC Guideline
PB-01	White paint	Control building – interior walls	<81 ppm	Low-level lead paint
PB-02	Grey paint	Control building – door and frame	1,200 ppm	Lead-containing paint
PB-03	Grey paint	Control building – ceiling	<80 ppm	Low-level lead paint
PB-04	Grey paint	Control building – wood floor	120 ppm	Low-level lead paint

Samples Analyzed	Material	Location	Lead Concentration	EACC Guideline
PB-05	White paint	Control building – exterior walls	<80 ppm	Low-level lead paint
PB-06	Grey paint	Control building – exterior roof	<81 ppm	Low-level lead paint

Based on the EACC Lead Guideline the following were identified as lead-containing (1,000 to 5,000 ppm) paints:

- **Grey paint on the control building door and frame (1,200 ppm)** – This paint was identified on the interior and exterior door and frame of the control building. The grey paint was observed to be in fair condition.

No samples were identified as lead-based (>5,000 ppm) paints based on the EACC Lead Guideline.

Laboratory certificates of analysis are included in Appendix B.

4.3 Mercury

Mercury is most commonly present in buildings as a liquid in thermostats, switches and switchgears, pressure and/or temperature gauges, flow relays, and pressure transmitter units. Compact fluorescent light (CFL) bulbs contain a small amount of mercury sealed within the glass tubing.

The following mercury containing materials were identified in the control building:

- Fluorescent lamp tubes (assume all contain a small amount of mercury vapour).

4.4 Silica

Free crystalline silica in the form of silica sand is commonly used in the construction of concrete blocks, poured concrete, brick and masonry products within structures. Many silica containing materials were identified at the Site such as concrete blocks and poured cement, including the standpipe material.

Coring, sawing, or breaking up the materials containing silica should be completed only with appropriate dust suppression methods, proper respiratory protection, and general worker safety precautions as outlines in the Occupational Health and Safety Act.

4.5 Acrylonitrile

Acrylonitrile may be present in stable form within paints, adhesives, and piping (i.e., black plumbing piping known as ABS – Acrylonitrile Butadiene Styrene). If present onsite in adhesives or as piping, these stable forms of acrylonitrile would not be expected to be a source of concern during demolition work related to any portion of the buildings. Should acrylonitrile be present within the materials, it is not expected that it would become airborne at concentrations above regulatory limits. Bulk acrylonitrile/acronitrile was not observed.

4.6 Arsenic

Arsenic would not be expected in the building or building materials and was not noted during the inspection.

4.7 Benzene

Benzene is a component in petroleum-based products such as hydraulic oils and fuels (gasoline, diesel, fuel oil).

Benzene may be present in roofing materials. Should benzene be present within the roofing materials, it is not expected that it would become airborne at concentrations above regulatory limits.

No suspected benzene containing materials were noted that required laboratory confirmatory analysis. Benzene concentrations in fuel products can be found in the Safety Data Sheets (SDS) for the products.

4.8 Coke Oven Emissions

Coke oven emissions would not be expected related to the structure and no evidence was noted during the inspection.

4.8.1 Ethylene Oxide

Ethylene oxide would not be expected in the structure and no evidence was noted during the inspection.

4.8.2 Isocyanates

Free isocyanate compounds would not be expected except for the possible inclusion of small amounts in paint finishes. Should isocyanate compounds be present within the materials, they would not be expected to become airborne at concentrations above regulatory limits. No bulk or significant amounts of isocyanates were suspected or noted.

4.8.3 Vinyl Chloride Monomer

Vinyl chloride monomer is typically a component of PVC piping and conduits. Should vinyl chloride monomer compounds be present within the materials, they would not be expected to become airborne at concentrations above regulatory limits. Vinyl chloride monomer would not be expected in these buildings and was not noted in any form during the inspection.

4.9 Other Substances of Potential Environmental Concern

4.9.1 Polychlorinated Biphenyls (PCBs)

Fluorescent light ballasts and transformers are a potential source of PCBs. Ballasts containing PCBs were phased out by manufacturers prior to July 1980. Based on the age of the building PCBs may be present. It is expected that during renovation or demolition, any electrical equipment would be removed as a whole component without dismantling.

The fluorescent light ballasts inspected for the presence of PCBs are summarized in Table 3 and photographs are included in Appendix A.

Table 3: PCB Inspection Descriptions and Locations

Description	Location	Manufacturer / Product Code	PCB Containing
Fluorescent Lamp Ballast within 2-bulb fluorescent light fixture	Control building	Universal Therm-O-Matic 446-LR-TC-P	Yes (assumed)

The fluorescent light ballast located in the control building is expected to be PCB containing.

It is noted that Burnside staff were unable to access the basement due to confined space restrictions, and available photos of the basement area did not show any light fixtures. If additional fluorescent light fixtures are present within the control building they should be assumed as PCB containing unless determined otherwise.

No suspected PCB containing materials were identified that required confirmatory sampling to determine if the content met regulatory requirements.

4.9.2 Ozone Depleting Substances

Older air conditioning units or systems may use ODS as refrigerant. No suspected ozone depleting substances were noted.

4.9.3 Radioactive Materials

Ionization smoke detectors use a small amount of radioactive material to make the air within the sensing chamber conduct electricity. Prior to any construction activities involving ionization smoke detectors, these devices should be removed.

Smoke detectors were not identified during the site inspection.

4.9.4 Urea Formaldehyde Foam Insulation (UFFI)

A visual assessment is conducted for the potential presence of urea formaldehyde foam insulation (UFFI). This will involve the inspection of exterior and interior walls for evidence of repaired openings (i.e., nozzle holes) made to facilitate the installation of the insulation. Although the inspection will be non-intrusive, wherever possible, an inspection of wall cavities through existing openings will be made.

Construction after 1980 did not use UFFI and it was rare in industrial/commercial buildings. The hazard associated with UFFI was related to formaldehyde outgassing during the curing phase, which typically lasted for a period of a few months up to a few years, and UFFI installations prior to 1980 would be highly unlikely to emit any detectable formaldehyde gas at present time even during building renovation or demolition activities.

No suspect UFFI containing materials were identified during the site inspection.

4.9.5 Mould

Although mould is not a designated substance, it is included as an additional component of Burnside's DSHMS as it can be a significant workplace issue and is important to owners. Typically, the mould of concern at a workplace is gross amounts that have the potential to impact the air quality and is indicative of a serious moisture control problem.

Gross mould is typically long-term growth that covers or penetrates a substrate fueled by constant moisture and air temperatures conducive to growth. Minor mould is defined as surficial, in a limited area, and a result of limited moisture and growth potential such as along the edge of a window that lacks caulking.

No significant amounts of mould (in gross amounts) or significant mould related issues were observed during the inspection. No sampling of suspected mould containing materials or air quality testing was deemed necessary.

4.9.6 Other Materials and Conditions

Except for a small portable generator within the control building no hazardous materials were stored on the property.

No significant evidence of an environmental impact such as leaks, or spills were noted or suspected.

Wastes were managed appropriately and no impacts from waste management were observed or suspected.

5.0 Conclusions

A DSHMS was conducted at the buildings and structures proposed for demolition/repair at the Site on February 7, 2023. The buildings and Site were inspected to determine if any of the 11 designated substances, as designated by the OHSA and regulations, were present or potentially present. The inspection included other items that may also require special handling during renovations or demolition.

The key findings of the DSHMS are:

- **Asbestos** was identified in the following materials:
  - **Vermiculite insulation (1.00 % Tremolite Asbestos)** – This material was identified within cinderblock wall cavities of the control building. The block walls surround the 3 m x 3 m (10' x 10') building, approximately 2.4 m (8') in height. The vermiculite insultation is considered a friable material under O. Reg. 278/05, and was observed to be falling from perforations in the block walls onto the floor and work bench within the building. The presence of loose vermiculite insulation in the building is considered a health hazard to workers in the building and is out of compliance with regulations.
  - **Caulking, white (8% Chrysotile Asbestos)** – This material was identified as caulking around the interior and exterior door frame, with a total linear amount of about 10 m. The white caulking material was observed in fair to poor condition and is not considered a friable material under O. Reg. 278/05.
- **Lead-containing paints** (1,000 to 5,000 ppm) were identified as follows:
  - **Grey paint on the control building door and frame (1,200 ppm)** – This paint was identified on the interior and exterior door and frame of the control building. The grey paint was observed to be in fair condition.
  - No samples were identified as lead-based (>5,000 ppm) paints.
- **Mercury** was identified the fluorescent lamp tubes within the control building.
- **PCBs** were identified in the fluorescent lamp ballast within the control building.
- **Silica** was identified as a component of concrete, cement, and brick.
- **Benzene** was identified as a component of diesel, gasoline and oil fuel.

No other designated substances or hazardous materials were identified or suspected.

The presence of asbestos containing materials without an Asbestos Management Plan is out of compliance with O. Reg. 278/05.

Soil and subsurface sampling were not included as part of the DSHMS. This report does not evaluate environmental impacts to soil, sediment or groundwater related to fuel storage tanks or other surface contaminant sources.

6.0 Recommendations

Based on the findings of the DSHMS, the following recommendations are provided:

1. Friable asbestos-containing vermiculite insulation falling out of wall cavities is considered a health hazard to workers and out of compliance with regulations. Workers working in the building or in close proximity to the material must be advised of the presence of asbestos-containing materials [vermiculite insulation (1% Tremolite, friable) and door frame caulking (8% Chrysotile, non-friable)].

    a) Workers should avoid disturbance to asbestos-containing material. Workers should not attempt to clean up the material (e.g., by sweeping, vacuuming, etc.) as this could cause the material to become airborne.

    b) Respirator use is recommended in accordance with O. Reg. 278/05 for building entry until the exposed asbestos has been cleaned up and sealed.

    c) All workers (including subcontractors) must be notified prior to building entry.

    d) Signage is required within the building.

2. The fallen vermiculite insulation must be cleaned up and removed, and the wall openings sealed such that material will not continue to fall out. Work on asbestos-containing materials must be conducted in accordance with the requirements in O. Reg. 278/05. Operations that may expose a worker to asbestos are classified as Type 1, Type 2 and Type 3 operations.

    The asbestos-containing vermiculite insulation identified within the cinderblock wall cavities of the control building is considered a friable material. Cleanup and repair work involving this material would be considered at Type 2 operation under O. Reg. 278/05. We recommend that this work be completed by a qualified abatement contractor.

    The asbestos-containing caulking material identified around the control building door frame is considered a non-friable material. If the material is disturbed or removed, the following abatement procedures are applicable to non-friable asbestos-containing materials:

    a) O. Reg. 278/05 Type 1 operations are used for the removal of non-friable asbestos-containing material if:

- the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated; or
- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is wetted to control the spread of dust/fibers and the work is done only by means of non-powered hand-held tools.

b) O. Reg. 278/05 Type 2 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the material is not wetted to control the spread of dust/fibres and the work is done only by means of non-powered hand-held tools; or
- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.

c) O. Reg. 278/05 Type 3 abatement procedures are used for the removal of non-friable asbestos-containing material if:

- the material is removed by breaking, cutting, drilling, abrading, grinding, sanding or vibrating, where the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

3. If the asbestos containing materials are to remain in the building an Asbestos Management Plan is required for the Site. The Plan must be prepared in accordance with O. Reg. 278/05 and include the associated labelling of the asbestos containing materials and worker training.

4. Removal of lead-containing materials must be conducted in accordance with the Ontario Ministry of Labour, Immigration, Training and Skills Development (MOL) guideline “Lead on Construction Projects.” Operations that may expose a worker to lead are classified as Type 1, Type 2 and Type 3 operations. The operations are based on the concentration of airborne lead. The following abatement procedures would be applicable to the removal of lead-containing paints identified at the Site:

a) Type 1 MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating is removed with a chemical gel or paste and fibrous laminated cloth wrap; or
- the coating or material is removed using non-powered hand tools, other than manual scraping or sanding; or

- the coating or material is removed using power tools equipped dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3.

b) Type 2a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed by scraping or sanding using non-powered hand tools; or
- lead-painted walls or building components are demolished by striking with a sledgehammer or similar tool.

c) Type 3a MOL lead-containing construction operations are used for the removal of lead-containing coatings or materials if:

- the coating or material is removed using power tools without dust-collecting devices equipped with HEPA filters capable of controlling airborne lead concentrations below 0.05 mg/m^3; or
- an operation that may expose a worker to lead, dust, fume or mist that is not a Type 1, Type 2 or Type 3b MOL lead-containing construction operation.

5. Appropriate worker precautions should be taken as per the OHSA when handling PCB-containing fluorescent lamp ballasts, mercury-containing fluorescent light bulbs, and fuel containers or equipment containing fuel/benzene.

6. Appropriate worker precautions should be taken as per the OHSA when cutting, coring or breaking up silica containing concrete, brick and masonry materials.

7. Handling and disposal of building materials and hazardous waste including, but not limited to the designated substances and hazardous materials identified within this DSHMS, should be conducted as per the requirements of O. Reg. 347.

8. A copy of this report should be provided to contractors involved in renovations and demolition at the Site.

9. New or undocumented suspect materials discovered in currently inaccessible areas (behind concrete walls or in plenum spaces) should be sampled prior to removal to ensure worker safety and compliance with regulatory requirements.

7.0 Limitations and Use of Report

R.J. Burnside & Associates Limited (Burnside) has conducted this study in accordance with generally accepted standards and field practices.

The conclusions in this report are professional opinions based upon visual observations of the Site conditions and data existing at the time of our assessment. Burnside does not guarantee the accuracy and reliability of the information provided by other persons or agencies and does not claim responsibility for undisclosed or non-visible environmental concerns that may result in costs for environmental clean-up or remediation.

This report was prepared for the exclusive use of the Township of North Huron and its contractors and consultants. Any use of reliance on or decisions based on this report by a third party are the responsibility of such third parties. Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. Reports or memoranda resulting from this assignment are not to be used, in whole or in part, outside the client's organization without prior written permission.

8.0 References

Environmental Abatement Council of Canada, Canadian Chapter of the EIA. EACC Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014).

Environmental Abatement Council of Ontario. Mould Abatement Guidelines (2004 – Edition 1).

Huron County. 2023. GIS Services, Interactive Mapping. Online. Available: https://www.huroncounty.ca/gis-services/interactive-mapping/ (Accessed 01 Mar 2023).

Ontario Ministry of Labour, Immigration, Training and Skills Development: Lead on Construction Projects (Issued September 2004, Content last reviewed April 2011).

Ontario Occupational Health and Safety Act, R.S.O. 1990, c. O.1 (updated July 1, 2022).

Ontario Regulation 278/05: Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.

Ontario Regulation 347: General – Waste Management.

Ontario Regulation 463/10: Ozone Depleting Substances and Other Halocarbons.

Ontario Regulation 490/09: Designated Substances, under the Occupational Health and Safety Act, R.S.O. 1990, C. O. 1 (updated January 1, 2020).

PCB Regulations (SOR/2008-273), under the Canadian Environmental Protection Act, 1999 (last amended October 31, 2021).

Chemical & Engineering News Archive 1976 54 (31), 7-8.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Figures



LEGEND

APPROXIMATE SITE BOUNDARY



N

0 5.0 10.0 20.0 30.0 40.0

Metres

Air Photo Source:
Background 2018 Air Photo obtained from Google Earth Professional / DigitalGlobe © Google Earth, use of products are subject to the Terms and Conditions of Licensed Google Earth Software.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID

BURNSIDE

Client

TOWNSHIP OF NORTH HURON
WINGHAM STANDPIPE - 199 JOHN STREET

Figure Title

DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY
SITE PLAN

Drawn	Checked	Date	Figure No.
CD	AM	February 2023	1
Scale		Project No.	
1:500		300053193.0000	

File: \\gue-dfs-v-02\Shared Work Areas\053193 Wingham DSS\02_Production\053193 DSS Figures.dwg Date Plotted: February 23, 2023 - 5:07 PM



Air Photo Source:
Background 2020 Air Photo obtained from County of Huron Online Mapping

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- ASBESTOS SAMPLE LOCATION - INTERIOR WALL
- ASBESTOS SAMPLE LOCATION - EXTERIOR WALL
- ASBESTOS SAMPLE LOCATION - ROOF / CEILING
- LEAD SAMPLE LOCATION - WALL
- LEAD SAMPLE LOCATION - FLOOR
- LEAD SAMPLE LOCATION - ROOF / CEILING
- LEAD CONTAINING PAINT (1,000 TO 5,000 ppm)
- LEAD BASED PAINT (>5,000 ppm)
- ASBESTOS CONTAINING MATERIAL

N

0 2.0 4.0 6.0 8.0
Metres

BURNSIDE

Client
TOWNSHIP OF NORTH HURON
WINGHAM STANDPIPE - 199 JOHN STREET

Figure Title
DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY
SAMPLE LOCATION PLAN

Drawn	Checked	Date	Figure No.
CD	AM	February 2023	2
Scale		Project No.	
1:100		300053193.0000	

File: \\gue-dfs-v-02\Shared Work Areas\053193 Wingham DSS\02_Production\053193 DSS Figures.dwg Date Plotted: March 1, 2023 - 9:54 AM

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Photographs



Photo 1: Exterior site view, showing control building and standpipe behind, facing north.



Photo 2: View of the upper standpipe structure, facing northwest from beside the control building.



Photo 3: Interior view of the control building from the front door, showing a portable generator and fuel container, electrical equipment, a workbench, and the ladder to the pump area in the basement with “Confined space enter by permit only” sign. Grey paint on ceiling (sample PB-03, low-level lead paint).

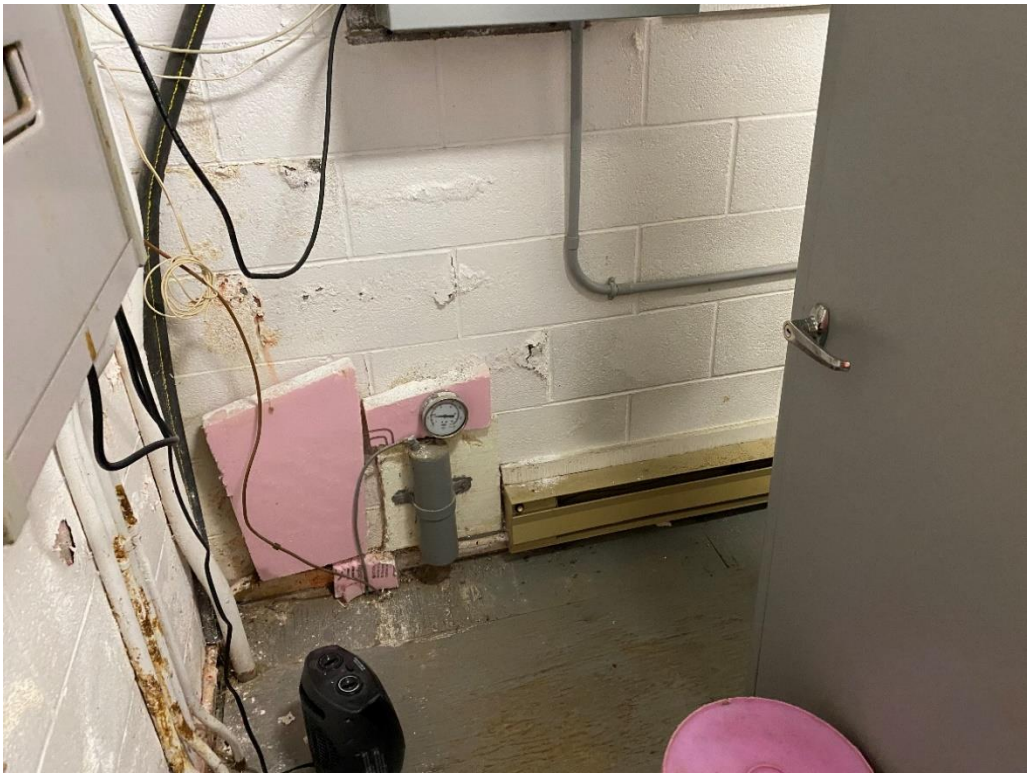


Photo 4: Interior view of control building showing electric baseboard and portable heaters and electrical equipment. White paint on walls (sample PB-01, low-level lead paint) and grey paint on wood floor (sample PB-04, low-level lead paint).

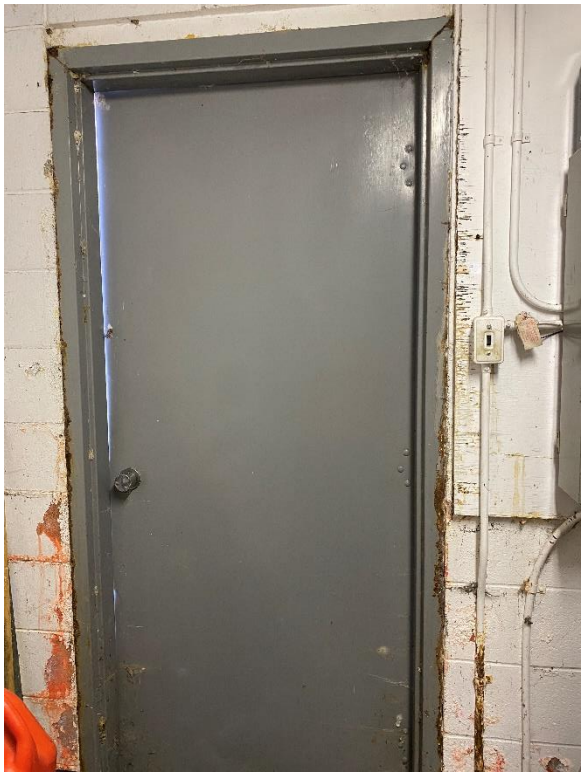


Photo 5: Interior view of control building door. Grey paint on door (sample PB-02, lead-containing paint), white paint on walls (sample PB-01, low-level lead paint).

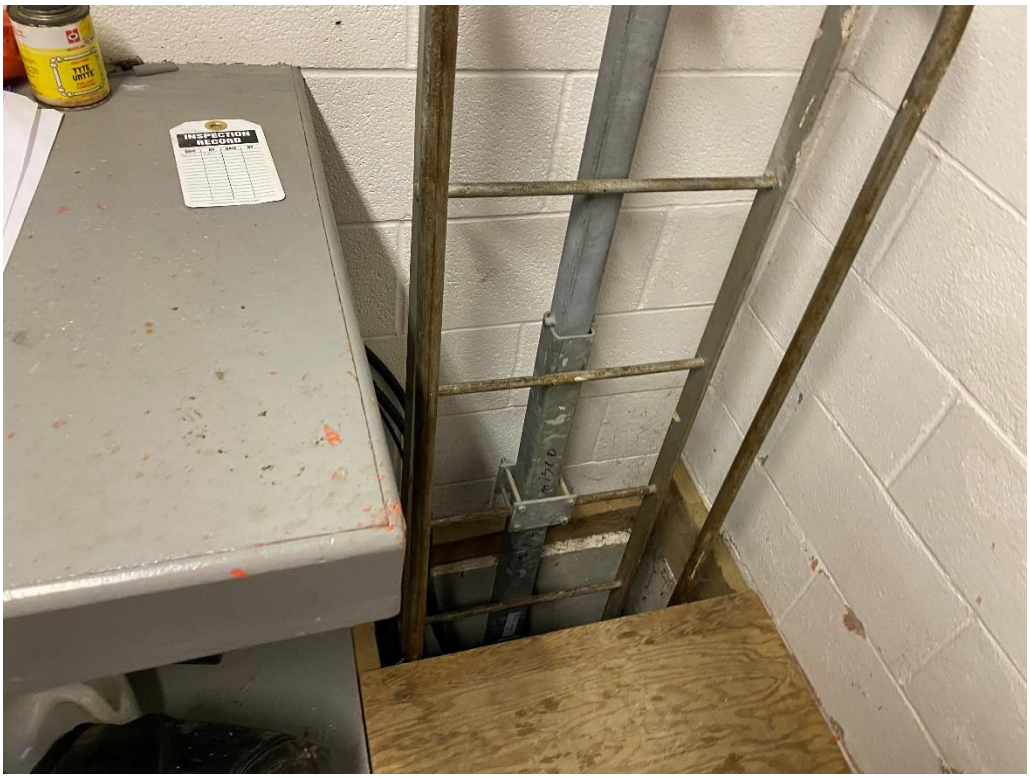


Photo 6: Interior control building, ladder to basement confined space area.



Photo 7: Control building basement, showing ladder, concrete walls and floors (photo taken by Wingham staff).

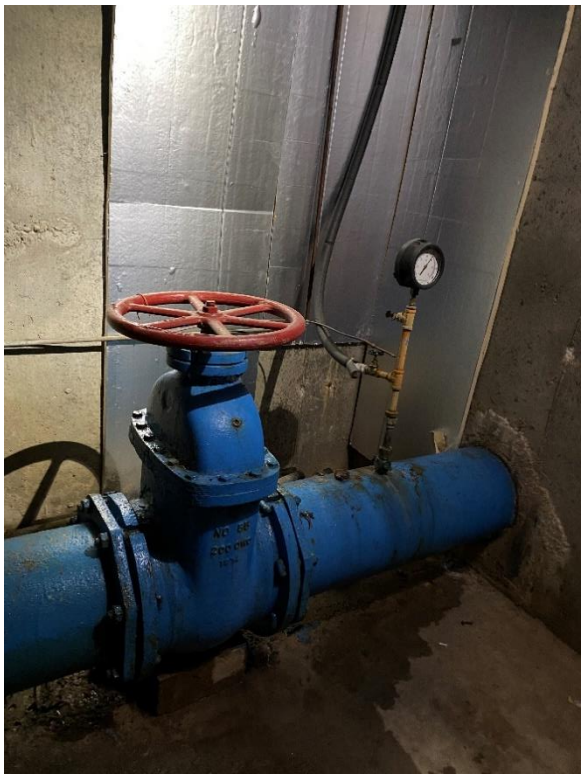


Photo 8: Control building basement, showing water control equipment. Floor and walls are poured concrete, partially covered with thermal foam boards (photo taken by Wingham staff).

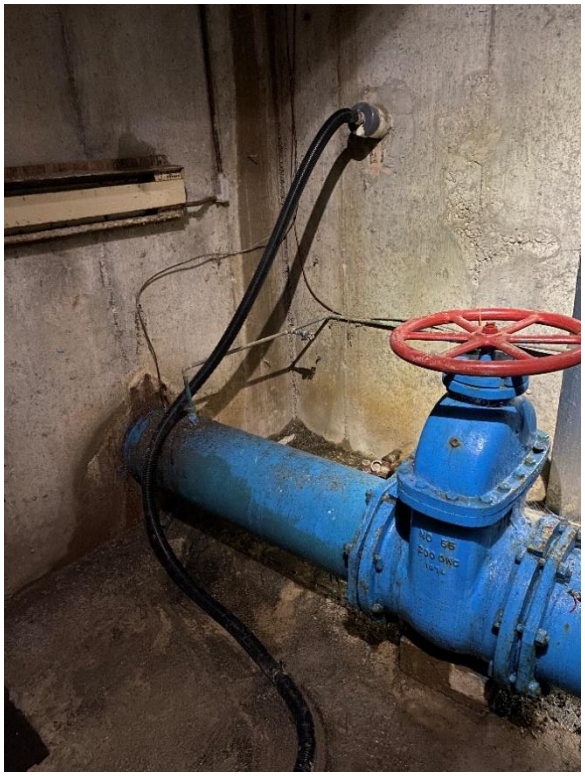


Photo 9: Control building basement, showing water control equipment and electric baseboard heater. Floor and walls are poured concrete.



Photo 10: Control building workbench, showing fallen asbestos-containing vermiculite insulation on workbench surface (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 11: Control building workbench, showing close-up view of fallen asbestos-containing vermiculite insulation (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 12: Control building wall above workbench, showing conduit penetration with asbestos-containing vermiculite insulation visible within penetration (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 13: Control building, base of block wall, showing asbestos-containing vermiculite insulation spilling from base of wall cavity (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 14: Control building, base of block wall, showing asbestos-containing vermiculite insulation spilling from base of wall cavity under baseboard heater (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 15: Control building, base of block wall, showing close-up view of asbestos-containing vermiculite insulation at base of wall cavity (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).



Photo 16: Control building, base of block wall, showing asbestos-containing vermiculite insulation spilling from base of wall cavity (sample VM-01-A/B/C, 1.00% Tremolite asbestos, friable).

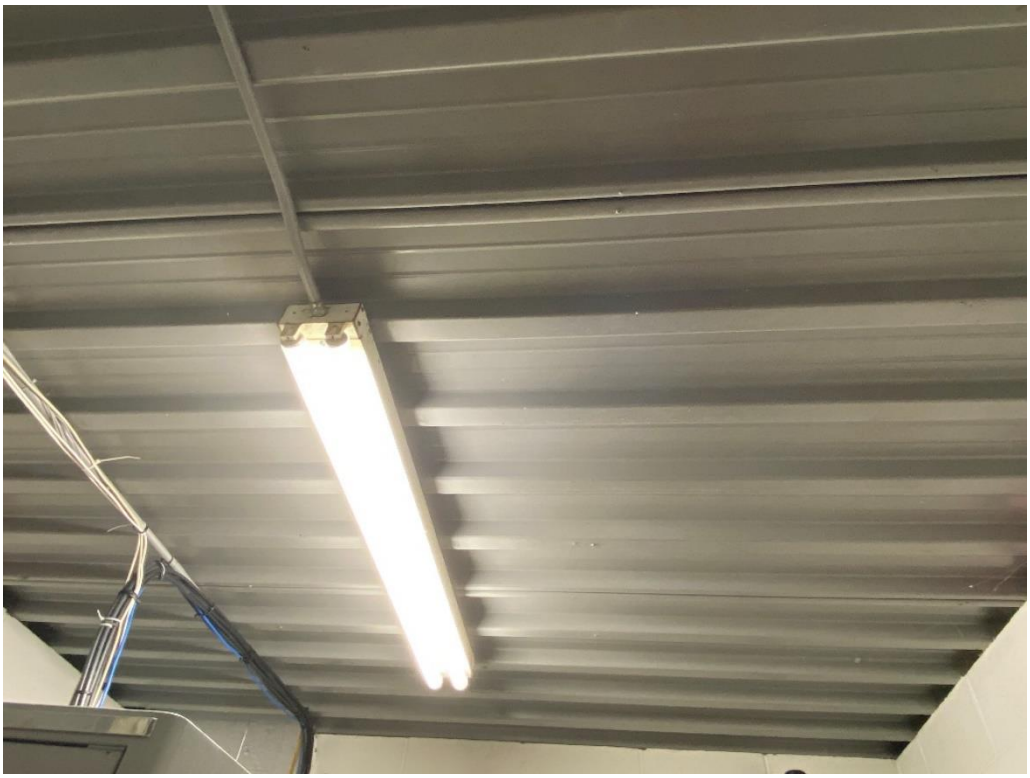


Photo 17: Control building ceiling, showing fluorescent light (tube bulbs assumed to contain small amounts of mercury vapour).



Photo 18: Control building ceiling, showing ballast (PCB-containing) within fluorescent light fixture.



Photo 19: Control building exterior door frame, showing asbestos-containing white caulking around door frame (sample CK-01-A/B/C, 8% Chrysotile).



Photo 20: Control building exterior, showing roof flashing material (sample RF-01-A/B/C, <0.5% asbestos), grey paint on flashing (sample PB-06, low-level lead paint) and white paint on exterior block walls (sample PB-05, low-level lead paint).



Photo 21: Control building exterior, showing firestop caulking on conduit penetrations (sample FS-01-A/B/C, <0.5% asbestos) and white paint on exterior block walls (sample PB-05, low-level lead paint).



Photo 22: Standpipe exterior access panel, showing white caulking above panel (sample CK-02-A/B/C, <0.5% asbestos).



Photo 23: Standpipe base showing area with broken foam insulation and exposed concrete (sample CON-01-A/B/C, <0.5% asbestos).

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Laboratory Certificates of Analysis

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552301889
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Attn: Angela Mason
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Phone: (519) 941-5331
Fax: (519) 941-8120
Collected:
Received: 2/09/2023
Analyzed: 2/23/2023

Proj: 300053193.0000 (Phase 1500)

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: CK-01-A **Lab Sample ID:** **552301889-0001**
Sample Description: White caulking, control room exterior door frame

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White/Beige	0.0%	92.0%	**8% Chrysotile**	

Client Sample ID: CK-01-B **Lab Sample ID:** **552301889-0002**
Sample Description: White caulking, control room exterior door frame

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023			Positive Stop (Not Analyzed)		

Client Sample ID: CK-01-C **Lab Sample ID:** **552301889-0003**
Sample Description: White caulking, control room exterior door frame

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023			Positive Stop (Not Analyzed)		

Client Sample ID: CK-02-A **Lab Sample ID:** **552301889-0004**
Sample Description: White caulking, standpipe access panel

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: CK-02-B **Lab Sample ID:** **552301889-0005**
Sample Description: White caulking, standpipe access panel

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: CK-02-C **Lab Sample ID:** **552301889-0006**
Sample Description: White caulking, standpipe access panel

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: FS-01-A **Lab Sample ID:** **552301889-0007**
Sample Description: Grey firestop caulking - control room exterior walls at wire/conduit penetrations

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Gray	2.0%	98.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552301889
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: FS-01-B ***Lab Sample ID:*** **552301889-0008**

Sample Description: Grey firestop caulking - control room exterior walls at wire/conduit penetrations

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Gray	2.0%	98.0%	None Detected	

Client Sample ID: FS-01-C ***Lab Sample ID:*** **552301889-0009**

Sample Description: Grey firestop caulking - control room exterior walls at wire/conduit penetrations

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Gray	0.0%	100.0%	None Detected	

Client Sample ID: RF-01-A ***Lab Sample ID:*** **552301889-0010**

Sample Description: Black roof flashing material - underside of control room exterior roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Black	15.0%	85.0%	None Detected	

Client Sample ID: RF-01-B ***Lab Sample ID:*** **552301889-0011**

Sample Description: Black roof flashing material - underside of control room exterior roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Black	15.0%	85.0%	None Detected	

Client Sample ID: RF-01-C ***Lab Sample ID:*** **552301889-0012**

Sample Description: Black roof flashing material - underside of control room exterior roof

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	2/23/2023	Black	15.0%	85.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

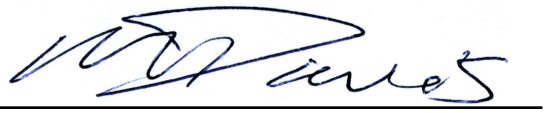
EMSL Canada Order 552301889
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Analyst(s):

Marzan Regaspi	PLM (3)
Vanessa Gallego	PLM (7)

Reviewed and approved by:



Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This is a summary report; official reports are available on LabConnect or upon request and relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 02/23/202316:00:54

OrderID: 552301889

Asbestos Chain of Custody (Air, Bulk, Soil, Water)

EMSL Order Number / Lab Use Only: 552301889

EMSL CANADA, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL Canada, Inc
2756 Slough Street
Mississauga ON L4T 1G3

PHONE (289) 997-4602
EMAIL: TorontoLab@EMSL.com

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information

Customer ID:	
Company Name:	R J. Burnside & Associates Ltd
Contact Name:	Angela Mason
Street Address:	292 Speedvale Avenue West, Unit #20
City, Province, Postal Code:	Guelph, Ontario N1H 1C4
Country:	Canada
Phone:	226-314-2129
Email(s) for Report:	angela mason@rjburnside com

Billing Information

Billing ID:	
Company Name:	
Billing Contact:	
Street Address:	
City, Province, Postal Code:	
Country:	
Phone:	
Email(s) for Invoice:	

Project Information

Project Name/No:	300053193.0000 (Phase 1500)
Purchase Order:	
EMSL LIMS Project ID: (If applicable, EMSL will provide)	
US State where samples collected:	N/A
Sampled By Name:	Angela Mason
Sampled By Signature:	
No. of Samples in Shipment	12

Turn-Around-Time (TAT)

☐ 3 Hour[1] ☐ 4-4.5 Hour[1] AHERA Only ☐ 6 Hour[1] ☐ 24 Hour ☐ 32 Hour[2] ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☑ 2 Week

[1]Premium Service Charge applies for 3 Hour TEM AHERA or EPA Level II TAT. TEM Air 3-6 Hour, please call ahead to schedule. [2]32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

Test Selection

PCM Air
- ☐ NIOSH 7400
- ☐ IRSST PCM

PLM - Bulk (reporting limit)
- ☑ PLM EPA 600/R-93/116 (<1%)
  - ☐ 400 PTCT (<0.25%)
  - ☐ Conditional 400 PTCT (<0.25%)
  - ☐ 1000 PTCT (<0.1%)
- ☐ PLM EPA NOB(<1%)
  - ☐ 400 PTCT (<0.25%) ☐ 1000 PTCT (<0.1%)
- ☐ IRSST PLM
- ☐ NIOSH 9002 (<1%)
- ☐ Other

TEM - Air
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ IRSST TEM (NYS 198.4)

TEM - Settled Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480

TEM - Water
- ☐ EPA 100.2 (All fibre sizes)
- ☐ EPA 100.2 (Fibres >10µm)

Soil - Rock - Vermiculite (reporting limit)*
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.25%)
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.01%)
- ☐ ASTM D7521 Sieve Method
- ☐ TEM Qualitative via Filtration Prep
- ☐ TEM Qualitative via Drop Mount Prep
- ☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM*
  *(required for vermiculite in BC and NS)

Asphalt
- ☐ PLM EPA Gravimetric with milling prep (<0.25%)

Stop At First Positive *(clearly identify homogenous areas below)*

*Please call with your project-specific requirements.

☑ **Positive Stop - Clearly Identified Homogeneous Areas (HA)** | **Filter Pore Size (Air Samples)** ☐ 0.8um ☐ 0.45um

Sample Number	Sample Location / Description	Volume, Area or Homogeneous Area	Date / Time Sampled (Air Monitoring Only)
CK-01-A/B/C	White caulking, control room exterior door frame		
CK-02-A/B/C	White caulking, standpipe access panel		
FS-01-A/B/C	Grey firestop caulking - control room exterior walls at wire/conduit penetrations		
RF-01-A/B/C	Black roof flashing material - underside of control room exterior roof		

RECEIVED EMSL CANADA INC. TORONTO 2023 FEB 9 A 9:54

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by: Angela Mason	Date/Time: 2023/02/07	Received by: LAB 55 / INC	Date/Time: 2/9/23 @ 9:54 Am
Relinquished by:	Date/Time:	Received by	Date/Time

Controlled Document - COC-05-CAN Asbestos R11 04/15/21

☑ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Canada, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance an Page 1 Of 1 **tions by Customer**

IC

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order: 552301893
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Attention: Angela Mason
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Project: 300053193.0000 (Phase 1500)

Phone: (226) 314-2129
Fax: (519) 941-8120
Received: 02/09/2023 9:56 AM
Analysis Date: 02/23/2023
Collected: 02/07/2023

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy and Milling Prep. Quantitation using 400 Point Count Procedure.

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
VM-01-A *552301893-0001*	Vermiculite insulation - control room, cinderblock wall cavitites	Beige Non-Fibrous Homogeneous		99.0% Non-fibrous (Other)	**1.00% Tremolite**
VM-01-B *552301893-0002*	Vermiculite insulation - control room, cinderblock wall cavitites				**Positive Stop (Not Analyzed)**
VM-01-C *552301893-0003*	Vermiculite insulation - control room, cinderblock wall cavitites				**Positive Stop (Not Analyzed)**

Analyst(s)

Vanessa Gallego (1)

Matthew Davis or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 “Interim Method”) but augmented with procedures outlined in the 1993 (”final”) version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. EMSL suggests that samples reported as <0.25% or none detected undergo additional analysis via TEM. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 02/23/2023 16:11:20

OrderID: 552301893

EMSL CANADA, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody (Air, Bulk, Soil, Water)

EMSL Order Number / Lab Use Only

552301893

EMSL Canada, Inc.
2756 Slough Street
Mississauga, ON L4T 1G3

PHONE: (289) 997-4602
EMAIL: TorontoLab@EMSL.com

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information		Billing Information	
Customer ID:		Billing ID:	
Company Name	R.J. Burnside & Associates Ltd.	Company Name:	
Contact Name:	Angela Mason	Billing Contact:	
Street Address:	292 Speedvale Avenue West Unit #20	Street Address:	
City, Province, Postal Code:	Guelph, Ontario N1H 1C4 — Country: Canada	City, Province, Postal Code:	Country:
Phone:	226-314-2129	Phone:	
Email(s) for Report:	angela.mason@rjburnside.com	Email(s) for Invoice:	

Project Information

Project Name/No: 300053193.0000 (Phase 1500)	Purchase Order:
EMSL LIMS Project ID: (If applicable EMSL will provide)	US State where samples collected: N/A
Sampled By Name: Angela Mason	Sampled By Signature: [signature] — No. of Samples in Shipment: 3

Turn-Around-Time (TAT)

☐ 3 Hour[1] ☐ 4-4.5 Hour[1] AHERA Only ☐ 6 Hour[1] ☐ 24 Hour ☐ 32 Hour[2] ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☑ 2 Week

[1]Premium Service Charge applies for 3 Hour TEM AHERA or EPA Level II TAT. TEM Air 3-6 Hour, please call ahead to schedule. [2]32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

Test Selection

PCM Air
- ☐ NIOSH 7400
- ☐ IRSST PCM

PLM - Bulk (reporting limit)
- ☐ PLM EPA 600/R-93/116 (<1%)
  - ☐ 400 PTCT (<0.25%)
  - ☐ Conditional 400 PTCT (<0.25%)
  - ☐ 1000 PTCT (<0.1%)
- ☐ PLM EPA NOB(<1%)
  - ☐ 400 PTCT (<0.25%) ☐ 1000 PTCT (<0.1%)
- ☐ IRSST PLM
- ☐ NIOSH 9002 (<1%)
- ☐ Other

TEM - Air
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ IRSST TEM (NYS 198.4)

TEM - Settled Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480

TEM - Water
- ☐ EPA 100.2 (All fibre sizes)
- ☐ EPA 100.2 (Fibres >10µm)

Soil - Rock - Vermiculite (reporting limit)*
- ☑ PLM EPA 600/R-93/116 with milling prep (<0.25%)
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.01%)
- ☐ ASTM D7521 Sieve Method
- ☐ TEM Qualitative via Filtration Prep
- ☐ TEM Qualitative via Drop Mount Prep
- ☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM* *(required for vermiculite in BC and NS)

Asphalt
- ☐ PLM EPA Gravimetric with milling prep (<0.25%)

Stop At First Positive ***(clearly identify homogenous areas below)***

**Please call with your project-specific requirements.*

☑ **Positive Stop - Clearly Identified Homogeneous Areas (HA)** — **Filter Pore Size (Air Samples)** ☐ **0.8um** ☐ **0.45um**

Sample Number	Sample Location / Description	Volume, Area or Homogeneous Area	Date / Time Sampled (Air Monitoring Only)
VM-01-A/B/C	Vermiculite insulation - control room, cinderblock wall cavitites		2023/02/07 11:00

RECEIVED
EMSL CANADA, INC.
TORONTO
2023 ... 9:56

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by: Angela Mason [signature]	Date/Time: 2023/02/07	Received by: LAB SS/NC	Date/Time: 2/9/23 @ 9:56AM
Relinquished by:	Date/Time:	Received by:	Date/Time:

Controlled Document - COC-05-CAN Asbestos R11 04/15/21

☑ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Canada, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc constitutes acceptance and a... s by Customer

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552302818
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Attn: Angela Mason
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Phone: (519) 941-5331
Fax: (519) 941-8120
Collected:
Received: 2/27/2023
Analyzed: 3/02/2023

Proj: 300053193.0000 (Phase 1500)

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Client Sample ID: CON-01-A ***Lab Sample ID:*** **552302818-0001**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	Gray	0.0%	100.0%	None Detected	

Client Sample ID: CON-01-B-Block Fill ***Lab Sample ID:*** **552302818-0002**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	White	0.0%	100.0%	None Detected	

Client Sample ID: CON-01-B-Mortar ***Lab Sample ID:*** **552302818-0002A**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	Gray	0.0%	100.0%	None Detected	

Client Sample ID: CON-01-C ***Lab Sample ID:*** **552302818-0003**
Sample Description: Concrete

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	3/02/2023	Gray	0.0%	100.0%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

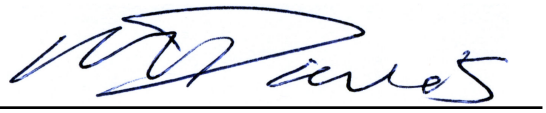
EMSL Canada Order 552302818
Customer ID: 55BNSD42
Customer PO: 300053193.0000
Project ID:

Summary Test Report for Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05

Analyst(s):

Natalie D'Amico	PLM (3)
Vanessa Gallego	PLM (1)

Reviewed and approved by:



Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This is a summary report; official reports are available on LabConnect or upon request and relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 03/02/202312:30:26

OrderID: 552302818

Asbestos Chain of Custody (Air, Bulk, Soil, Water)

EMSL Order Number / Lab Use Only: 552302818

EMSL CANADA, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL Canada, Inc.
2756 Slough Street
Mississauga, ON L4T 1G3
PHONE: (289) 997-4602
EMAIL: TorontoLab@EMSL.com

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information		Billing Information	
Customer ID		Billing ID:	
Company Name	R.J. Burnside & Associates Ltd.	Company Name:	
Contact Name	Angela Mason	Billing Contact:	
Street Address	292 Speedvale Avenue West, Unit #20	Street Address:	
City, Province, Postal Code	Guelph, Ontario N1H 1C4	City, Province, Postal Code	
Country	Canada	Country:	
Phone	226-314-2129	Phone:	
Email(s) for Report:	angela.mason@rjburnside.com	Email(s) for Invoice:	

Project Information

Project Name/No:	300053193.0000 (Phase 1500)
Purchase Order:	
EMSL LIMS Project ID. (If applicable, EMSL will provide)	
US State where samples collected:	N/A
Sampled By Name:	Josh Stewart
Sampled By Signature:	
No. of Samples in Shipment	3

Turn-Around-Time (TAT)

☐ 3 Hour[1] ☐ 4-4 5 Hour[1] AHERA Only ☐ 6 Hour[1] ☐ 24 Hour ☐ 32 Hour[2] ☐ 48 Hour ☑ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

[1]Premium Service Charge applies for 3 Hour TEM AHERA or EPA Level II TAT. TEM Air 3-6 Hour, please call ahead to schedule. [2]32 Hour TAT available for select tests only, samples must be submitted by 11:30am.

Test Selection

PCM Air
- ☐ NIOSH 7400
- ☐ IRSST PCM

PLM - Bulk (reporting limit)
- ☑ PLM EPA 600/R-93/116 (<1%)
  - ☐ 400 PTCT (<0.25%)
  - ☐ Conditional 400 PTCT (<0.25%)
  - ☐ 1000 PTCT (<0.1%)
- ☐ PLM EPA NOB(<1%)
  - ☐ 400 PTCT (<0.25%) ☐ 1000 PTCT (<0.1%)
- ☐ IRSST PLM
- ☐ NIOSH 9002 (<1%)
- ☐ Other

TEM - Air
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ IRSST TEM (NYS 198 4)

TEM - Settled Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480

TEM - Water
- ☐ EPA 100.2 (All fibre sizes)
- ☐ EPA 100 2 (Fibres >10µm)

Soil - Rock - Vermiculite (reporting limit)*
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.25%)
- ☐ PLM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)
- ☐ TEM EPA 600/R-93/116 with milling prep (<0.01%)
- ☐ ASTM D7521 Sieve Method
- ☐ TEM Qualitative via Filtration Prep
- ☐ TEM Qualitative via Drop Mount Prep
- ☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM*
  *(required for vermiculite in BC and NS)

Asphalt
- ☐ PLM EPA Gravimetric with milling prep (<0.25%)

Stop At First Positive *(clearly identify homogenous areas below)*

*Please call with your project-specific requirements

☑ **Positive Stop - Clearly Identified Homogeneous Areas (HA)** | **Filter Pore Size (Air Samples)** ☐ 0.8um ☐ 0.45um

Sample Number	Sample Location / Description	Volume, Area or Homogeneous Area	Date / Time Sampled (Air Monitoring Only)
CON-01-A/B/C	Concrete		

RECEIVED EMSL CANADA, INC. TORONTO 2023 FEB 24 AM 9:42

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment		Sample Condition Upon Receipt:	
Relinquished by: Josh Stewart	Date/Time: 2023/02/24	Received by: LAB 55/NC	Date/Time: 2/27/23 @ 9:42 AM
Relinquished by: J. Stewart	Date/Time:	Received by:	Date/Time

Controlled Document - COC-05-CAN Asbestos R11 04/15/21

☑ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Canada, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and a Page 1 Of 1 **is by Customer**

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552301880
CustomerID:	55BNSD42
CustomerPO:	300053193.0000
ProjectID:	

Attn: **Angela Mason**
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

Phone: (519) 941-5331
Fax: (519) 941-8120
Received: 2/9/2023 09:52 AM
Collected: 2/7/2023

Project: **300053193.0000 (Phase 1500)**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
PB-01	2/7/2023	2/9/2023	0.2475 g	81 ppm	<81 ppm
552301880-0001	Site: Control building interior walls, white paint				
PB-02	2/7/2023	2/9/2023	0.2466 g	81 ppm	1200 ppm
552301880-0002	Site: Control building door and frame, grey paint				
PB-03	2/7/2023	2/9/2023	0.2530 g	80 ppm	<80 ppm
552301880-0003	Site: Control building ceiling, grey paint				
PB-04	2/7/2023	2/9/2023	0.2000 g	100 ppm	120 ppm
552301880-0004	Site: Control building wood floor, grey paint				
PB-05	2/7/2023	2/9/2023	0.2506 g	80 ppm	<80 ppm
552301880-0005	Site: Control building exterior walls, white paint				
PB-06	2/7/2023	2/9/2023	0.2484 g	81 ppm	<81 ppm
552301880-0006	Site: Control building exterior roof flashing, grey paint				

Rowena Fanto, Lead Supervisor
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
* Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA LAP, LLC-ELLAP Accredited #196142

Initial report from 02/24/2023 08:22:20

OrderID: 552301880

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

552301880

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: CinnaminsonLeadLab@emsl.com

Customer Information		Billing Information	
Customer ID:		Billing ID	
Company Name:	R.J. Burnside & Associates Ltd.	Company Name:	
Contact Name	Angela Mason	Billing Contact:	
Street Address	292 Speedvale Avenue West, Unit #20	Street Address	
City, State, Zip:	Guelph, Ontario N1H 1C4	City, State, Zip	
Country	Canada	Country:	
Phone:	226-314-2129	Phone	
Email(s) for Report	angela.mason@rjburnside.com	Email(s) for Invoice:	

Project Information

Project Name/No: 300053193.0000 (Phase 1500)		Purchase Order:
EMSL LIMS Project ID: (If applicable, EMSL will provide)	US State where samples collected: N/A	State of Connecticut (CT) must select project location. ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)
Sampled By Name: Angela Mason	Sampled By Signature: AM	No. of Samples in Shipment: 6

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 32 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☑ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

MATRIX	METHOD	INSTRUMENT	REPORTING LIMIT	SELECTION
CHIPS ☐ % by wt. ☑ ppm (mg/kg) ☐ mg/cm²	SW 846-7000B	Flame Atomic Absorption	0.008% (80ppm)	☑
*Reporting Limit based on a minimum 0.25g sample weight	SW 846-6010D*	ICP-OES	0.0004% (4ppm)	☐
AIR	NIOSH 7082	Flame Atomic Absorption	4µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-OES	0.5µg/filter	☐
	NIOSH 7300M / NIOSH 7303M	ICP-MS	0.05µg/filter	☐
WIPE ☐ ASTM ☐ NON-ASTM	SW 846-7000B	Flame Atomic Absorption	10µg/wipe	☐
*If no box is checked, non-ASTM Wipe is assumed	SW 846-6010D*	ICP-OES	1.0µg/wipe	☐
TCLP	SW 846-1311 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1311 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
SPLP	SW 846-1312 / 7000B / SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW 846-1312 / SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
TTLC	22 CCR App. II, 7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	22 CCR App II, SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
STLC	22 CCR App. II, 7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	22 CCR App II, SW 846-6010D*	ICP-OES	0.1 mg/L (ppm)	☐
Soil	SW 846-7000B	Flame Atomic Absorption	40mg/kg (ppm)	☐
	SW 846-6010D*	ICP-OES	2mg/kg (ppm)	☐
Wastewater	SM 3111B / SW 846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
Unpreserved ☐ / Preserved with HNO3 ☐ PH<2	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	☐
Drinking Water	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	☐
Unpreserved ☐ / Preserved with HNO3 ☐ PH<2	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	☐
Other:				☐

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
PB-01	Control building interior walls, white paint		2023/02/07 10:30
PB-02	Control building door and frame, grey paint		2023/02/07 10:45
PB-03	Control building ceiling, grey paint		2023/02/07 11:00
PB-04	Control building wood floor, grey paint		2023/02/07 11:15
PB-05	Control building exterior walls, white paint		2023/02/07 11:30

Method of Shipment:		Sample Condition Upon Receipt	
Relinquished by: Angela Mason AM	Date/Time: 2023/02/07	Received by: LAB 55 / NC	Date/Time: 2/9/23 @ 9:52 Am
Relinquished by:	Date/Time	Received by:	Date/Time

Controlled Document - COC-25 Lead R16 4/19/2021

*6010C Available Upon Request

Purolator: 339640437361C

☑ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

OrderID: 552301880

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Lead Chain of Custody

EMSL Order Number / Lab Use Only

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: CinnaminsonLeadLab@emsl co

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
PB-06	Control building exterior roof flashing, grey paint		2023/02/07 12:00

RECEIVED
EMSL CANADA, INC.
TORONTO
2023 FEB 8 A 9:52

Method of Shipment:		Sample Condition Upon Receipt.	
Relinquished by: Angela Mason	Date/Time: 2023/02/07	Received by.	Date/Time
Relinquished by:	Date/Time:	Received by.	Date/Time

Controlled Document - COC-25 Lead R16 4/19/2021

☑ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

R.J. Burnside & Associates Limited

GEOTECHNICAL INVESTIGATION

PROPOSED STANDPIPE REPLACEMENT
199 JOHN STREET EAST
WINGHAM, ONTARIO

CMT Project 22-219.R01

Prepared For:

R.J. Burnside & Associates Limited

August 17, 2022

CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Tel: 519-699-5775
Fax: 519-699-4664
www.cmtinc.net

August 17, 2022 22-219.R01

R.J. Burnside & Associates Limited
449 Josephine Street
P.O. Box 10
Wingham, Ontario
N0G2W0

Attention: Mr. Gary Voorthuyzen, E.I.T.

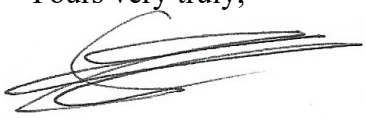
Dear Sir:

Re: Geotechnical Investigation
Proposed Standpipe Replacement
199 John Street East
Wingham, Ontario

As requested, CMT Engineering Inc. conducted a geotechnical investigation at the above-referenced site, and we are pleased to present the enclosed report.

We trust that this information meets your present requirements and we thank you for allowing us to undertake this project. Should you have any questions, please do not hesitate to contact our office.

Yours very truly,



Shawn Wheatley, M.Eng.

ks

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 EXISTING SITE CONDITIONS 1

3.0 FIELD AND LABORATORY PROCEDURES 1

4.0 SUBSOIL CONDITIONS 2

4.1. Topsoil 3
4.2. Silt Fill 3
4.3. Sand and Silt Till 3
4.4. Sandy Silt Till 3
4.5. Groundwater 3

5.0 DISCUSSION AND RECOMMENDATIONS 4

5.1. Serviceability and Ultimate Limit Pressure 4
5.2. Foundation Alternatives 6
5.2.1. Helical Piles 6
5.2.2. Driven Piles 7
5.2.3. Caissons 7
5.3. Seismic Site Classification 8
5.4. Soil Design Parameters 8
5.5. Site Preparation 9
5.5.1. Fill/Unsuitable Soil Removal 10
5.5.2. Structure Demolition 10
5.5.3. Removal/Relocation of Existing Services 10
5.5.4. Site Grading 10
5.6. Slab-on-Grade/Modulus of Subgrade Reaction 12
5.7. Excavations 13
5.8. Construction Dewatering Considerations 13
5.9. Service Pipe Bedding 14
5.10. Backfilling 15
5.11. Pavement Design/Drainage 15
5.12 Excess Soil Management 18
5.12.1. Chemical Testing was NOT Undertaken 18
5.12.2. TCLP Requirement 19

6.0 SITE INSPECTIONS 19

7.0 LIMITATIONS OF THE INVESTIGATION 20

Drawing 1 - Location Map

Drawing 2 - Site Plan View Showing Borehole Location

Appendix A - Borehole Log

Appendix B - Grain Size Analyses

1.0 INTRODUCTION

The services of CMT Engineering Inc. (CMT Inc.) were retained by Mr. Gary Voorthuyzen, E.I.T. of R.J. Burnside & Associates Limited, to conduct a geotechnical investigation for the proposed standpipe replacement to be constructed at 199 John Street East, in Wingham, Ontario. The location of the site is provided on Drawing 1.

It is understood that the existing standpipe has reached the end of its useful life and is to be replaced with a standpipe with an approximate capacity of 2,600 m^3, an approximate diameter of 10.2 m (33.5 ft), and an approximate height of 35.2 m (115.5 ft). As part of the construction of the new standpipe, a new booster pumping station is to be constructed with reinforced concrete block and pre-engineered wood trusses. It is understood that the proposed booster pumping station is to be constructed on conventional shallow foundations.

The purpose of the geotechnical investigation was to assess the existing soil and groundwater conditions encountered in the borehole. Included in the assessment are the soil classification and groundwater observations, as well as comments and recommendations regarding geotechnical resistance (bearing capacity); serviceability limit states (anticipated settlement); recommended founding elevations; site classification for seismic site response; dewatering considerations; recommendations for site grading, site servicing, excavations and backfilling; soil design properties; laboratory analysis; and a summary of the results.

2.0 EXISTING SITE CONDITIONS

The site currently comprises the existing standpipe and pumping station. The land surrounding the existing standpipe and pumping station is vacant and grassed, and slopes gently away from the existing standpipe on all sides. The site is bounded by John Street East to the south, a parking lot to the west, and residential properties to the north and east. The location of the proposed site is shown on Drawing 1.

3.0 FIELD AND LABORATORY PROCEDURES

Prior to the commencement of the field drilling program, underground service locates were organized by CMT Inc. to ensure that underground utilities would not be damaged.

The field investigation was conducted on May 16, 2022, and comprised the advancement of one (1) borehole (referenced as Borehole 1), utilizing a Geoprobe 7822DT drillrig operated by employees of CMT Drilling Inc. The borehole was advanced approximately 7.0 m west of the centre of the existing standpipe, to a depth of approximately 14.33 m (47.0 ft) below the existing ground surface elevation.

Standard penetration testing (SPT) and sampling was carried out in the borehole using 38 mm inside diameter split spoon sampling equipment and an automatic hammer, in accordance with ASTM D 1586 "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils". SPT soil sampling was generally conducted at 0.76 m (2.5 ft) intervals to approximately 3.0 m (10.0 ft) and every 1.52 m (5.0 ft) thereafter to borehole termination. Technical staff from CMT Inc. observed the drilling operation and collected and logged the recovered soil samples. A small portion of each sample was placed in a sealed, marked jar for moisture content determinations.

Two (2) representative soil samples from the following depths were submitted to the CMT Inc. laboratory in St. Clements, Ontario for grain size analyses:

- Borehole 1 – approximate depth 3.05 m to 3.66 m (10.0 ft to 12 ft).
- Borehole 1 – approximate depth 13.72 m to 14.33 m (45.0 ft to 47.0 ft).

The borehole log is provided in Appendix A and the grain size analyses are provided in Appendix B.

CMT Inc. may be contacted for additional laboratory testing on previously obtained samples (such as grain size analyses) should it be required. Samples are typically held for three months, unless other arrangements are made.

CMT Inc. surveyed the ground surface elevation at the borehole location (using laser survey equipment) on June 16, 2022. The south door of the existing pumping shed on the property was utilized as a temporary benchmark with an assumed elevation of 100.0 m. The ground surface elevation at the location of Borehole 1 was determined to be approximately 100.29 m. The locations of the borehole and the temporary benchmark are shown on Drawing 2.

4.0 SUBSOIL CONDITIONS

The soils encountered in the borehole are described briefly below with a more detailed stratigraphic description provided on the borehole log in Appendix A. The following paragraphs have been simplified into terms of major soil strata. The soil boundaries indicated have been inferred from non-continuous samples and observations of sampling and drilling resistance and typically represent transitions from one soil type to another rather than exact planes of geological change. Further, the subsurface conditions are assumed to be consistent between the borehole location and the location of the proposed tower.

4.1. Topsoil

Loose, dark brown, silty organic topsoil was encountered at the surface of Borehole 1. The topsoil was observed to be approximately 180 mm in thickness. The topsoil was considered to be moist. The thickness of the topsoil is anticipated to vary throughout the site. Materials designated as topsoil in this report were classified based on material and textural evidence.

4.2. Silt Fill

Dark brown silt fill with some sand, trace gravel and clay, as well as trace organics was encountered underlying the topsoil in Borehole 1. The silt fill was considered to be loose, with an SPT N-value of 7 blows per 0.30 m. The silt fill was considered to be moist, with a moisture content of about 11.8%.

4.3. Sand and Silt Till

Light brown sand and silt till with some gravel and trace clay was encountered underlying the silt fill in Borehole 1. The sand and silt till was considered to be loose to compact, with SPT N-values ranging from 7 to 26 blows per 0.30 m (average 16 blows per 0.30 m). The sand and silt till was considered to be moist to wet, with moisture contents ranging from about 7.6% to 12.0% (average 9.1%).

4.4. Sandy Silt Till

Grey sandy silt till with some gravel and trace clay was encountered underlying the sand and silt till in Borehole 1. The sandy silt till was considered to be dense to very dense, with SPT N-values ranging from 48 to in excess of 100 blows per 0.30 m (average 77 blows per 0.30 m). The sandy silt till was considered to be moist, with moisture contents ranging from about 5.9% to 11.6% (average 8.8%).

4.5. Groundwater

Accumulated groundwater and wet soil conditions were encountered upon completion of the borehole conducted as part of this investigation. Wet soils were noted within the sand and silt till soils between approximately 6.10 m and 7.72 m depth. It should be noted that the relatively dense and fine-grained sandy silt till soils have the potential to create perched water conditions in any overlying soils, as was observed during the borehole investigation. Groundwater conditions (particularly perched water) are generally

dependent on the amount of precipitation, control of surface water, as well as the time of year, and can fluctuate significantly in elevation and volume.

Recommendations with respect to dewatering conditions are provided in Section 5.8 of this report.

5.0 DISCUSSION AND RECOMMENDATIONS

This section of the report provides CMT Inc.'s interpretation of the factual geotechnical data obtained during the investigation and is intended for the guidance of the owner and design engineer. Where comments are made on construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the work should make their own independent interpretation of the factual subsurface information provided as it affects their proposed construction means and methods, equipment selection, scheduling, pricing, and the like.

Utilizing the information gathered during the geotechnical investigation and assuming that the borehole information is representative of the subsoil conditions throughout the site, the following comments and recommendations are provided.

5.1. Serviceability and Ultimate Limit Pressure

Based on the information obtained from the borehole, the following table provides a summary of the estimated geotechnical reaction at the Serviceability Limit States (SLS) and the factored geotechnical resistance at the Ultimate Limit States (ULS) pressures at the various elevations, including soil types:

Borehole No.	Ground Surface Elevation (m)	SLS kPa (psf)	ULS kPa (psf)	Estimated Highest Founding Elevation (m)	Depth to Highest Founding Elevation (m)	Soil Type
BH1	100.29	75 (1,500) 150 (3,000) 250 (5,000) 300 (6,000)	110 (2,200) 225 (4,500) 375 (7,500) 425 (8,500)	98.69 to 97.24 97.24 to 95.72 95.72 to 92.57 92.57 to 85.96 (termination)	1.60 3.05 4.57 7.72	Sand and Silt Till Sand and Silt Till Sandy Silt Till

Based on the bearing capacities and elevations provided in the table above, soils suitable of supporting conventional foundations designed with a minimum bearing capacity of 75 kPa (1,500 psf) at SLS and 110 kPa (2,200 psf) at ULS were encountered underlying the topsoil and fill, at a depth of approximately 1.60 m below existing ground surface. Soils suitable of supporting conventional foundations designed with a minimum bearing capacity of 150 kPa (3,000 psf) at SLS and 225 kPa (4,500 psf) at ULS were encountered underlying the loose, upper sand and silt till, at a depth of approximately 3.05 m below existing ground surface. Soils suitable of supporting conventional foundations designed with a minimum bearing capacity of 250 kPa (5,000 psf) at SLS and 375 kPa (7,500 psf) at ULS were encountered within the compact, sand and silt till, at a depth of approximately 4.57 m below existing ground surface. Soils suitable of supporting conventional foundations designed with a minimum bearing capacity of 250 kPa (5,000 psf) at SLS and 375 kPa (7,500 psf) at ULS were encountered within the dense to very dense, sandy silt till, at a depth of approximately 7.72 m below existing ground surface.

With respect to the Serviceability Limit State (SLS), the total and differential footing settlements are not expected to exceed the generally acceptable limits of 25 mm (1") and 19 mm (3/4") respectively.

Should foundations be designed to be constructed at elevations higher than the elevations provided in the table above, then structural fill could be utilized to achieve the design grades for the proposed foundations. The serviceability limit pressure structural fill consisting of good quality granular structural fill (Granular 'B' – Type I, II or III) placed and compacted in accordance with Section 5.5.4 of this report and constructed on approved competent native soil is estimated to be at least 150 kPa (3,000 psf) at SLS and 225 kPa (4,500 psf) at ULS. Alternatively, lean mix concrete fill could be utilized, or footings could be stepped down to bear on approved undisturbed founding soils.

Footings may be placed at a higher elevation relative to another footing provided that the slope between the outside face of the footings is separated by a minimum slope of 10 horizontal to 7 vertical (10H:7V) with an imaginary line projected from the underside of the footings.

All exterior footings and foundations must be provided with a minimum of 1.2 m of soil cover or equivalent thermal insulation (sufficient thermal insulation is required to protect all footings and slab-on-grades during construction until such a time that the structure is heated) in order to provide protection from frost action.

5.2. Foundation Alternatives

If conventional foundations are not suitable for the support the proposed standpipe replacement, then a deep foundation system such as helical piles, driven piles or caissons, may be a more suitable/cost-effective option. If a deep foundation system is required, it would be recommended to contact a deep foundation supplier/installer to develop a site-specific foundation plan. Estimated soil design parameters for use in the design of deep foundations can be found in Section 5.4 of this report. The following are provided as general recommendations should deep foundations be required for this site.

5.2.1. Helical Piles

The soils encountered at the site are considered feasible for the support of helical pile foundations. The helical piles will need to be advanced through the upper fill soils and loose native soils, and into the underlying dense to very dense soils. Dense to very dense sandy silt till was encountered in the borehole below a depth of approximately 7.72 m below the existing ground surface. The majority of the resistance of the helical piles will come from end bearing resistance, and it would be recommended to ignore skin friction, within any saturated zones. No cobbles, boulders or fill materials which may hinder the installation of helical piles were encountered in the borehole advanced on the subject site.

It should be noted that helical piles can be installed with many different configurations based on the intended application. It would be prudent to contact a specialized helical pile designer/installer for project specific helical pile designs.

When installing helical piles, the required load value is typically converted to a torque value based on the specific equipment used for installation. The conversion factors and equipment specifications are typically provided by the contractor/installer.

A qualified structural engineer should be retained to design any grade beams, pile cap foundations and/or structural slab for the helical pile system, using the estimated soil design parameters outlined in Section 5.4 of this report.

It is recommended that regular inspections by qualified personnel be conducted during helical pile installation in order to confirm the founding strata and installation torque values.

5.2.2. Driven Piles

The soils encountered at the site are considered feasible for the support of driven steel (H-pile, Pipe pile, etc.) foundations. The piles are recommended to be driven through the upper fill soils and into the underlying dense to very dense native soils. Dense to very dense sandy silt till was encountered in the borehole below a depth of approximately 7.72 m below the existing ground surface. It may be required to penetrate a significant distance into the compact sand and silt till soils in order to achieve the required pile capacity. No cobbles, boulders or fill materials which may hinder the installation of driven piles were encountered in the borehole advanced on the subject site.

The majority of the resistance strength of the piles will come from end bearing resistance, however skin friction should be ignored within any saturated soil zones. The bearing resistances for the soils encountered on the subject site which can be used in the design are provided in Section 5.1 of this report. The structural resistance of the pile must be checked by the structural engineer.

Pile drive shoes should be installed on each pile in accordance with all current OPSD standards. Piles must be driven a suitable depth to achieve the required resistance and the pile capacity must be verified in the field by the use of the Hiley formula (Standard Structural Drawing SS-103-11) or Pile Driving Analyzer (PDA). It is recommended that a pile driving log be kept for the entire driving of the pile. Normal tolerances during pile driving of 2% plumbness and 75 mm in location should not be exceeded.

5.2.3. Caissons

The soils encountered at the site are generally considered feasible for the support of drilled caisson foundations.

Given the native soils encountered in the borehole, it is expected that caisson installation will require temporary lining throughout the installation. This is to prevent collapse of the potentially wet native sand and silt till soils into the caisson excavation as well as to seal off the inflow of any groundwater. Where workers have to enter the caisson for inspection or cleaning, a liner must be provided. A pump should be present on-site to remove any water which may accumulate at the base of the caisson prior to concrete placement. Final cleaning of the caisson base and installation of the reinforcing steel cage should not be carried out unless a concrete truck is present on-site ready to discharge. Concrete must be placed from the bottom up via the use of a tremie pipe, to avoid segregation of the concrete mix.

If a caisson foundation is utilized, it is recommended that the caisson be terminated within the dense to very dense sandy silt till soils, encountered in the borehole at below a depth of approximately 7.72 m, however, it is expected that the caisson may need to extend to greater depths in order to provide the required resistance to the overturning forces.

Based on the soils encountered in the geotechnical investigation, waterbearing layers are expected to be encountered in the native sand and silt till layers, encountered in the borehole between approximately 6.10 m and 7.72 m. Any water inflow should be able to be removed by conventional pumping techniques. It is also not anticipated that quickening or heaving of the base of the excavation will occur, and therefore it is not anticipated that any special installation methods involving the use of a bentonite slurry to balance the hydrostatic pressure will be required. An experienced deep foundations contractor should be employed for this installation and should review the information presented in this report prior to determining the caisson installation methodology.

5.3. Seismic Site Classification

The site classification for seismic response in Table 4.1.8.4 of the 2012 Ontario Building Code relates to the average properties of the upper 30.0 m of strata. The information obtained in the geotechnical field investigation was gathered from the upper 14.33 m of strata. Based on the information gathered in the geotechnical field investigation, the site classification for seismic site response would be considered Site Class D (stiff soils) for structures founded on the native soils at the recommended founding elevations provided in Section 5.1 of this report. For foundations constructed on structural fill, placed in accordance with Section 5.5.4 of this report, the site classification for seismic site response would be considered Site Class D (stiff soil). The structural engineer responsible for the design of the structure should review the earthquake loads and effects.

5.4. Soil Design Parameters

The following table provides the estimated soil design parameters for imported granular fill, as well as the existing native soils encountered on-site. It should be noted that earth pressure coefficients (Ka, Kp, Ko) provided are for flat ground surface conditions and will differ for areas with slopes or embankments.

The estimated soil design parameters can be utilized for the design of foundations/deep foundations, as required:

Soil Type	Soil Density (kg/m^3)	Friction Angle (Degree)	Coefficient of Active Pressure (K_a)	Coefficient of Passive Pressure (K_p)	Coefficient of At-Rest Pressure (K_o)	Coefficient of Internal Friction (μ)	Cohesion (kPa)
Imported Granular 'A'/ Granular 'B' (OPSS 1010)	2,100	34°	0.28	3.54	0.44	0.67	0
Sand and Silt Till	1,850	32°	0.31	3.25	0.47	0.41	0
Sandy Silt Till	1,900	32°	0.31	3.25	0.47	0.41	0

Based on the soils encountered on the subject site and Tables 18.1 and 18.2 from the Canadian Foundation Engineering Manual (4th Edition), the estimated combined shaft resistance factor (β) and toe bearing capacity (N_t) for the soils encountered on the subject site are provided below:

Combined Shaft Resistance Factor (β)

Soil Type	Cast-in-Place Caissons	Driven Piles
Sand and Silt Till	0.40	0.60
Sandy Silt Till	0.40	0.60

Toe Bearing Capacity (N_t)

Soil Type	Cast-in-Place Caissons	Driven Piles
Sand and Silt Till	50	100
Sandy Silt Till	50	100

5.5. Site Preparation

The site preparation for the proposed standpipe replacement is anticipated to include removal of unsuitable soils, removal or relocation of existing services, demolition of the existing structures, followed by the placement of structural fill (as required) and site grading to achieve proposed grades.

5.5.1. Fill/Unsuitable Soil Removal

All existing fill, as well as any native soils that contain topsoil or other deleterious materials, have inadequate bearing capacity, or have been disturbed by past site uses and/or construction processes and are deemed unsuitable to support footings, must be subexcavated from within the footprint of the proposed standpipe replacement to expose approved competent subgrade soils.

5.5.2. Structure Demolition

It is expected that the existing structures on the subject site will be demolished/removed. All existing foundation walls, footings, slab-on-grade and other construction materials as well as all associated backfill material must be removed from areas of the demolished structures. The excavations should be inspected and backfilled according to the procedures outlined in Section 5.5.4 of this report. It is recommended that imported sand and gravel (OPSS 1010 Granular 'B' or an approved alternative) be placed as structural fill to backfill the building demolition area.

5.5.3. Removal/Relocation of Existing Services

All existing underground services (if present) that may be located within the proposed building envelope and/or parking areas and driveways should be removed/relocated. If left in place, the location of existing services must be reviewed to ensure that they do not conflict with proposed foundation locations. All terminated pipes must be completely sealed with watertight mechanical covers, concrete or grout at termination points to prevent the migration of soils into pipe voids which can result in potential settlement. All existing trench backfill material associated with any underground services must be subexcavated and the subsequent excavation should be backfilled with approved soils placed in accordance with Section 5.5.4 of this report.

5.5.4. Site Grading

Following the stripping of topsoil and removal of unsuitable fill materials or native soils, the exposed subgrade must be proof-rolled, and any soft or unstable areas must be subexcavated and replaced with approved fill materials.

Any fill materials required to achieve the design site grades should be placed according to the following procedures:

- Should the native subgrade soils at the design founding elevation comprise wet or saturated soils, then a granular drainage layer constructed in accordance with Section 9.14.4 of the current Ontario Building Code (OBC) may be required. Alternatively, a lean mix concrete mud mat may be placed overlying the subgrade soils to provide a stable base;

- Prior to placement of any structural fill, the subgrade for the proposed fill area must be prepared large enough to accommodate a 1:1 slope commencing a distance of 1.0 m beyond the outside edge of the proposed foundation down to the approved competent founding soils;

- Soils approved for use as structural fill must be placed in loose lifts not exceeding 0.3 m (12") in depth for granular soils (recommended fill materials) and 0.2 m (8") in depth for silts and clays, or the capacity of the compactor (whichever is less);

- Approved imported granular fill materials (OPSS 1010 Type II or Type III Granular 'B' recommended for this application) can be compacted utilizing adequate heavy vibratory smooth drum or padfoot compaction equipment;

- Approved fill materials must be at suitable moisture contents to achieve the specified compaction. Soil moisture will also be dependent on weather conditions at the time of construction. Granular soils may require the addition of water in order to achieve the specified compaction;

- Approved bulk fill (foundation backfill, bulk fill under slab-on-grades that will not support footings or heavy point loading, bulk fill for driveways and parking areas) must be compacted to a minimum 95% SPMDD.

It should also be noted that the native soils encountered in Borehole 1 were observed to become dense to very dense with depth. It is imperative that if the dense to very dense soils are utilized as fill, the material must be broken down (pulverized) to minimize void space and reduce the potential for settlement. Backfilling utilizing this material must be performed in thin lifts with considerable compactive effort applied, thereby reducing the void space, and minimizing long-term settlement.

A flat, stable area around the proposed footprint of the standpipe replacement should be prepared for access and support of heavy machinery needed for the tower installation. If required, the contractors carrying out the installation of the standpipe and/or deep foundations should determine the necessary parameters for site access and equipment stabilization prior to installation.

5.6. Slab-on-Grade/Modulus of Subgrade Reaction

Prior to the placement of the granular base for any slab-on-grade construction, the subgrade should be proof-rolled. Any soft or weak zones, as well as any potential unsuitable fill in the subgrade, should be subexcavated and backfilled with approved fill materials (see Sections 5.5.4 and 5.10 of this report).

The following table provides the estimated modulus of subgrade reaction (k) for imported granular fill, as well as the native soils encountered on-site:

Soil Type	Modulus of Subgrade Reaction (k)
Sand and Silt Till	61,000 kN/m^3 (225 lb/in^3)
Sandy Silt Till	75,000 kN/m^3 (275 lb/in^3)
Imported Sand and Gravel (OPSS 1010)	81,000 kN/m^3 (300 lb/in^3)

In dry conditions, any slab-on-grades can be founded on a minimum thickness of 150 mm (6") of an OPSS 1010 Granular 'A' and compacted to 100% SPMDD. Alternatively (particularly in wet conditions), 150 mm (6") of 19 mm clear crushed stone (OPSS 1004) could be used. Utilizing clear crushed stone for the slab-on-grade base can assist in providing a moisture barrier by reducing the potential for capillary rise of moisture from the subgrade soils. Compactive effort is required to consolidate the clear stone. The 19 mm clear crushed stone should meet the physical property and gradation requirements of OPSS 1004.

It is recommended that areas of extensive exterior slab-on-grade (sidewalks, accessibility ramps and exterior stairs) be constructed with a Granular 'B' subbase (450 mm) and a Granular 'A' base (150 mm), as well as incorporating subdrains, to provide rapid drainage and reduce the effects of frost heaving. Alternatively, a structural frost slab could be designed and constructed, or sufficient thermal insulation could be provided at all door entrances and areas of barrier-free access.

5.7. Excavations

All excavations must be carried out in accordance with Ontario Regulation 213/91 (Reg 213/91) of the Occupational Health and Safety Act and Regulations for Construction Projects.

Type 3 Soils - In general, the existing fill and native soils encountered in the borehole, in a drained state (not wet or saturated), would be classified as Type 3 soils under Reg 213/91. The Type 3 soils must be sloped from the bottom of the excavation at a minimum gradient of 1 horizontal to 1 vertical. Soils underlain by Type 4 soils that are exposed in the excavation must be treated accordingly as Type 4 soils (see below). All saturated soils encountered must be treated as Type 4 soils, as described below.

Type 4 Soils - In general, any wet to saturated soils would be classified as Type 4 soils under Reg 213/91. Type 4 soils must be sloped from the bottom of the excavation at a minimum gradient of 3 horizontal to 1 vertical.

If it is not practical to excavate according to the above requirements, then a trench support system (designed in accordance with the Ontario Health and Safety Act Regulations) may be utilized. When using a temporary trench support system consisting of trench boxes to reduce the lateral extent of the excavations, it should be noted that the support system is intended primarily to protect workers as opposed to controlling lateral soil movement. Any voids between the excavation walls and the support system should be immediately filled to reduce the potential for loss of ground and to provide support to existing adjacent utilities and structures, and it is recommended that the excavation be carried out in short sections, with the support system installed immediately upon excavation completion. If the excavation is not a trench, no worker should be required to be closer to a wall of the excavation than the height of the excavated wall.

5.8. Construction Dewatering Considerations

Accumulated groundwater was observed in the borehole conducted as a part of this investigation and wet soil conditions were encountered at approximately 6.1 m depth within the sand and silt till. It should be noted that the fine-grained sandy silt till soils have the potential to create perched water conditions in any overlying soils. Groundwater conditions (particularly perched water) are generally dependent on the amount of precipitation, control of surface water, as well as the time of year, and can fluctuate significantly in elevation and volume. As such, provisions for site dewatering should be part of the site development and construction process.

Seepage control requirements and groundwater conditions during construction are generally dependent on the area of work on the site, amount of precipitation, and the control of surface water. As required, seepage should generally be adequately controlled

using conventional construction dewatering techniques such as pumping from sump pits. However, if heavy seepage occurs, it may be necessary to increase the number of pumps during construction.

Dewatering should be performed in accordance with OPSS 517, and the control of water must be in accordance with OPSS 518. It is the responsibility of the contractor to propose a suitable dewatering system based on the groundwater elevation at the time of construction. Collected water should discharge a sufficient distance away from the excavation to prevent re-entry. Sediment control measures must be installed at the discharge point of the dewatering system to avoid any potential adverse impacts on the environment.

5.9. Service Pipe Bedding

The native soils encountered in the geotechnical investigation are generally considered suitable for indirect support of the site service pipes. Should instability due to saturated soil conditions be encountered, it may be necessary to increase the thickness of the granular base and/or utilize 19 mm clear stone to create an adequate supporting base for the service pipes, and/or manholes. Pipe embedment, cover and backfill for both flexible and rigid pipes should be in accordance with all current and applicable OPSD, OPSS and OBC standards and guidelines and as follows:

Flexible Pipes - The pipe bedding should be shaped to receive the bottom of the pipe. If necessary, pipe culvert frost treatment should be undertaken in accordance with OPSD-803.031. The trench excavations should be symmetrical with respect to the centreline of the pipe. The granular material placed under the haunches of the pipe must be compacted to 100% SPMDD prior to the continued placement and compaction of the embedment material. The homogeneous granular material used for embedment should be placed and compacted uniformly around the pipe. Should wet conditions be encountered at the base of the trench, then the pipe bedding should consist of 19 mm clear stone (meeting OPS Specifications) wrapped completely in a geotextile fabric such as Terrafix 270 or equivalent.

Rigid Pipes - In general, the pipe installation recommendations for rigid pipes are the same as those for flexible pipes, except that the minimum bedding depth below a rigid pipe should be 0.15*D* (where *D* is the pipe diameter). In no case should this dimension be less than 150 mm or greater than 300 mm.

Any service pipes that are nor provided with sufficient frost coverage must be protected with the necessary equivalent thermal insulation. The general contractor is responsible to protect service piping from damage by heavy equipment.

5.10. Backfilling

The native soils (non-organic) are generally considered suitable for reuse as backfill; however, any wet to saturated soils will require significant air-drying in order to achieve the specified field compaction. Air-drying cannot typically be achieved during winter construction; therefore, depending on the time of year that construction takes place, it may be more feasible to utilize an imported granular fill for this project.

Backfilling operations should be carried out with the following minimum requirements:

- Adequate heavy smooth drum or padfoot vibratory compaction equipment (suited to soil type) should be used for the compaction and to break down any large blocky pieces of soil;

- Loose lift thicknesses should not exceed 0.3 m (12") for granular soils or 0.2 m (8") for clay and silt soils or the capacity of the compactor (whichever is less);

- The soils must be at suitable moisture contents to achieve compaction to a minimum 95% SPMDD in non-structural bulk fill areas. Service trenches excavated in the zone of influence of the footings for structures must be compacted to a minimum of 100% SPMDD;

- It is recommended that inspection and testing be carried out during construction to confirm backfill quality, thickness and to ensure that compaction requirements are achieved;

- Service trench backfill materials may consist of approved excavated soils with no particles greater than 100 mm and no topsoil or other deleterious materials;

- If construction operations are undertaken in the winter, strict consideration should be given to the condition of the backfill material to make certain that frozen material is not used.

It should be noted that the existing native soils were observed to become very dense with depth. It is imperative that if the very dense soils are utilized for backfilling, the material must be broken down (pulverized) to minimize voids and reduce the potential for settlement.

5.11. Pavement Design/Drainage

Any existing asphalt, concrete, topsoil, vegetation (including tree root structures as well as any loose soils that are typically associated with root structures), fill, and loose/soft native soils must be stripped and subexcavated from within the proposed driveway. At a

minimum, any existing buried topsoil or fill which includes intermixed organic material should be subexcavated from the driveway to prevent problems associated with frost heaving such as loss of structural integrity and frost boils. Thorough inspection and proof-rolling will be required at the time of construction to assess the existing fill to ensure there is no buried topsoil, asphalt, or other deleterious materials within the subgrade. Remedial action will also be required to further consolidate the existing fill and/or loose/soft native soils if it is decided to leave them in place. It would be expected that significant air-drying may be required in order to achieve the design compaction. If the existing fill is left in place, provisions for the alterations to the design of the pavement structure such as increasing the thickness of the Granular 'B' base, installing a reinforcing geotextile and/or installing biaxial geogrids, should be included in the tender documents. Review of the subgrade and potential changes to the design of the pavement structure, as required, will have to be addressed at the time of construction.

Prior to placement of the granular base, the subgrade soils must be proof-rolled and any soft or unstable areas should be subexcavated and replaced with suitable drier materials. The subgrade should be graded smooth (free of depressions) and properly crowned to ensure positive drainage, with a minimum grade of 3% toward drainage outlet or edge of asphalt (provided collection and proper gravity drainage to a suitable outlet is provided). When service pipes are installed, pipe bedding and backfilling should be undertaken as indicated in Sections 5.9 and 5.10 of this report.

Rapid drainage of the pavement structure is critical to ensure long-term performance and to help minimize frost heave. The requirement for subdrains will be dependent on the composition of the prepared pavement subgrade soils. Based on the information obtained from the borehole, it is likely that the subgrade soils will consist of more cohesive frost-susceptible soils, and as such, it is recommended to install subdrains (provided gravity drainage to a suitable outlet can be provided). It is recommended to install minimum 100 mm diameter perforated subdrains to collect and redirect water beneath the pavement surface. Subdrains should be designed and installed in accordance with OPSS 405 and OPSD 216.021. If Granular 'A' bedding (OPSS 1010) is utilized, the subdrains should be equipped with a factory installed filter sock. If 19 mm clear stone (OPSS 1004) is utilized as bedding for the subdrain, then the bedding must be wrapped completely with geotextile filter fabric such as Terrafix 270R (or equivalent). Installation of rigid subdrains allows for better grade control and less potential for damage during installation; however, it would be expected that there would be higher cost implications associated with the installation of rigid subdrains over flexible subdrains. Positive drainage through grade control of subdrains is critical, as improperly installed subdrains can turn drainage systems into reservoirs, which can fuel frost action. The subdrains will hasten the removal of water, thereby reducing the risk and effects of frost heaving and load transfer in saturated conditions. It is suggested that, at a minimum, subdrains be installed through all low areas in the driveway to prevent water from entering the granular subbase. The subdrains should be installed in a 0.3 m (1.0 ft) by 0.3 m (1.0 ft) trench in the subgrade and bedded approximately 50 mm (2") above the bottom of the

trench. The subgrade must be prepared with positive drainage to the subdrains and the subdrains must be installed with positive drainage into a catch basin structure or other suitable outlet.

The native subgrade soils encountered in the borehole are generally sensitive to change in moisture content and can become loose or soft if the soils are subject to inclement weather and seepage or severe drying. Furthermore, the subgrade soils could be easily disturbed if traveled on during construction. As such, where this material will be exposed, it is recommended that the granular subbase be placed immediately upon completion of the subgrade preparation to protect the integrity of the subgrade soils.

It is expected that the driveway will experience light traffic (personal vehicles) and heavy traffic (delivery trucks, as well as maintenance and emergency vehicles). Based on the anticipated loading and frost-susceptibility of the soils, the following pavement design is provided:

Material	**Recommended Thickness For New Pavement**	
	Light Traffic	Heavy Traffic
Asphaltic Concrete	HL3 - 40 mm (1.5") HL4 or HL8 - 50 mm (2.0")	HL3 - 50 mm (2.0") HL4 or HL8 - 60 mm (2.5")
Granular 'A' Base (OPSS 1010)	150 mm (6.0")	150 mm (6.0")
Granular 'B' Subbase (OPSS 1010)	400 mm (16.0")	450 mm (18.0")

Should wet to saturated conditions be encountered during construction, site assessments may be required at the time of construction to determine what options can be undertaken to construct a stable driveway and parking lot base. These options may include subexcavation and increasing the thickness of the Granular 'B' subbase, the use of reinforcing geotextile and/or geogrid, or a combination of all. As such, it is recommended that provisions for subexcavation and disposal of wet soils, importing and placing additional Granular 'B' (OPSS 1010), as well as supply and placement of a reinforcing geotextile (Terrafix 270R or equivalent) and geogrid (Tensar BX1200 or equivalent) should be included in the tender documents.

The granular base and subbase materials must conform to the physical property and gradation requirements of OPSS 1010 and must be compacted to 100% SPMDD. Asphaltic concrete should be supplied, placed and compacted to a minimum 92.0% Marshall maximum relative density, in accordance with OPSS 1150 and OPSS 310.

Construction joints in the surface asphalt must be offset a minimum of 150 mm to 300 mm (6" to 12") from construction joints in the binder asphalt so that longitudinal joints do not coincide.

Where new asphalt is joined into existing asphalt, it is recommended that the existing asphalt be sawcut in a straight line prior to being milled to a depth of 40 mm and a width of 150 mm as per OPSD 509.010. It is recommended that a tackcoat be applied to the edge and surface of all milled asphalt prior to placement of new asphalt in conformance with OPSS 308. Frost tapers must be constructed at any changes from light traffic to heavy traffic areas.

The pavement should be designed to ensure that water will not pond on the pavement surface. If the surface asphalt is not placed within a reasonable time following placement of the binder asphalt, it is recommended that the catch basin lids are set at a lower elevation or apertures provided to allow surface water to drain into the catch basins and not accumulate around the catch basins. The strength of the pavement structure relies on all of the components to be in place in order to provide the design strength; therefore, it is strongly recommended that the surface asphalt be placed shortly after placement of the binder asphalt so as to avoid undue stress on the binder asphalt by not having the complete pavement structure in place.

It should be noted that, currently, asphalt mixes tend to be more flexible and, as such, there is a tendency for damage to occur from vehicles turning their steering wheels or applying excessive brake pressure. The damage can occur from both passenger vehicles as well as large vehicles. The condition is further intensified during hot weather.

It is recommended that any areas of extensive exterior slab-on-grade (sidewalks, accessibility ramps and exterior stairs) be constructed with a Granular 'B' subbase (450 mm) and a Granular 'A' base (150 mm), as well as incorporating subdrains, to provide rapid drainage and reduce the effects of frost heaving. Alternatively, a structural frost slab or thermal insulation could be implemented.

5.12 Excess Soil Management

5.12.1. Chemical Testing was NOT Undertaken

Generally, if surplus soils are to be exported off-site, it may be necessary to perform chemical analysis of the soils. Chemical analysis was not undertaken as part of this geotechnical investigation.

5.12.2. TCLP Requirement

If soils are transported to a landfill facility, additional chemical testing in accordance with Ontario Regulation 347, Schedule 4, as amended to Ontario Regulation 558/00, dated March 2001, Toxicity Characteristic Leaching Procedure (TCLP) may be required.

When transporting soils off-site, the following is recommended:

- All chemical analyses and environmental assessment reports must be fully disclosed to the receiving site owners/authorities, who must agree to receive the material.
- An environmental consultant must confirm the land use at the receiving site is compatible to receive the material.
- An environmental consultant must monitor the transportation and placement of the materials to ensure that the material is placed appropriately at the pre-approved site.
- The excess materials may not be transported to a site that has previously had a Record of Site Condition (RSC) filed, unless the material meets the criteria outlined in the RSC.

It should be noted that landfill sites will generally only accept laboratory test results that have been completed within 30 days of exporting. Therefore, it is recommended that provisions for chemical analysis be included in the tender documents. It should also be noted that the laboratory testing generally takes five (5) working days to process with a regular turnaround time.

6.0 SITE INSPECTIONS

Qualified geotechnical personnel should supervise the installation of the floating raft slab and provide excavation inspections as well as compaction testing for structural filling, site grading and site servicing. This will ensure that footings are founded in the proper strata and that proper material and techniques are used and the specified compaction is achieved. CMT Engineering Inc. would be pleased to review the design drawings and provide an inspection and testing program for the construction of the proposed development.

7.0 LIMITATIONS OF THE INVESTIGATION

This report is intended for the Client named herein and for their Client. The report should be read in its entirety, and no portion of this report may be used as a separate entity. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review our recommendations when the drawings and specifications are complete, or if the proposed construction should differ from that mentioned in this report.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments are based on the results obtained at the test locations only. It is therefore assumed that these results are representative of the subsoil conditions across the site. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations.

It should be noted that this report specifically addresses geotechnical aspects of the project and does not include any investigations or assessments relating to potential subsurface contamination. As such, there should be no assumptions or conclusions derived from this report with respect to potential soil or water contamination. Soil or water contamination is generally caused by the presence of xenobiotic (human-made) chemicals or other alteration processes in the natural soil and groundwater environment. If necessary, the investigation, assessment and rehabilitation of soil and water contaminants should be undertaken by qualified environmental specialists.

The samples obtained during the geotechnical investigation will be stored for a period of three months, after which time they will be disposed of unless alternative arrangements are made.

We trust that this report meets with your present requirements. Should you have any questions, please do not hesitate to contact our office.

Prepared by:

Shawn Wheatley, M.Eng.

ks



Reviewed by:

Nathan Chortos, P.Eng.
Senior Engineer



NOTES:

Base map provided by Huron County

NO.	DESCRIPTION	DATE

REVISIONS

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Tel.: 519-699-5775
Fax: 519-699-4664
www.cmtinc.net

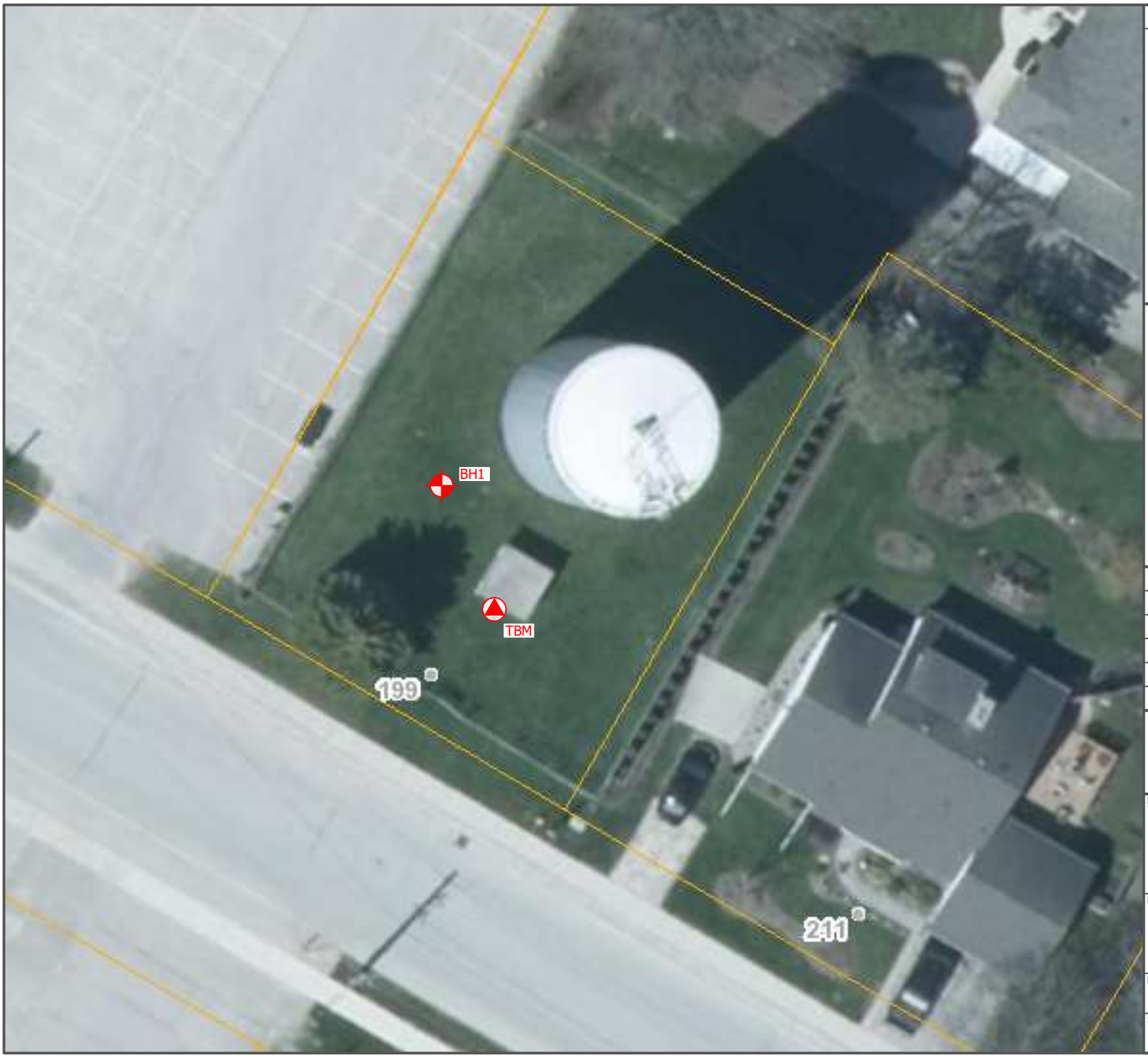
PROJECT:

Geotechnical Investigation
199 John Street East,
Wingham, Ontario

DRAWING TITLE:

SITE LOCATION MAP

PROJECT NO.:	DATE:
22-219	August 4, 2022
SCALE:	DRAWING NO.
N.T.S.	1



NOTES:

1. This drawing is for information purposes only. Locations and sizes of existing and proposed structures are approximate only, and should not be used for construction.
2. Base drawing provided by Huron County
3. Temporary Benchmark: South door of existing shed
   Assumed Elevation = 100 m.

LEGEND

- Approximate Borehole Location (2021)
- Temporary Benchmark

N

NO.	DESCRIPTION	DATE

REVISIONS

CMT ENGINEERING INC.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Tel.: 519-699-5775
Fax: 519-699-4664
www.cmtinc.net

PROJECT:

Geotechnical Investigation
199 John Street East,
Wingham, Ontario

DRAWING TITLE:

SITE PLAN SHOWING
BOREHOLE LOCATIONS

PROJECT NO.:	DATE:
22-219	August 4, 2022
SCALE:	DRAWING NO.
N.T.S.	1

APPENDIX A

BOREHOLE LOG

CMT Engineering Inc.
1011 Industrial Crescent. St. Clements
N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER BH1

PROJECT: Proposed Standpipe Replacement
PROJECT ADDRESS: 199 John Street E,
PROJECT NUMBER: 22-219
PROJECT LOCATION: Wingham, Ontario
DRILLING DATE: 22-6-16
GROUND ELEVATION: 100.29 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: SW
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0	**TOPSOIL** Loose, dark brown, silty organic topsoil, moist (180 mm)	0.00, 100.29	SPT 1	49	0-2-3-6 (5)
		0.18, 100.11			
1	**SILT FILL** Loose, dark brown silt fill, some sand, trace gravel and clay, some organics, moist		SPT 2	49	3-3-4-4 (7)
2	**SAND AND SILT TILL** Loose, light brown, sand and silt till, some gravel, trace clay, moist	1.60, 98.69	SPT 3	66	3-4-5-3 (9)
			SPT 4	15	10-3-4-3 (7)
3	Becoming compact	3.05, 97.24	SPT 5	90	5-7-8-21 (15)
4					
5			SPT 6	100	9-11-15-13 (26)
6	Becoming wet	6.10, 94.19	SPT 7	100	2-6-19-22 (25)
7					
8	**SANDY SILT TILL** Dense, grey, sandy silt till, some gravel, trace clay, moist	7.72, 92.57	SPT 8	100	14-24-25-49 (49)
9			SPT 9	100	18-21-27-23 (48)
10					
11	Becoming very dense	10.67, 89.62	SPT 10	75	35-46-50 (96)
12					
13			SPT 11	80	13-35-56-50 (91)
14			SPT 12	80	36-55-46-50 (101)

SPT N VALUE (10, 20, 30, 40)
POCKET PENETROMETER (kPa) (90, 180, 270, 360)
MOISTURE CONTENT (%) (12, 24, 36, 48)

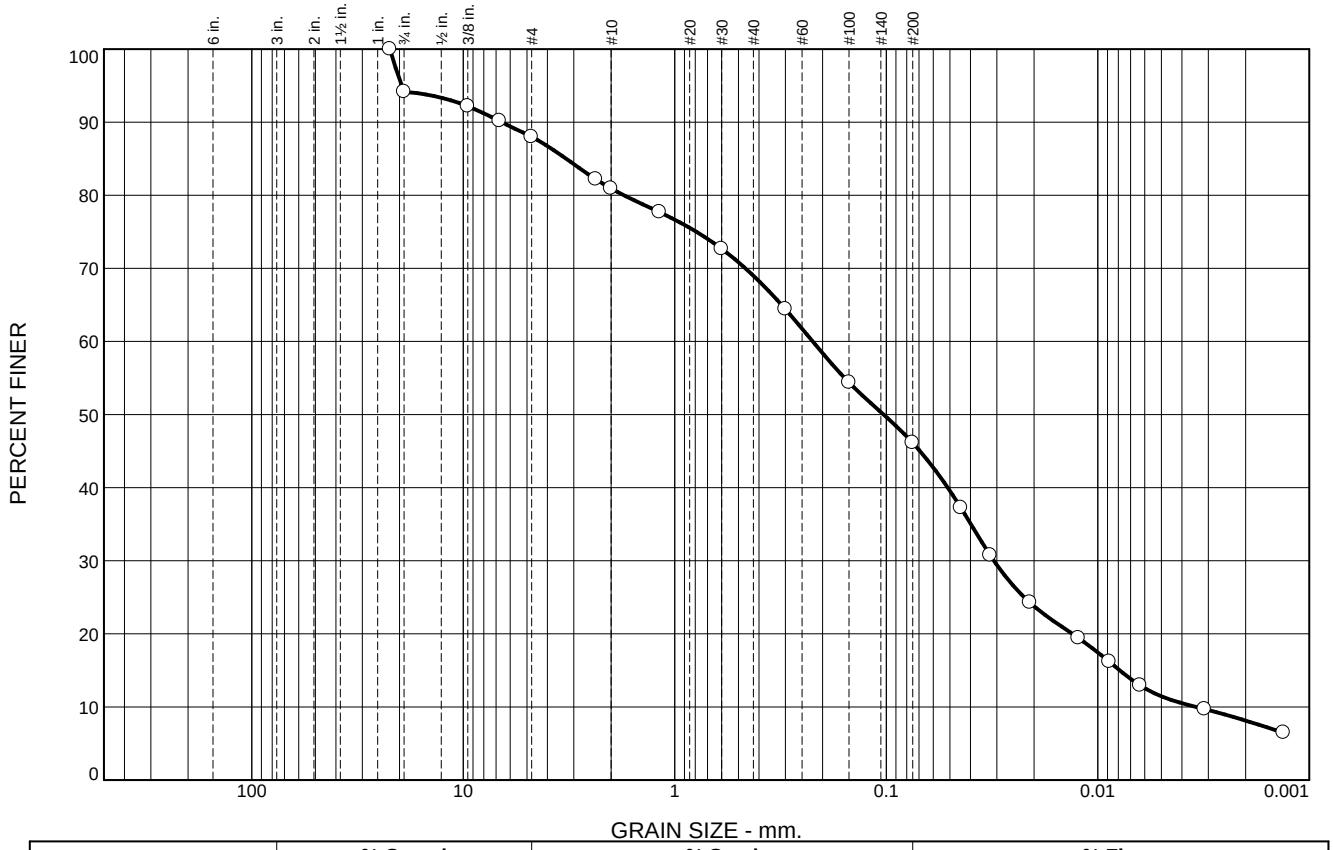
Borehole caved to approximately 9.75 m below ground surface upon completion. Accumulated groundwater encountered in open borehole.

Bottom of borehole at 14.33 m, Elevation 85.96 m.

APPENDIX B

GRAIN SIZE ANALYSES

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	5.9	6.1	7.1	11.9	22.9	38.0	8.1

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH1	5	3.05-3.66m	sand and silt, some gravel, trace clay	SM
				Sampled by SW of CMT Engineering Inc., June 16, 2022	
				Tested by JM of CMT Engineering Inc.	

CMT Engineering Inc.

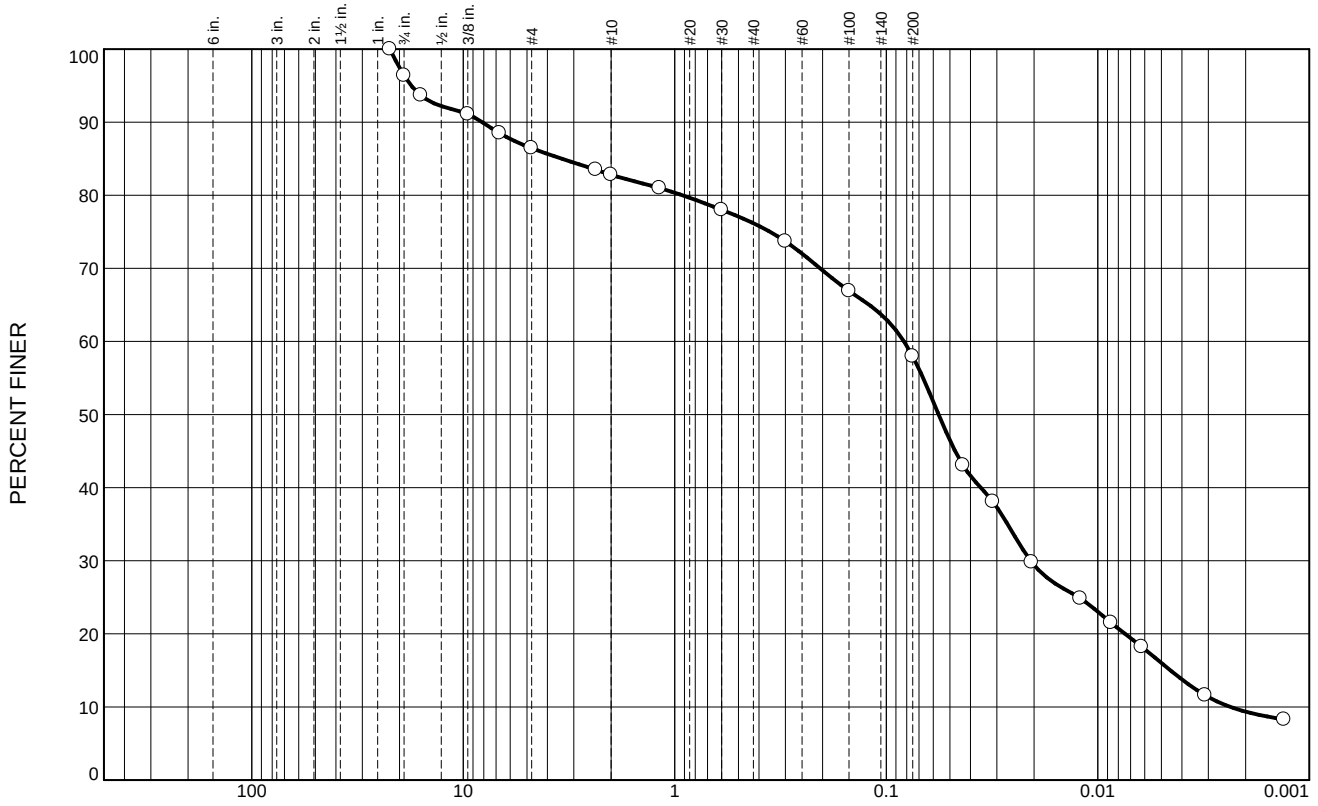
St. Clements, ON

Client: R. J. Burnside and Associates

Project: Proposed Standpipe
199 John Street East, Wingham, Ontario

Project No.: 22-219 **Figure** 1

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	3.6	10.0	3.6	6.6	18.2	48.6	9.4

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH1	12	13.72-14.33m	sandy silt, some gravel, trace clay	ML
				Sampled by SW of CMT Engineering Inc., June 16, 2022	
				Tested by JM of CMT Engineering Inc., June 20, 2022	

CMT Engineering Inc.

St. Clements, ON

Client: R. J. Burnside and Associates

Project: Proposed Standpipe
199 John Street East, Wingham, Ontario

Project No.: 22-219 **Figure** 2

B.M. ROSS & ASSOCIATES LIMITED
CONSULTING ENGINEERS
GODERICH ONTARIO

Report On
SOIL INVESTIGATION
for
PROPOSED STANDPIPE
TOWN OF WINGHAM

by

Dominion Soil Investigation Limited
1220 Trafalgar Street
London Ontario

Ref: 73-9-L4
Oct. 17, 1973

DOMINION SOIL INVESTIGATION LIMITED
CONSULTING SOIL & FOUNDATION ENGINEERS
1220 TRAFALGAR ST., P.O. BOX 4033, STATION C, LONDON, ONT. (519) 455-7780

73-9-L4

B.M. Ross & Associates Limited,
Consulting Engineers,
41 West Street,
Goderich, Ontario.

Attention: Mr. B.M. Ross P.Eng.,

Dear Sirs:

Re: Soil Investigation for Proposed Standpipe, Town of Wingham.

We have completed this project in accordance with your letter of authorization dated September 7, 1973. This report contains a record of our findings and presents our recommendations for the design of the new foundations.

FIELD WORK

The field work, consisting of one borehole, was carried out on September 28, 1973, at the location shown on Enclosure 2. The borehole was located centrally on the property immediately to the north of the existing standpipe.

Standard penetration tests were performed at frequent intervals of depth, as detailed in Appendix 'A', and the results are recorded on the borehole logs as 'N' values. The split-spoon samples were stored in air-tight containers and transferred to our London laboratory for classification, testing and storage.

The field work was supervised by a soils engineer, who also related the ground surface elevation at the borehole location to a local benchmark. The benchmark was taken as the top of a S.I.B., which is indicated on Enclosure 2 and given an assumed value El. 100 feet.

SUBSURFACE CONDITIONS

Detailed descriptions of the strata, which were encountered in the borehole, are given on the borehole log comprising Enclosure 3. The following notes are intended only to amplify this data.

The borehole penetrated a surface layer of topsoil, 8 inches thick, overlying successive layers of clayey silt and silty sand which extend to a depth of 4 feet.

Below this level the borehole penetrated a glacial sandy silt till stratum in which it was terminated at a depth of 25 feet. The relative density of the sandy silt till is described as 'dense' to 'very dense' based on 'N' values ranging from 29 to 84 blows per foot.

A grading analysis of a representative sample of the silty sand layer is shown as a grain size distribution curve on Enclosure 4.

Based on a visual inspection of the soil samples it may be assumed that the groundwater table is at a depth of about 10 feet below the prevailing ground surface (El. 88±). The water level in the open hole was observed at a depth of 21 feet (El. 77.6) at the completion of the field work, and this indicates that insufficient time was available for the water level to reach an equilibrium state. It is also an indication of the impermeable nature of the sandy silt subsoil.

DISCUSSION AND RECOMMENDATIONS

The investigation has shown that the soil profile consists of thin layers of clayey silt and silty sand overlying a 'dense' to 'very dense' glacial sandy silt till stratum which extends to a depth of at least 25 feet. On the basis of the borehole results the following allowable soil pressures are appropriate for the design of spread footing foundations.

Footing Elevation (feet)	Maximum Allowable Soil Pressure p.s.f.
96 to 95	4000
94 and below	8000

The above soil pressures incorporate a factor of safety of at least 3 against shear failure of the underlying soil, and total settlement of footings 10 feet in width is estimated to be about 1 inch. The greater part of the settlement will occur immediately as the load is applied.

The footing grade must have a minimum depth of soil cover of 4 feet to provide sufficient protection against heave due to frost action.

No problems are anticipated in carrying out excavations to a depth of 10 feet or less, and the sides of the excavation will be stable with slopes of 2 vertically to 1 horizontally during the construction period. Seepage into the excavation will be limited to rainfall and surface runoff, and it is recommended that the footing grade be protected from softening due to water seepage after it has been exposed.

We trust that the foregoing recommendations are sufficient for your requirements, however if further discussion is necessary please do not hesitate to contact us.

Yours very truly,

DOMINION SOIL INVESTIGATION LTD.



C.J.W.Atkinson,M.Sc.,P.Eng.
Branch Manager

CJWA:eg

APPENDIX 'A'

THE STANDARD PENETRATION TEST.

In order to determine the relative density of non-cohesive soils, such as sands and gravels, the standard penetration test has been adopted. The test also gives an indication of the consistency of cohesive soils.

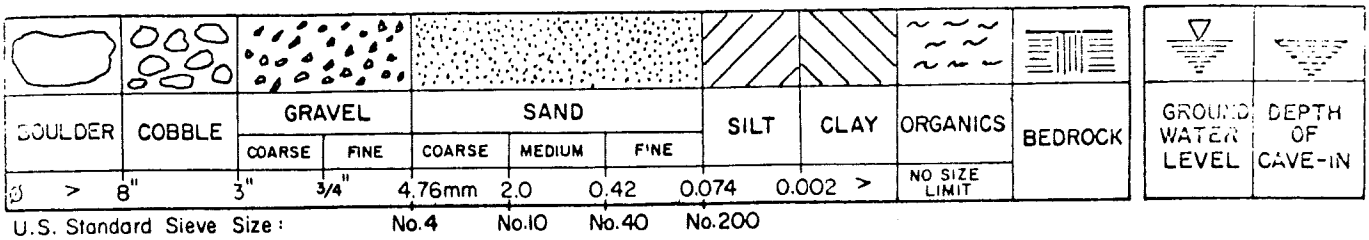
A two inch external diameter thick-walled sample tube is driven into the ground at the bottom of the borehole by means of a 140 lb. hammer falling freely through 30-ins. The tube is first driven an initial 6-inches to allow for the presence of disturbed material at the bottom of the borehole. The number of standard blows (N) required to drive the sampler a further 12-in. is recorded. The sample tube is one originally developed by Raymond Concrete Pile Company in the United States, where a sufficient number of tests have been made in conjunction with field investigations to show that the results, although essentially empirical, may be applied to foundation design.

For Sands:-

Values of 'N'	Density
Less than 10	Loose
Between 10 and 30	Compact
Between 30 and 50	Dense
Greater than 50	Very dense

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

SOIL COMPONENTS AND GROUND WATER CONDITIONS.



SAMPLE TYPES.

AS	Auger sample	RC	Rock core	TP	Piston, thin walled tube sample
CS	Sample from casing	%	Recovery	TW	Open, thin walled tube sample
ChS	Chunk sample	SS	Split spoon sample	WS	Wash sample

SAMPLER ADVANCED BY static weight : w
" pressure : p
" tapping : t

OBSERVATIONS MADE WHILE CORING
- Steady pressure
- No pressure
- Intermittent pressure
- Washwater returns
- Washwater lost

PENETRATION RESISTANCES.

SYMBOL :

DYNAMIC PENETRATION RESISTANCE : to drive a 2"ϕ, 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot.

STANDARD PENETRATION RESISTANCE, -N- : to drive a 2" outside dia, split spoon sampler 1 foot into the ground, expressed in blows per foot.

EXTRAPOLATED -N- VALUE

The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches

322

SOIL PROPERTIES.

W %	Water content	γ	Natural bulk density (unit weight)	k	Coeff. of permeability	
LL %	Liquid limit	e	Void ratio	C	Shear strength	in terms of total stress
PL %	Plastic limit	RD	Relative density	ϕ	Angle of int. friction	
PI %	Plasticity index	C_v	Coeff. of consolidation	C'	Cohesion	in terms of effective stress
LI	Liquidity index	m_v	Coeff. of volume compressibility	ϕ'	Angle of int. friction	

UNDRAINED SHEAR STRENGTH.

— DERIVED FROM —

TRIAXIAL — UNCONFINED COMPRESSION TEST — St

LABORATORY — FIELD VANE TEST — St

POCKET PENETROMETER TEST — St

Strain at failure is represented by direction of stem

20%
15% — 5%
10%

St : sensitivity = $\frac{\text{shear strength in undisturbed state}}{\text{shear strength in remoulded state}}$

SOIL DESCRIPTION.

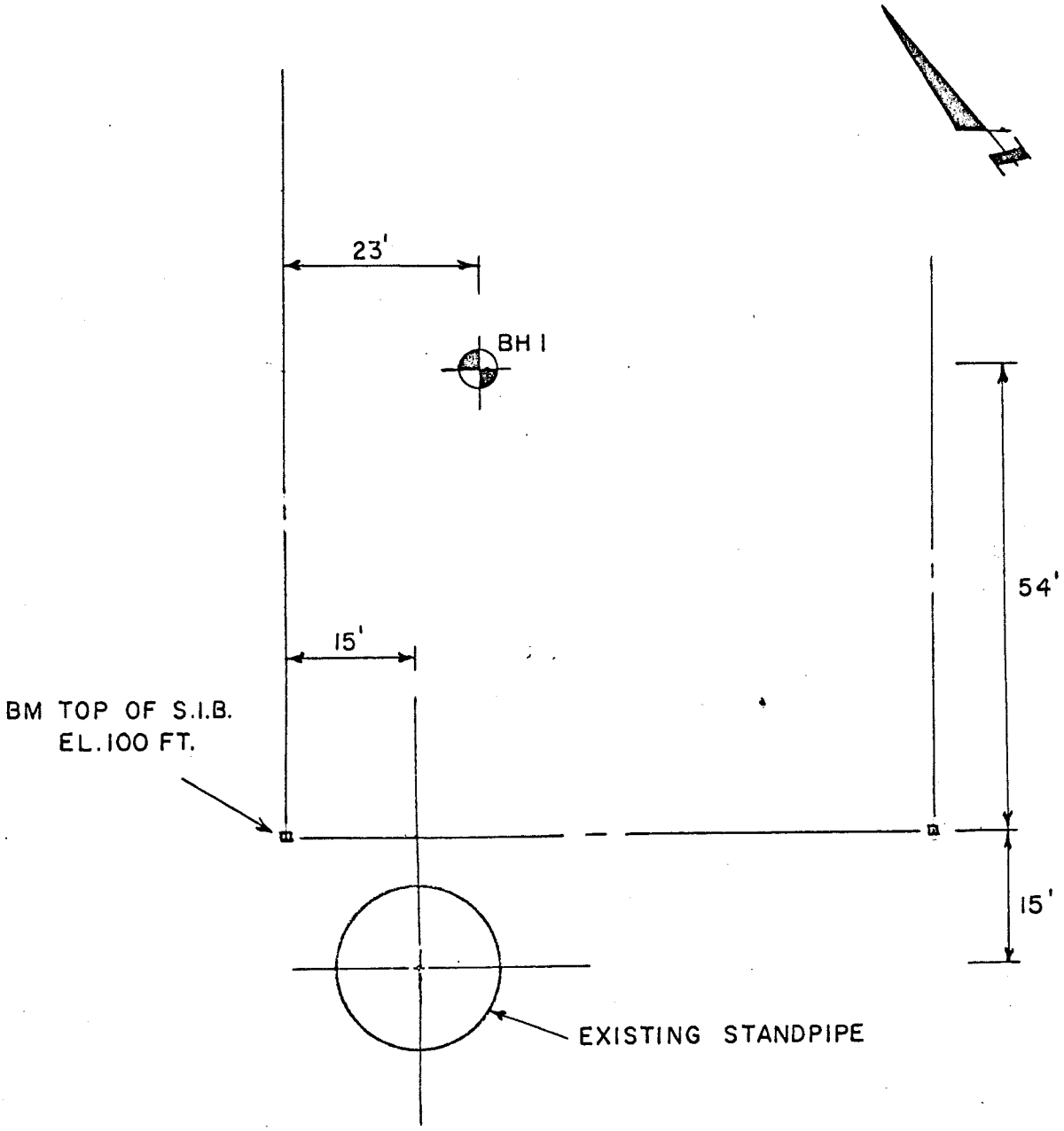
COHESIONLESS SOILS :	RD :
Very loose	0 – 15 %
Loose	15 – 35 %
Compact	35 – 65 %
Dense	65 – 85 %
Very dense	85 – 100 %

COHESIVE SOILS	C lbs/sq ft
Very soft	less than 250
Soft	250 – 500
Firm	500 – 1000
Stiff	1000 – 2000
Very stiff	2000 – 4000
Hard	over 4000

Our Ref. No. 73-9-L4

Enclosure No. 2

Prep. By



LOCATION OF BOREHOLE

SCALE 1" = 20'

DOMINION SOIL INVESTIGATION LIMITED

LOG OF BOREHOLE 1

Our Reference No. 73-9-L4

Enclosure No. 3

CLIENT: B.M. Ross & Associates Ltd.,
PROJECT: Proposed Standpipe,
LOCATION: Wingham, Ontario
DATUM ELEVATION: 100 feet (see Enclosure 2)

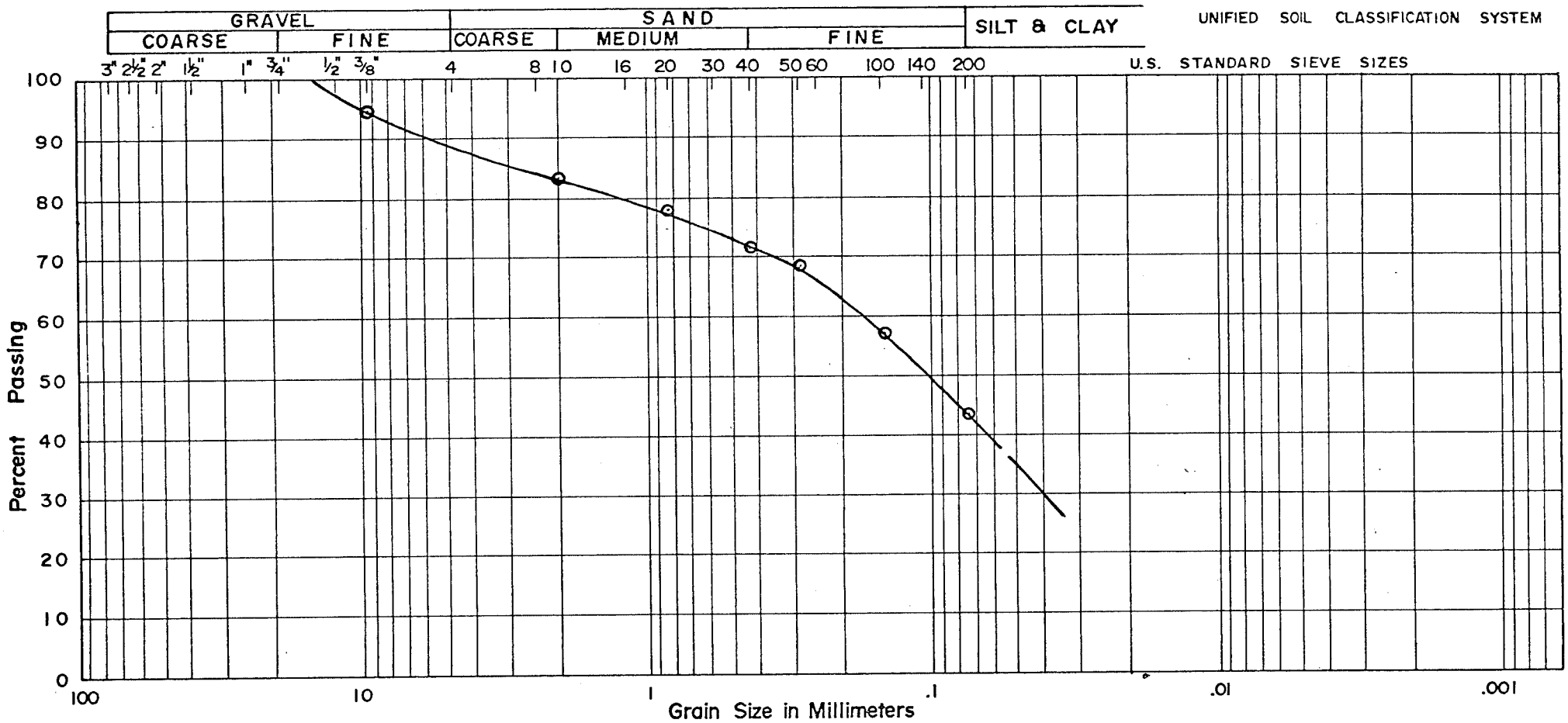
DRILLING DATA
Method: Auger
Diameter: 4½ inch
Date: September 28, 1973

ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' Blows/Ft.	PENETRATION RESISTANCE Blows/Ft. (20 40 60 80 100) / UNDRAINED SHEAR STRENGTH p.s.f. (+ FIELD VANE TEST, ⊙ COMPRESSION TEST)	WATER CONTENT % (PLASTIC LIMIT W_P — NATURAL W — LIQUID LIMIT W_L)	REMARKS
98.6	0.0	Ground Surface								
		8" Topsoil								
	2.0	Clayey silt trace of roots.			1	SS	17	⊙		
95		Compact brown silty sand, trace of gravel.								
	4.0				2	SS	40	⊕		
					3	SS	41	⊙		
90		Dense to very dense damp wet brown sandy silt, some gravel, trace of clay.			4	SS	51	⊙		
85					5	SS	29	⊙		
80		(Glacial Till)		▽	6	SS	51	⊙		
75										
	25.0				7	SS	84	⊙		

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE Nº 73-9-L4



PROJECT: Proposed Standpipe
LOCATION: Wingham
BOREHOLE Nº: 1
SAMPLE Nº: 1
DEPTH: 2 to 3 feet
ELEVATION: 96 feet

COEFFICIENT OF UNIFORMITY :
COEFFICIENT OF CURVATURE :

Classification of Sample and Group Symbol:
Silty sand with a trace of gravel.

PLASTIC PROPERTIES

LIQUID LIMIT	% =
PLASTIC LIMIT	% =
PLASTICITY INDEX	% =
MOISTURE CONTENT	% =

ENCLOSURE Nº 4

Township of North Huron - 2015 Standpipe Structural Condition Assessment

Township of North Huron

R.J. Burnside & Associates Limited
449 Josephine Street P.O. Box 10
Wingham ON N0G 2W0 CANADA

September 30, 2015
300036835.0000

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
	Yes	Yes	Township of North Huron

Record of Revisions

Revision	Date	Description
0	September 30, 2015	Initial DRAFT Submission to Twp. of North Huron
1	October 1, 2015	Final Submission to Twp. of North Huron

R.J. Burnside & Associates Limited



Report Prepared By:

James Mann
Structural Engineer
JM:ls

Report Reviewed By:

Carl Lankinen
Senior Structural Engineer
CL:ls

Executive Summary

On September 14 and 15, 2015, R.J. Burnside & Associates Limited (Burnside) conducted a structural condition assessment of the Wingham Stand Pipe located at 199 John St., Wingham ON. The stand pipe consists of a conventionally reinforced, cast-in-place, concrete cylinder with external prestressing strands set in a layer of shotcrete. Burnside used the National Building Code of Canada 2010 Commentary L recommendations for the evaluation of the existing structure as a guide to complete the review of the structure.

The review consisted of removing the steel cladding and insulation from randomly selected locations selected throughout the height and around the perimeter of the stand pipe to review the condition of the concrete structure. Each area exposed was visually reviewed for any damage, distress or deterioration. The following is a summary of the observations that Burnside made during the review:

- shotcrete was delaminating in a few locations, exposing severely corroded prestressing strands on the exterior face of the structure
- horizontal, stained cracks were noted in the shotcrete surface suggesting additional prestressing strands are corroding
- the coating on the exterior surface was peeling and appeared to be in generally poor condition.

Based on the condition of the stand pipe, it is Burnside's opinion that the stand pipe requires repairs and/or alterations to continue at the current operating level. The following three alternative approaches are suggested based on the current condition of the standpipe:

- Make no repairs and reduce the operating level (<50') until a replacement standpipe is constructed.
- Complete targeted external strengthening of the structure and maintain the current operating level until a replacement standpipe is constructed.
- Complete major rehabilitation of the structure including completing concrete and prestressing repairs throughout the stand pipe, and applying a new sealant to the interior face of the concrete.

Table of Contents

1.0 Introduction 1
1.1 Purpose and Method of Review 1
1.2 Description of Standpipe Structure 2
1.3 Review of Existing Standpipe Documentation 2
2.0 Field Observations 3
2.1 Opening #1 (Photos 1 through 4) 5
2.2 Opening #2 (Photos 5 to 10) 5
2.3 Opening #3 (Photos 11 to 13) 6
2.4 Opening #4 (Photos 14 to 16) 6
2.5 Opening #5 (Photos 17 and 18) 6
2.6 Opening #6 (Photo 19) 7
2.7 Opening #7 (Photos 20 and 21) 7
2.8 Opening #8 (Photos 22 to 24) 7
2.9 Opening #9 (Photos 25 and 26) 7
3.0 Recommendations 8
3.1 Do Nothing – Reduced Operating Level 8
3.2 Externally Reinforce Structure and Replace 8
3.2.1 Remove bottom cladding and sound concrete 8
3.2.2 Install external steel reinforcing hoops 8
3.3 Major Rehabilitation 9
3.3.1 Sound entire exterior concrete surface 9
3.3.2 Remove unsound shotcrete from exterior surface 9
3.3.3 Review condition of and repair interior sealant 9
3.3.4 Sound interior concrete surface 9
3.3.5 Replace prestressing strands as required 10
3.3.6 Complete patch repairs of concrete 10
4.0 Summary 10

Figures

Figure 1 –Elevation view of stand pipe with approximate opening locations shaded 4

Appendices

Appendix A Photo Appendix

Disclaimer

Other than by the addressee, copying or distribution of this document, in whole or in part, is not permitted without the express written consent of R.J. Burnside & Associates Limited.

In the preparation of the various instruments of service contained herein, R.J. Burnside & Associates Limited was required to use and rely upon various sources of information (including but not limited to: reports, data, drawings, observations) produced by parties other than R.J. Burnside & Associates Limited. For its part R.J. Burnside & Associates Limited has proceeded based on the belief that the third party/parties in question produced this documentation using accepted industry standards and best practices and that all information was therefore accurate, correct and free of errors at the time of consultation. As such, the comments, recommendations and materials presented in this instrument of service reflect our best judgment in light of the information available at the time of preparation. R.J. Burnside & Associates Limited, its employees, affiliates and subcontractors accept no liability for inaccuracies or errors in the instruments of service provided to the client, arising from deficiencies in the aforementioned third party materials and documents.

1.0 Introduction

On September 14 and 15, 2015, Burnside completed a structural condition review of the stand pipe that is part of the Wingham municipal water system, located at 199 John St, Wingham On. The review was completed based on a request from the Township of North Huron staff to assess the condition of the structure.

Burnside collected field observations and measurements of the structure during the on-site review in addition to using interviews with the Township of North Huron staff, previous condition review reports, repair records and original construction documents for the stand pipe that were provided to Burnside by the Township of North Huron.

1.1 Purpose and Method of Review

Building structures may deteriorate in service for a variety of reasons throughout their service lives and periodic review of the structures is important to assess their fitness. The review of the structure is aimed at identifying areas of deterioration, distress, and damage to determine areas within the structure that may require additional repairs, monitoring, structural analyses, material testing, or replacement. The recommendations may also include timelines for implementation. This review completed does not consist of completing an exhaustive structural analysis of the structure. This review report is limited to the structural elements and did not include reviewing electrical, mechanical, or life safety systems.

This evaluation is based around the recommended practises included in Commentary L of the National Building Code of Canada (NBCC, 2010). This commentary provides direction on structural evaluation and upgrading of structures. Commentary L of the NBCC states that a structure may be considered to have demonstrated satisfactory capacity to resist applied loads provided that the following requirements are satisfied:

- The structure has demonstrated satisfactory performance for thirty years or more;
- The structural system is reviewed, including examination of critical details and checking them for load transfer;
- There have been no changes within the past thirty years that could significantly increase the loads on the structure or affect its durability; and
- Careful examination does not expose any evidence of significant damage, distress or deterioration.

This evaluation was limited to a random visual review of the condition of the exterior shotcrete surface of the stand pipe structure.

1.2 Description of Standpipe Structure

From the documentation provided to Burnside, the existing standpipe was constructed in 1974 and consists of a 28 feet inner diameter, conventionally reinforced, 8inch thick, cast-in place concrete cylinder that extends approximately 101feet high. The inner concrete cylinder is externally reinforced using prestressing strands, prestressed around the perimeter of the tank to an initial stress of 140,000 psi and set in a ¾ inch thick layer of shotcrete. The concrete cylinder is insulated with a layer of rigid insulation that is protected by a layer of steel cladding.

It is our opinion, that with this type of design, that the inner concrete cylinder is designed to support the vertical loading on the standpipe, and the external prestressing provides the circumferential strength to the standpipe by pre-compressing the inner cylinder in such a way that the concrete is under compression from the prestressing strands and prevented from cracking.

1.3 Review of Existing Standpipe Documentation

Burnside completed a review of existing documentation provided to Burnside by the Township of North Huron for the standpipe including records of previous repairs and upgrades.

In 1984, major concrete repairs and rehabilitation was undertaken on the standpipe. This major rehabilitation consisted of reviewing the condition of the concrete on the entire interior and exterior surfaces of the standpipe for cracked, or delaminated concrete. Damaged concrete was marked out and removed using a chipping hammer and the following repairs and upgrades were completed to the concrete:

- Full thickness concrete replacement at construction joints coating the steel with a 3/8inches diameter maximum aggregate, 4000 psi compressive strength concrete mix.
- Small crack repairs using Cappar Cap Patch at various locations.
- At the 10’ elevation 5 broken prestressing strands were repaired by installing two new 3/8” diameter seven-wire strand that were coated in Cappar Product 19, and then enclosed in Cappar Cap Patch
- At the 46’ elevation 11 broken prestressing strands were repaired by installing three new 3/8 inches diameter seven-wire strands that were coated in Cappar Product 19 and then enclosed in Cappar Cap Patch.
- Entire exterior surface was brush blasted and coated with two coats of Cappar Niklepoxy Concrete Sealer, Product No. 2M50 – Off White
- Interior repairs were completed with a coating of Cappar Product 215 Epoxy being applied to the surface which was noted in the repairs as being completed since in 1981 the entire interior surface was coated.

Burnside was not informed of repairs completed in 1981, except that the interior surface was coated with Cappar Product 215 Epoxy, which was noted in the 1984 repair report. standpipe. Burnside was also unable to confirm when the standpipe was insulated and clad, but it is our understanding that this occurred sometime between the 1984 repairs and the 2005 review.

The standpipe was reviewed again in 2005 by Landmark and they noted the following:

- Interior tank floor coating had failed and should be replaced
- Exterior concrete surface did not show signs of deterioration
- Rooftop flashing sealant was damaged and should be replaced.
- Safety upgrades are required
- Lightning protection upgrades are required.
- Tank venting is required

It is our understanding that repairs were completed to the ladder and safety systems at the completion of this review; however, the interior linings were not repaired. The interior coatings were not reviewed as part of our review; however the recommendations above from the 2005 report would suggest that the interior linings should be replaced.

2.0 Field Observations

This section summaries the observations that were collected during the review of the standpipe structure. The review was completed by removing the steel cladding and insulation at various locations around the exterior of the standpipe to view the condition of the exterior concrete surface of the structure.

Figure 1, presents the locations of the openings that were completed on the structure. A total of 9 openings were completed throughout the standpipe to review the condition of the concrete. The entire surface of each area was sounded by using tapping the surface with a hammer, to determine areas of the concrete that are delaminating from the reinforcing bars.

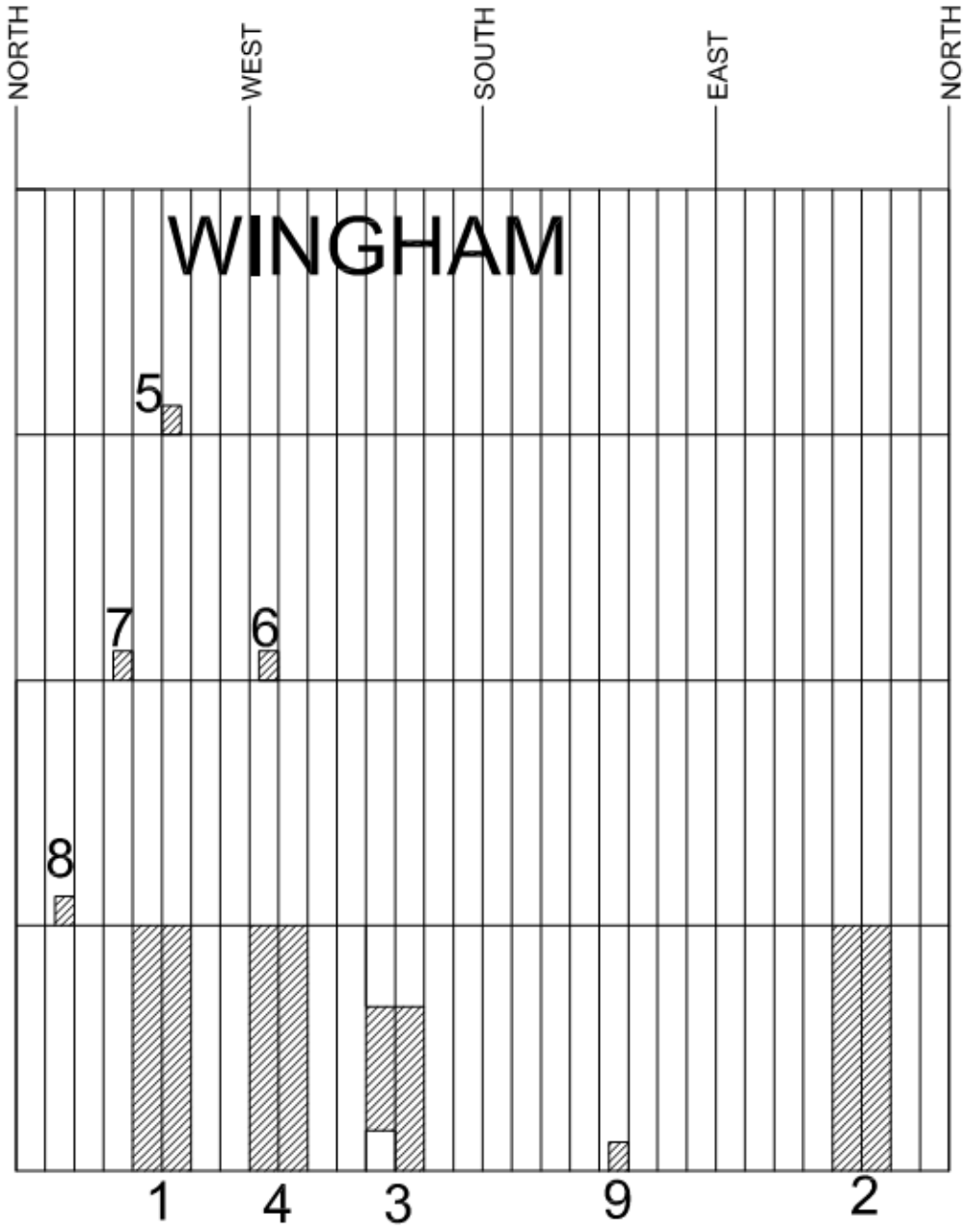


Figure 1 –Elevation view of standpipe with approximate opening locations shaded

The majority of the openings that were completed were located at the bottom of the standpipe since this was the most accessible location and will be subject to the highest internal pressures from the water. A detailed description of the observations made at each opening is completed in the following sections. The horizontal and vertical lines depicted in Figure 1 represent the steel cladding panel locations around the perimeter of the standpipe and each section is approximately 25feet high and 3feet wide. The photos

for each opening are presented in the photo appendix and reference is given to the photo numbers throughout the following sections.

2.1 Opening #1 (Photos 1 through 4)

The first opening was located in the bottom section of cladding, and consisted of removing two full sections of steel cladding to review an approximately 6 feet wide by 25 feet high section of the wall (Photo 1) located on the north west portion of the standpipe, as shown in Figure 1.

The exterior face of the concrete in Opening #1, appeared to be in a serviceable condition without any delaminated or cracked concrete. The coating on the concrete appeared to be peeling (Photo 4). A number of round orange/red spots were noted on the exterior face of the concrete that suggest that corrosion of the steel is occurring below the concrete surface (Photo 2). The previously completed concrete patch over the prestressing strands completed at the 10foot elevation appeared to be in good condition in this opening with the repair material appeared well bonded to the concrete (Photo 3).

2.2 Opening #2 (Photos 5 to 10)

The second opening was located in the bottom section of cladding, and consisted of removing two full sections of steel cladding to review an approximately 6 feet wide by 25 feet high section of the wall located near the tanks north elevation.

The exterior face of the concrete in Opening #2 had two delaminated sections of shotcrete with corroded prestressing strands visible. One delamination was approximately foot long x 4 inches high with two prestressing strand visible in the delamination (Photos 6 and 7). The other delamination in this opening was approximately 4 inches long x 2 inches high with one prestressing strand visible in the delamination (Photos 8 and 9). The prestressing strands that were visible in the delamination's appeared to be severely corroded. The percentage of the strands remaining/corroded was not determined during the review.

There was also a horizontal crack in the opening with rust staining that extended the entire width of the opening (Photo 10). This horizontal crack and staining suggests that the prestressing strand is corroding at this location underneath the surface of the concrete. The concrete at this crack appeared to be well bonded to the steel based on sounding the location.

The mortar protecting the previously repaired prestressing strands appeared to be well bonded to the surface and appeared to be in good shape.

The exterior coating was peeling and generally in a poor condition.

2.3 Opening #3 (Photos 11 to 13)

The third opening was located in the bottom section of the cladding and consisted of removing cladding panels above the standpipe manhole access on the southwest side of the standpipe. This opening was approximately 6 feet wide by 16 feet high (Photo 11).

A delaminated section of shotcrete, approximately 1foot x1 foot, was uncovered during sounding at this location (Photo 12). The delaminated section appeared to be damp and contained 15 prestressing strands that were all severely corroded with evidence of pitting corrosion (Photo 13).

The mortar protecting the previously replaced prestressing strands was well bonded to the parent concrete material and appeared to be in good shape.

The exterior coating was generally in poor condition with evidence of peeling.

2.4 Opening #4 (Photos 14 to 16)

The fourth opening was located in the bottom section of the cladding and consisted of removing two complete sections of the cladding on the west side of the standpipe. This opening was approximately 6feet wide x 25feet high (Photo 14).

One minor delaminated piece of concrete approximately 4inches square was noted in the opening with a single corroded prestressing strand exposed in the delamination (Photos 15 and 16).

The exterior coating was generally in poor condition with evidence of peeling.

2.5 Opening #5 (Photos 17 and 18)

The fifth opening was located at the bottom of the top section of cladding (approximately located at the 75 foot elevation) on the west side of the tower in one of the cladding panels (Photo 17). This opening was approximately 1foot-6inches wide by 3 feet.

A stained horizontal crack was noted in this opening and extended the width of the opening, (Photo 18). This suggests that the prestressing strand is corroding causing the cracking. The shotcrete was well bonded in this area and did not appear to be delaminating from the prestressing strands.

The exterior coating was generally in poor condition with evidence of peeling.

2.6 Opening #6 (Photo 19)

The sixth opening was located at the bottom of the second section of cladding from the top (approximately located at the 50 foot elevation) on the west side of the standpipe. This opening was approximately 1 foot-6 inches wide by 3 feet (Photo 19).

Two small horizontal cracks were noted, one approximately 4 inch long and one approximately 6 inch long were noted in this opening at approximately the same elevation. The cracking was indicative of the expanding of the steel strands due to corrosion.

The exterior coating was in poor condition with evidence of peeling.

2.7 Opening #7 (Photos 20 and 21)

The seventh opening was located at the bottom of the second section of cladding from the top (approximately located at the 50 foot elevation) on the northwest side of the standpipe. This opening was approximately 1foot -6 inches wide by 3 feet (Photo 20).

The shotcrete surface was generally in good condition in this opening.

The exterior coating was in poor condition with evidence of peeling (Photo 21).

2.8 Opening #8 (Photos 22 to 24)

The eighth opening was located at the bottom of the second section of cladding from the bottom (approximately located at the 25 foot elevation) on the north side of the standpipe. This opening was approximately 1 foot -6 inches wide by 3 feet.

A single small 4 inch horizontal crack was noted in the shotcrete surface in this opening (Photo 24) indicative of expansion forces due to corrosion.

The exterior coating was in poor condition with evidence of peeling.

2.9 Opening #9 (Photos 25 and 26)

The ninth opening was located at the bottom of the second section of cladding from the top (approximately 50 foot elevation) on the southeast side of the standpipe. This opening was approximately 1foot -6 inches wide by 3 feet (Photo 25).

The concrete in this opening was generally in good condition without evidence of cracking or delamination noted.

The exterior coating was in poor condition with evidence of peeling (Photo 26)

3.0 Recommendations

Burnside has provided three alternative maintenance strategies for the continued operation of the standpipe based on the review of the structure.

3.1 Do Nothing – Reduced Operating Level

Based on the condition of the structure, it would be possible to reduce the current operating water level of the standpipe to a level based on the deterioration observed on the standpipe. It is our opinion that based on the limited amount of review completed, and the deterioration observed that this water level would be 50'. It is our understanding that based on the pressure requirements for the water system, this would not be a feasible option. The pressure at the base of the standpipe would only be approximately 22 psi with this reduced operating level.

This option does not address deterioration that was observed to be occurring in the structure. The structure at the reduced operating level would still require that frequent monitoring of the condition of the structure is completed to ensure further deterioration is not occurring since it will not be addressed by completing repairs.

3.2 Externally Reinforce Structure and Replace

The second alternative is a method to structurally reinforce the existing standpipe for operation of the standpipe at the current operating level temporarily until a new standpipe can be constructed. The following outlines the recommended method to externally reinforce the structure to maintain the current operating level until a replacement tank is constructed. This method does not address the deterioration that is currently occurring in the structure and we would also recommend more frequent condition monitoring until the structure is decommissioned..

3.2.1 Remove bottom cladding and sound concrete

The bottom 25 foot section of cladding and insulation around the perimeter of the standpipe should be removed. The entire exterior surface of the concrete should be sounded to determine areas of delaminated concrete. All delaminated concrete should then be chipped away using a chipping hammer to expose all the corroded steel.

3.2.2 Install external steel reinforcing hoops

Once all the delaminated concrete is removed, the prestressing wires that are exposed should be cleaned to determine the extent of and number of prestressing wires that are corroded. External reinforcing hoops will be installed to provide additional strength, as required, to offset the strength reduction from loss of cross sectional area in the wires due to corrosion.

3.3 Major Rehabilitation

The third strategy is a major rehabilitation of the standpipe that we would anticipate would be required to restore the current standpipe structure to its original load carrying capacity and eliminate deterioration mechanisms that are occurring in the structure. The recommended repairs described below are meant to provide a basis for costing repairs and are not meant to be used for construction of the repairs. These recommendations are aimed at extending the life of the structure as much as possible; however, it is extremely difficult to ascertain a quantifiable value for the extension of life provided by these repairs.

3.3.1 Sound entire exterior concrete surface

Based on the review completed of the exterior surfaces of the standpipe, we would recommend sounding the entire exterior surface of the concrete to identify locations of delaminated concrete that requires repair.

3.3.2 Remove unsound shotcrete from exterior surface

Delaminated areas of the shotcrete should be removed to a sound substrate throughout the standpipe. The shotcrete should be removed using a small chipping hammer to remove the shotcrete to a sound surface. Prestressing strands that are encountered in openings should be cleaned to remove all corrosion from the bar.

3.3.3 Review condition of and repair interior sealant

The sealant that was applied to the inside of the standpipe has been in service since 1984. The product was produced by Cappar (no longer in business) and no information regarding the life of the sealant could be obtained by Burnside for this review. This interior coating was recommended to be repaired in 2005 and based on the corrosion observed in the prestressing strands, we would anticipate it requires repairs or replacement.

Based on the age and previous evaluation, we would anticipate that this sealant will require replacement and localized patch repairs will not be sufficient to address water infiltration issues into the concrete.

3.3.4 Sound interior concrete surface

During the review of the interior sealant, we would recommend completing sounding of the interior concrete surface to determine areas of unsound concrete and corroding reinforcing steel. Concrete removals, steel repairs and concrete replacement should be completed depending on the condition of the concrete surface.

3.3.5 Replace prestressing strands as required

The prestressing strands were observed to be severely corroded in a couple of locations during the onsite review of the standpipe and it is our opinion that these strands should be repaired in order to restore the structure to its original strength.

Once all the unsound shotcrete has been removed from the exterior of the standpipe all reinforcing strands that are exposed should be cleaned to determine the extent of corrosion. Depending on the extent of and number of reinforcing strands corroded at each delamination, replacement reinforcing strands should be installed. Each prestressing strand should be set in a mortar or concrete bed to provide protection to the replacement strands from corrosion. This will need to be completed around the entire perimeter of the standpipe.

3.3.6 Complete patch repairs of concrete

The concrete adjacent to prestressing strands that have corroded will delaminate from the reinforcing bars and adjacent concrete as the reinforcing steel corrodes. All unsound concrete around repair areas should be removed to a sound substrate and replaced with new concrete materials.

4.0 Summary

The following is a summary of the observations that Burnside made during the review:

- shotcrete was delaminating in a few locations, exposing severely corroded prestressing strands on the exterior face of the structure
- horizontal, stained cracks were noted in the shotcrete surface suggesting additional prestressing strands are corroding
- the coating on the exterior surface was peeling and appeared to be in generally poor condition.

Based on the condition of the stand pipe, it is Burnside's opinion that the stand pipe requires repairs and/or alterations to continue at the current operating level. The following three alternative approaches are suggested based on the current condition of the standpipe:

- Make no repairs and reduce the operating level (<50') until a replacement standpipe is constructed.
- Complete targeted external strengthening of the structure and maintain the current operating level until a replacement standpipe is constructed.
- Complete major rehabilitation of the structure including completing concrete and prestressing repairs throughout the stand pipe, and applying a new sealant to the interior face of the concrete.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Photo Appendix



Photo 1: Opening #1- General Photo



Photo 2: Opening #1- Staining Spots



Photo 3: Opening #1- Previous Repair

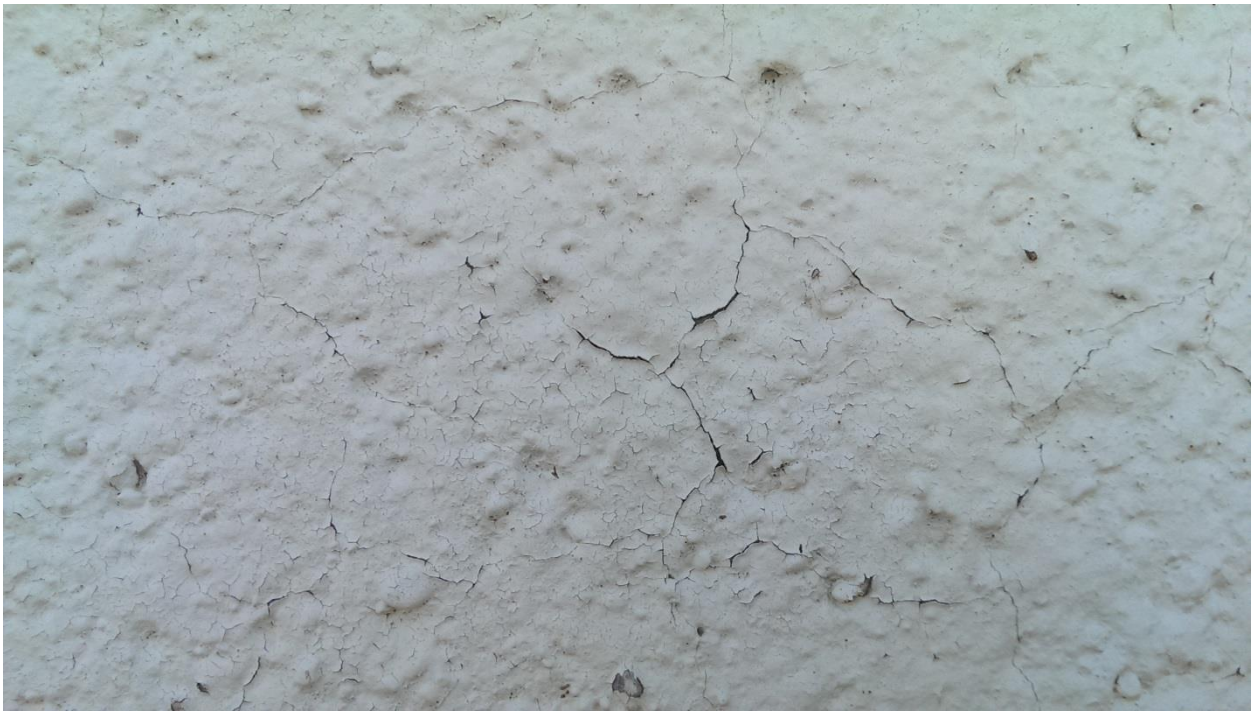


Photo 4: Opening #1- Peeling Coating



Photo 5: Opening #2 – General Photo



Photo 6: Opening #2 – Delaminated Concrete at Bottom of Opening



Photo 7: Opening #2 – Close-up Photo of delaminated concrete



Photo 8: Opening #2 – Delaminated Concrete at upper portion of opening



Photo 9: Opening #2 – Delaminated Concrete at upper portion of opening –close-up



Photo 10: Opening #2 Crack with Staining



Photo 11: Opening #3 – General Photo



Photo 12: Opening #3 – Delaminated Concrete



Photo 13: Opening #3 – Close-up of delamination

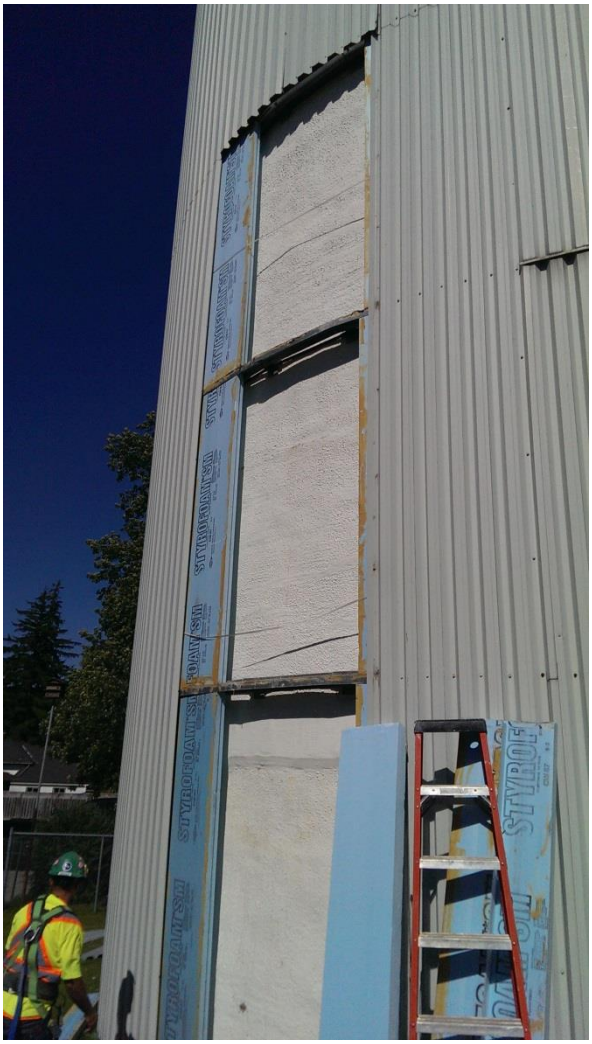


Photo 14: Opening #4 –General Photo



Photo 15: Opening #4 – Delaminated Concrete



Photo 16: Opening #4 – Close up of delamination



Photo 17: Opening #5 – General Photo



Photo 18: Opening #5 – Photo of Concrete – Horizontal Cracking



Photo 19: Opening #6 –General Photo



Photo 20: Opening #7 – General Photo



Photo 21: Opening #7 – General Photo



Photo 22: Opening #8 – General Photo



Photo 23: Opening #8 – General Photo



Photo 24: Opening #8 – Cracking



Photo 25: Opening #9 – General Photo



Photo 26: Opening #9 – Peeling Coating

LANDMARK
TANK & TOWER SERVICES

3091 Harrison Court
Burlington, Ontario
L7R 3X4

Tel: (905) 319-7700
Fax: (905) 319-1373
www.tankandtower.com

May 12, 2005

Mr. Ralph W. Campbell
Director of Public Works
Township of North Huron
P.O. Box 90
Wingham, ON N0G 2W0

Mr. Campbell:

Re: Wingham Inspection Report No. tt5-21

Enclosed, you will find a detailed report following Landmark Tank & Tower Services' clean and inspection of the Cardinal composite water tower. Conducted on April 25 2005, Landmark Tank & Tower Services provided:

> *...an initial inspection of the standpipe that would clean the sediment, inspect the lower 10' of the interior surfaces and provide a recommended upgrades in a written report, complete with pictures. ...LTTS agreed to include the removal of the panel in the metal cladding and inspect the area of previous spalling.*

The following areas are of note:

Interior Surfaces

- Protective coating on the tank floor has failed
- Minor concrete decomposition evident on tank floor
- Recommend sand blasting existing lining on floor up to 2' above floor/wall joint and apply 2 coats of ICI Devoe 233H Bar-Rust epoxy coating
- Existing patches on the interior walls to 10' and beyond are generally holding. Some minor holidays are evident in the lining and should be monitored over subsequent inspections.
- Evidence of parging on the ceiling disbonding.
- Recommend blasting and coating with a two part 100% solids epoxy filler with a sand agregate.

Exterior Concrete Surface

- Metal profile cladded inspection panel and insulation was removed for inspection.
- Minor staining evident. No deterioration of concrete evident
- Striations of moisture evident on the wall - attributed to the rooftop flashing sealant deterioration.

Systems In Need of Upgrading

- Safety
- Lightning protection
- Tank venting/vacuum

In the following pages we have prepared the attached report that includes the following:

- Summary of report (page 2)
- Detailed report of inspection including recommendations
- Photographic support of inspection

- Before and after photos of cleaning
- Quote for urgently required repairs
- Quote for additional recommended repairs

At this time I wish to thank you for your business and the opportunity to assist you in the maintenance of your water storage facility. In order to maintain the integrity of your facility, **we urge you to schedule your next Clean, Inspect and Report by no later than April 2006**.

Should you have any questions or concerns regarding the enclosed material, or should you wish to schedule any of the necessary repairs and upgrades, please contact me at (905) 719-8872.

Yours very truly,

LANDMARK TANK AND TOWER SERVICES.



Jerry Stark
General Manager

Encl.

LANDMARK
TANK AND TOWER SERVICES
3091 Harrison Court, Burlington ON L7R 3X4
Tel: (905) 719-8872 Fax: (905) 319-1373
Email: slconn1@aol.com

STANDPIPE INSPECTION REPORT

Report No. Wingham TT521

Landmark Contract No.	Inspection Date	Last Inspection Date
TT5-21	25-Apr-05	Unknown
Inspector	**Report Date**	**Reviewed By**
M. Knul	12-May-05	J.Stark

OWNER / CONTACT

Owner	Township of North Huron	**Contact**	Ralph W. Campbell CRS-Int.
Project Location	Wingham	**Title**	Director of Public Works
		Phone	(519) 357-3550
Address	199 Victoria St. E. Wingham, ON	**Fax**	(519) 357-1110
		Email	

TANK DESCRIPTION

				See Photo # for Documentation
Constructor	The Canada Gunite Company Ltd.	**Tank Capacity**	384 650 Imp. Gallons	
Tank Type	Prestressed Concrete	**Year Built**	1974	
DWG's Available	Yes	**DWG's Reviewed**	Yes	
Tank Diameter	28' - 0"	**HWL**	100' - 0"	1
Coating System	Profile Steel Claded	**LWL**	3' - 0"	
Lining System	Cappar 215 Epoxy	**Roof**	106' - 0"	
Number of Rings				

Note

The attached report has been prepared in order to provide the tower owner a detailed description of the following:
The present condition of interior and exterior coatings, any pitting and/or corrosion on the interior of the water retaining vessel, the apparent condition of exposed foundations and the status of, and recommendations for, upgrades on safety procedures, equipment and other appurtenances.

Landmark Tank and Tower Services has not performed a design review, an ultrasonic x-ray, nor destructive and/or non-destructive testing. Comments and recommendations are based on visual inspection only.

REPORT SUMMARY

Legend:

URGENT! Immediate attention required
Repairs strongly recommended
Separate report attached

Repairs Made During Inspection

	Photo No.

	Photo No.

Recommended Repairs

Siteworks

Foundations

Valve Pit / Chamber

	Photo No.
Install Dehumidification Unit	8

Support Structure

	Photo No.
Reseal Flashing at Roof	

Anchorage

Coatings, Linings and Metal Condition

	Photo No.
Interior Floor Blast & Recoat	74

Accessories

	Photo No.
2 exit/entry gates	31
Roof dismount mast	31
Roof handrail	37
Reinforce ladder at roof	69
Fixed rail	31
Trolleys	
Harnesses with lanyards	
Supply retrieval system at rooftop hatch	42
Stretcher	
Replace rooftop hatch	42
Combination vent/vacuum relief unit	43
Remove ladder cage	31
Supply & install new overflow piping	52
Recoat valve in chamber	54
Remove and replace antenna pipe truss	61
Replace ladder bolt sets	

Lightning Protection

	Photo No.
Lightning Protection Required	

Security

	Photo No.
Install ladder gate	

Mixing System

	Photo No.
Dead Zone Analysis	

Chlorine Analysis

Existing Maintenance Contract? No

Thank you for allowing Landmark Tank and Tower Services to assist you in the maintenance of your elevated water storage facility. To maintain the integrity of your facility **we recommend that you schedule your next Clean, Inspect and Report by no later than:**

April-06

		Photo No.
Siteworks		
EXTERIOR VALVE CHAMBER	Good	2
FENCE	Good	3
GATES	Good	4
WALKWAYS	Good	5
OVERFLOW SPILLWAY	Grade Shift at Overflow	6

REPAIRS OR MAINTENANCE REQUIRED

Valve Pit / Chamber

Describe deficiencies in space provided.

DOES THE TANK HAVE A VALVE PIT OR CHAMBER OR BOTH?	Both	7
CONDITION OF VALVE PIT/CHAMBER? WET/DRY	Wet	8
ARE THERE ANY INDICATIONS OF SETTLEMENT?	No	9
IS THE CONCRETE IN THE PIT/CHAMBER CRACKED, SPALLED OR LEAKING?	Yes	10
ARE FOOT ELBOWS ANCHORED OR THRUSTED?	N/A	11
IS THERE ANY INDICATION OF PIPE MOVEMENT?	No	12

REPAIRS OR MAINTENANCE REQUIRED

Install Dehumidification Unit

Foundations

Describe deficiencies in space provided.

HOW FAR DOES THE FOUNDATION EXTEND OUT OF THE GROUND? (Ring Wall)	N/A	13
ARE THERE ANY INDICATIONS OF FOUNDATION SETTLEMENT?	No	14
IS CONCRETE OR GROUT CHIPPED OR CRACKED	N/A	15
IS THE SOIL AT THE BASE SATURATED OR IS THERE PONDED WATER?	No	16
IS THERE ANY INDICATION OF UNDERGROUND PIPE LEAKAGE?	No	17
IS SOIL AT BASE ERODED?	Soil Drop at Overflow	18
IS THE FOUNDATION UNDERMINED OR EXPOSED?	No	19

REPAIRS OR MAINTENANCE REQUIRED

Support Structure

Describe deficiencies in space provided.

CONDITION OF SKETCH PLATE?	N/A	20
IS CYLINDER STRAIGHT?	Yes	21
CONDITION OF ROOF?	Flashing Sealant Deteriorating	22

REPAIRS OR MAINTENANCE REQUIRED

Reseal Flashing at Roof

Anchorage

Describe deficiencies in space provided.

IS BASE PLATE DETERIORATED OR IN POOR CONDITION?	N/A	23
ARE ANCHOR BOLTS & NUTS DETERIORATED OR IN POOR CONDITION?	N/A	24
ARE ANCHOR BOLT CHAIRS DETERIORATED OR IN POOR CONDITION?	N/A	25
ARE ANCHOR BOLTS TIGHT?	N/A	26

REPAIRS OR MAINTENANCE REQUIRED

Accessories

Enter description of condition, N/A for 'not applicable' or N/I for 'not inspected'.

		Photo No.
DOORS	Moderate - Minor Dent	27
HARDWARE	Good	28
ENTRANCE ALARM	N/I	29
LADDER	Corroded Ladder Bolt Sets	30
* To Roof	Remove Ladder Cage	31
* On roof	Reinforce Ladder Mounts	32
SAFETY CLIMB		33
* Type	Poor - Cable	34
EXIT / ENTRY GATES	Poor - None	35
TRANSFER POINTS	Poor - None	36
TROLLEYS	Poor - Cable	37
HARNESS SETS	One - BELTS ARE NOT COMPLIANT	38
VESSEL ENTRY AND RESCUE	Poor-None	39
VESSEL ENTRY AND RESCUE EQUIPMENT	Poor-None	40
LANDINGS	N/A	41
ROOF HATCHES	Poor-Hinges Seized - replace	42
VENT	Insufficient	43
VACUUM RELIEF	Insufficient	44
PAINT RAIL ACCESS	None	45
PAINT RAIL	None	46
TANK ACCESS	Poor	47
HEAT TRACING	N/A	48
INSULATION		49
* Tank	N/I	50
* Riser	N/A	51
RISER AND OVERFLOW PIPING	Poor-Separated Requires Relocating	52
VALVE CHAMBER PIPING	Good	53
VALVE CHAMBER VALVES	Poor - Hand Tool & Recoat	54
TELEMETRY	N/A	55
CATHODIC PROTECTION		
TYPE	N/A	56
MANUFACTURER	N/A	
AIRCRAFT WARNING LIGHTS	Bulbs Need Replacing	57
ANTENNAE		58
* Bell Mobility		59
* Clearnet		60
* Police/Fire	Poor	61
* Microcell		62

			Photo No.
Accessories cont'd			
ELECTRICAL			
* Receptacles		Good	63
* Lights		Exterior Valve Chamber Missing	64
* Panels		Good	65
* Cabinets		Good	66
* Conduits		Good	67
EMERGENCY LIGHTS		N/A	68
OTHER	Roof Handrail	Poor-None	69
LIGHTNING PROTECTION	***SEPARATE REPORT***	Poor-Lightning protection required	70
CHLORINE ANALYSIS	***SEPARATE REPORT***		71
MIXING DEAD ZONE*	***SEPARATE REPORT***	Poor-Dead zone analysis required	72
SECURITY	***SEPARATE REPORT***	Ladder Gate Required	73

REPAIRS OR MAINTENANCE REQUIRED

2 exit/entry gates
Roof dismount mast
Roof handrail
Reinforce ladder at roof
Fixed rail
Trolleys
Harnesses with lanyards
Supply retrieval system at rooftop hatch
Stretcher
Replace rooftop hatch
Combination vent/vacuum relief unit
Remove ladder cage
Supply & install new overflow piping
Recoat valve in chamber
Remove and replace antenna pipe truss
Lightning protection upgrade required
Replace ladder bolt sets

* All standpipe facilities require the installation of a mixing system for the purposes of eliminating dead zones in the tank.

Acknowledgement of Receipt and Understanding

The undersigned acknowledges that they have received, read and accepted the contents within _____
Site Location

Inspection Report No. _____ as prepared for _____
Name of Owner

on the _____ day, of _____, 20_____

Owner Representative (Please Print)	Landmark Tank & Tower Services Representative (Please Print)
Title	Title
Signature	Signature

Ministry of Public Safety and Security

Office of the Fire Marshal

Place Nouveau Building
7th Floor
5775 Yonge Street
North York ON M2M 4J1
Telephone: (416) 325-3221
Facsimile: (416) 325-3213

Ministère de la Sûreté et de la Sécurité publique

Bureau du commissaire des incendies

Édifice Place Nouveau
7e étage
5775 rue Yonge
North York ON M2M 4J1
Téléphone: 416-325-3221
Télécopieur: 416-325-3213

Ontario

RECEIVED FEB 2 4 2003

February 19, 2003

MEMORANDUM TO: Jerry Stark, Landmark

FROM: David Horne, P.Eng., Fire Protection Engineer

SUBJECT: Meeting with Landmark Tank and Tower Services on Lightning Protection Grounding Considerations

---

A meeting was held on February 5, 2003 with Landmark Tank & Tower Services, at 3091 Harrison Court, Burlington. In attendance were Jerry Stark, General Manager and Mike Knul from Landmark and David Horne from the Office of the Fire Marshal (OFM).

Landmark erects large volume, elevated water tanks. Steel tanks are supported on reinforced concrete silos.

Lightning protection is specified for the tanks. It includes two, copper down-conductors that are separated 180^0 and coursed down on the interior surface of the reinforced concrete wall. Bonding is provided to the steel water tank which acts as an air terminal. The down-conductors are connected to ground rods or auxiliary grounds. The water main riser has bonding straps around expansion joints to ensure electrical conductivity. There is an extended section of metal underground main running from the tank. Bonds are provided to metal objects within 6 ft. of the down conductors within the concrete silo supporting structure.

Landmark indicated that the installed lightning protection has been successful in protecting the water towers from the type of structural damage for which this protection was designed. There were cases, however, where damage had occurred to sensitive electronic equipment in or on the water tower. Landmark noted, for instance, that elevated water tanks often support communications equipment on their tank top, may have heating strips within the tank and may have various monitoring equipment mounted within the silo portion of the tank.

In one specific case, damage to sensitive electronic equipment had resulted from a lightning strike remote from the water tower creating surge on the incoming electrical power lines. Landmark indicated that surge protection on incoming power lines had subsequently been provided to protect against further damage to sensitive equipment.

Other cases of damage to sensitive equipment may have been from unwanted currents imposed on nearby equipment by lightning discharges passing along the intended paths to ground. These paths include the installed lightning down-conductors and interconnected metallic paths to ground. Traditional lightning protection can be expected to reduce the likelihood and intensity of such impacts but not eliminate them. Landmark was actively seeking solutions to protect against these problems.

The protection needs of sensitive electronic equipment are outside OFM's expertise and jurisdiction. However, it was noted for the benefit of Landmark's review that many standards and codes identify the importance that grounds for the lightning protection system and for electrical wiring systems and electrical equipment be at a common potential, especially if located in close proximity.

The 23rd Edition(2002) of the Ontario Electrical Safety Code which is a mandatory document in Ontario provides grounding and bonding information.
Some of sections of note are the following.

- 10-702 Artificial Grounding Electrodes—provides in Subrule (1) that artificial grounding electrodes consist of a concrete encased electrode, rod electrode, plate electrode, or similar device. Subrule (6) requires that each artificial grounding electrode be separated at least 2m from any other electrode including an electrode used for signal circuits, radio, lightning protection, or any other purpose.
- 10-706 Spacing or Bonding Electrical and Lightning Rod Systems—identifies the need to keep 2m between lightning rod conductors and electrical conductors or equipment but if the separation is not possible, at least a No.6 AWG copper bond is required between the ground electrodes for the two systems.
- 10-708 Spacing and Bonding of Electrical, Communication, and Community Antenna Distribution System Grounding—requires that artificial electrodes (e.g. ground rods) of electrical, communication, and community antenna distribution systems where used as the grounding means are to be separated a minimum of 2m and bonded with at least No. 6 AWG copper conductor.
- 10-710 Use of Lightning Rods—requires that lightning protection conductors or their grounds are not to be used for grounds of wiring systems or electrical equipment.

CAN/CSA-B72-M87, Installation Code for Lightning Protection Systems also provides grounding and bonding information. This is not a mandatory standard in Ontario.
Some of the more relevant sections are the following.

6.7 Common Grounding

- 6.7.1 General—requires that the lightning protection grounding system and the grounding of other systems be interconnected to obtain a common ground.
- 6.7.2 Electric-Service Ground—requires at least one ground of the lightning protection system be interconnected with the ground electrode of the electric service with a buried copper conductor of at least No. 6 AWG.
- 6.7.3 Telephone Protective Ground—requires at least one ground of the lightning protection system be interconnected with the ground electrode of the communications service with a buried copper conductor of at least No. 6 AWG.
- 6.7.4 Where Water Pipes are Present—requires that the lightning protection grounding system be connected to the metallic underground water-piping system for the structure.
- 6.7.5 Other Grounding Mediums—requires that all other grounding mediums be bonded to the lightning protection system. Pipes with cathodic protection require special attention.

National Fire Protection Standard 780-2000 Edition, "Lightning Protection Systems" also provides comments on grounding. This is not a mandatory standard in Ontario.
Of interest are the comments on common grounding.

3.14 Common Grounding

- 3.14.1 General—requires that all grounding media in or on a structure be interconnected to provide a common ground potential. This includes lightning protection, electric service, telephone and antenna system grounds, as well as underground metallic piping systems. Underground metallic piping systems includes water service, well casings located within 25-ft of the structure, gas piping, underground conduits, underground liquefied petroleum gas piping systems and so on. Interconnection to a gas line is to be made on the customer's side of the meter. Main-size lightning conductors are to be used for interconnecting these grounding systems to the lightning protection system.
- 3.14.2 Common Ground Bondings—provides that where electric, Community Antenna Television (CATV), data, telephone, or other systems are bonded to a metallic water pipe, only one connection from the lightning protection system to the water pipe system is required, provided that the water pipe is electrically continuous between all systems. If the water pipe is not electrically continuous due to the use of plastic pipe sections or other reasons, the nonconductive sections are to be bridged with main-size conductors, or the connection is to be made at a point where electrical continuity is ensured.

The Lightning Rods Act of Ontario and its Regulations, which are mandatory in Ontario, do not identify common bonding between different grounding systems. The content of the Regulation predates the growing concern for the protection of sensitive equipment and is focused on the protection of the structure against the major destruction possible from lightning strikes.

The Regulation requires that lightning protection grounds be a minimum of 6 ft from groundings of electric equipment or electric-wiring systems. Subsection 31.(3) goes on to say that underground water pipes could be used as a common grounding between the lightning protection system and electric equipment or electric-wiring systems . Subsection 32.(1) requires that where an underground water pipe is available, a down-conductor shall be connected to it underground and outside any building.

While the Regulation does not identify common bonding between grounding systems, it does comment in Subsection 31(3) on common grounding of systems with the presence of underground water pipes. The final outcome would be grounding systems at the same potential. This has been deemed by other codes and standards as a desirable feature to reduce the impacts from lightning strikes. The installation of a ground loop with two auxiliary grounds has been identified in the Regulation as a means to achieve lightning protection grounding in high challenge soil conditions. Connection of the grounding loop to lightning protection down-conductors together with bonding of the ground loop to the underground water pipe and to grounding systems for electric equipment or electric-wiring systems would ensure that the grounding systems were at the same potential.

Dave Hum



01 Overview.jpg



02 Valve Chamber Exterior.JPG


06a Overflow & Antenna Conduit.JPG


06b Overflow & Antenna Conduit.JPG


06c Overflow & Antenna Conduit at Grade.JPG


07b Valve Chamber.JPG


07c Valve Chamber .JPG


18a Tank Shell at Grade.JPG


18b Tank Shell at Grade.JPG



82f Floor Linings.JPG



82k Floor Linings.JPG



82p Floor Decomposition Patch..JPG



84 Hatch Interior.JPG



18d Tank Shell at Grade.JPG



31a Ladder to Roof.JPG



31b Ladder to Roof Bolt Sets.JPG



31c Ladder to Roof.JPG



31e Ladder to Roof.JPG



55e Valve Chamber Ladder Anchor.JPG



61e Rooftop Antenna.JPG



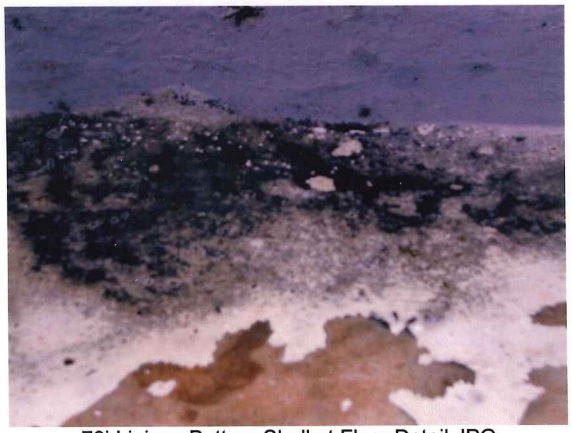
74a Shell Exterior Condensation.JPG



74f Shell Exterior Staining.JPG



78e Linings Bottom Shell.JPG



78j Linings Bottom Shell at Floor Detail.JPG



79c Linings Middle Shell.JPG



79g Linings Middle Shell Holiday.JPG



82a Floor Linings.JPG



31f Ladder to Roof.JPG



31g Ladder to Roof.JPG



31h Ladder to Roof.JPG



31j Ladder at Roof.JPG



31k Ladder at Roof.JPG



31l Ladder Support at Roof.JPG



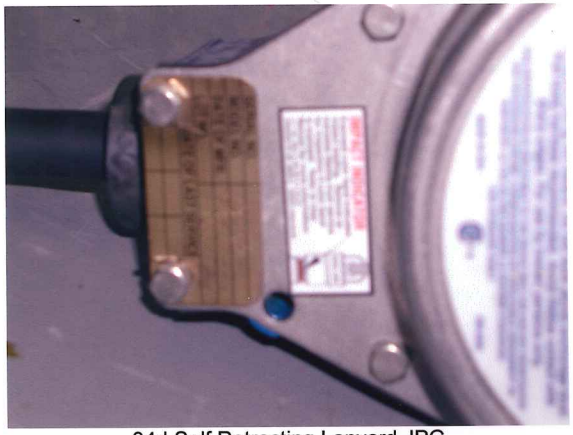
31m Ladder Support at Roof.JPG



34b Self Retracting Lanyard Detail.JPG



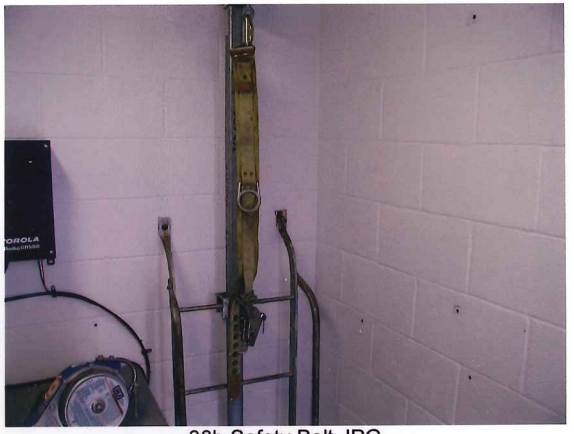
34c Self Retracting Lanyard.JPG



34d Self Retracting Lanyard.JPG



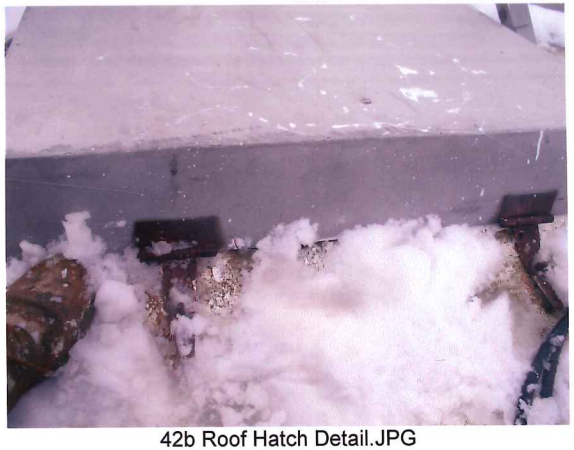
34e Ladder Anchor.JPG



38b Safety Belt.JPG



42a Roof Hatch.JPG



42b Roof Hatch Detail.JPG



42c Roof Hatch Detail.JPG



43 Rooftop Vent.JPG



47 Tank Access During Cleaning.JPG



50a Cladding.JPG



18c Tank Shell at Grade.JPG



31d Ladder to Roof and Overflow Split.JPG



31i Ladder at Roof.JPG



34a Self Retracting Lanyard.JPG



38a Full Body Harness.JPG



42d Roof Hatch Detail.JPG



50c Cladding.JPG



50h Inspection Panel & Insulation Reinstalation.JPG



54b Valve Chamber Valve Block.JPG



50b Cladding.JPG



50d Inspection Panel.JPG



50e Inspection Panel & Insulation Removal.JPG



50f Inspection Panel & Insulation Removal.JPG



50g Inspection Panel & Insulation Removal.JPG



52a Riser.JPG



53a Valve Chamber Piping & Valve.JPG



53b Valve Chamber Piping & Valve.JPG



54a Valve Chamber Valve Block.JPG



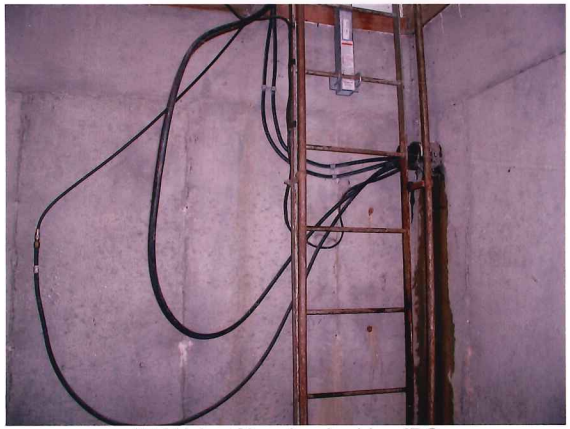
55a Valve Chamber Ladder.JPG



55b Valve Chamber Ladder Anchors.JPG



55c Valve Chamber Ladder.JPG



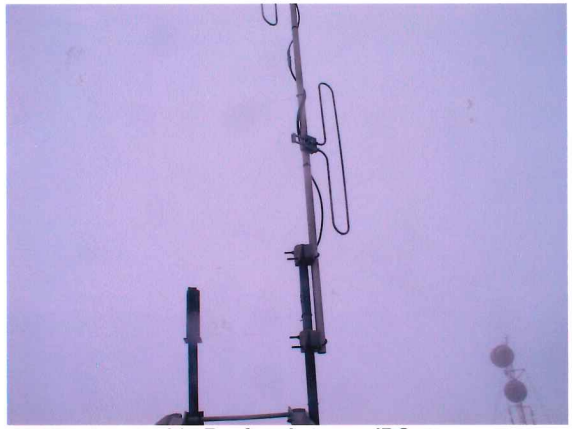
55d Valve Chamber Ladder.JPG



61a Rooftop Antenna.JPG



61b Rooftop Antenna.JPG



61c Rooftop Antenna.JPG



61d Rooftop Antenna Cables.JPG



66a Electrical Cabinets.JPG



66b Electrical Cabinet.JPG



66c Electrical Cabinets.JPG


67 Electrical Conduit on Ladder to Roof.jpg


74b Shell Exterior Staining.JPG


74c Shell Exterior Staining.JPG


74d Shell Exterior Staining.JPG


74e Shell Exterior Staining.JPG


78a Linings Bottom Shell.JPG


78b Linings Bottom Shell.JPG



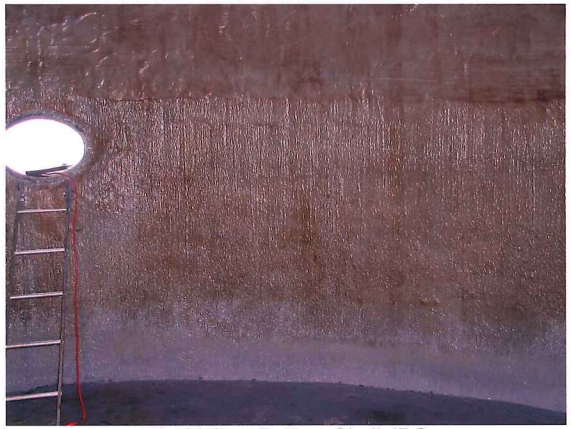
78c Linings Bottom Shell.JPG



78d Linings Bottom Shell.JPG



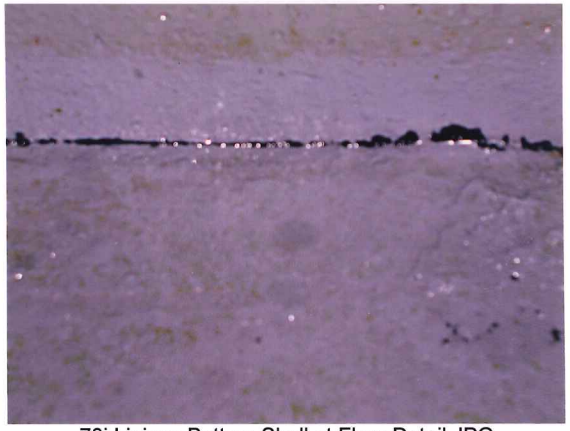
78f Linings Bottom Shell.JPG



78g Linings Bottom Shell.JPG



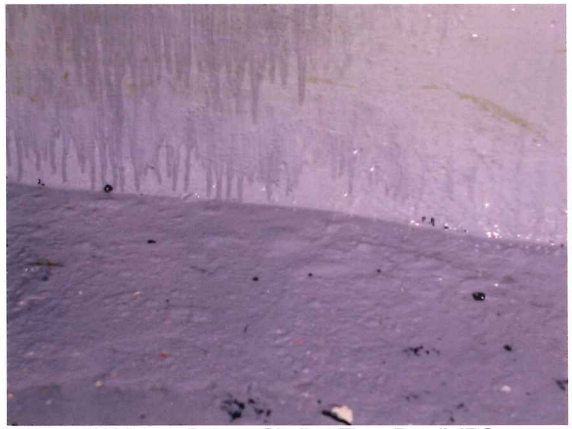
78h Linings Bottom Shell at Floor Detail.JPG



78i Linings Bottom Shell at Floor Detail.JPG



78k Linings Bottom Shell at Floor Detail.JPG



78l Linings Bottom Shell at Floor Detail.JPG



79a Linings Middle Shell.JPG



79b Linings Middle Shell Holiday Detail.JPG



79d Linings Middle Shell Holiday.JPG



79d Linings Middle Shell.JPG



79e Linings Middle Shell Holiday Detail.JPG



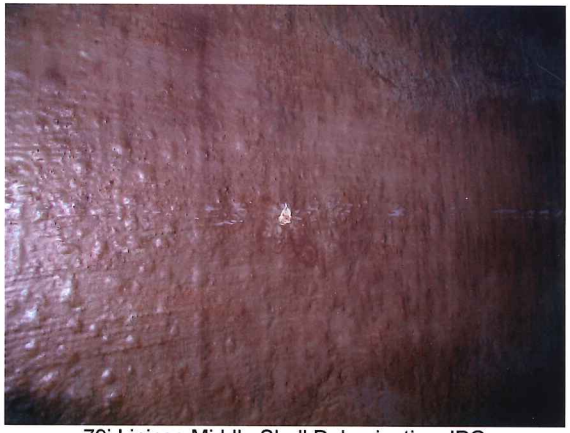
79f Linings Middle Shell Holiday.JPG



79h Linings Middle Shell Holiday.JPG



79i Linings Middle Shell Holiday.JPG



79j Linings Middle Shell Delamination.JPG



80a Linings Upper Shell.JPG



82b Floor Linings.JPG



82c Floor Linings.JPG



82d Floor Linings.JPG



82e Floor Linings.JPG



82g Floor Linings.JPG



82h Floor Linings.JPG



82i Floor Linings.JPG



82j Floor Linings.JPG



82l Floor Linings.JPG



82m Floor Concrete Decomposition.JPG



82n Floor Decomposition Patch.JPG



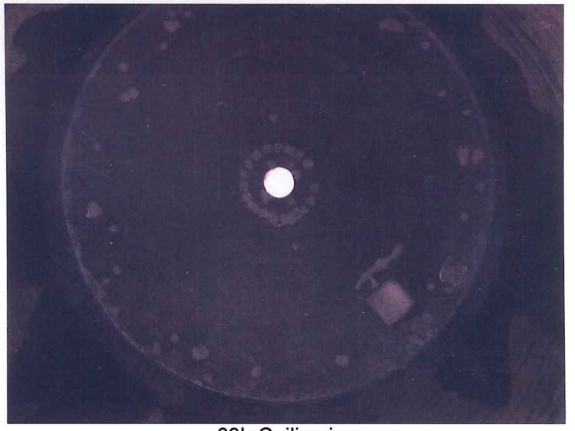
82o Floor Decomposition Patch..JPG



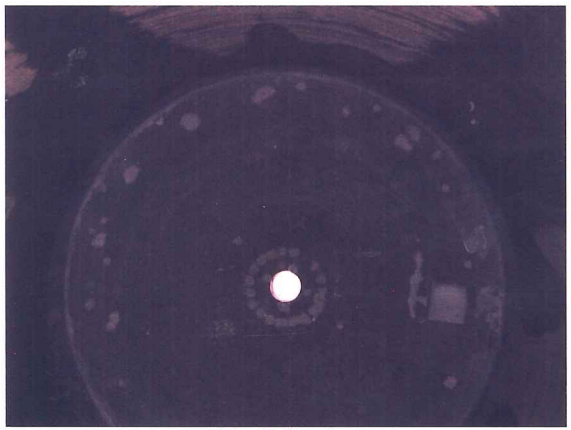
82q Floor Decomposition Patch..JPG



83a Ceiling.jpg



83b Ceiling.jpg



83c Ceiling.jpg



Before Clean 01.JPG



Before Clean 02.JPG



Before Clean 03.JPG



Before Clean 04.JPG

PROPRIETARY AND CONFIDENTIAL INFORMATION PROTECTION NOTICE

TO The Customer

(1) Landmark Tank and Tower is the OWNER of Proprietary and Confidential information contained in the documents to which this Notice is appended or attached. These documents are the intellectual property of Landmark Tank and Tower, its heirs, successors or assignees.

(2) To further the business relationship between the OWNER, Landmark Tank and Tower, and customers including owners, operators and managers of water towers in Ontario and elsewhere, it will be necessary to disclose certain confidential information regarding processes and designs which are the creative effort of Landmark group of companies.

(3) Confidential or proprietary information or materials includes methodologies, designs, scientific and technical information pertaining to any application for which any drawing, specification, system or design in a bid package delivered to a contracting party for the purpose of a tender on a project.

(4) The materials prepared by Landmark Tank and Tower disclosing proprietary and confidential information include, but are not limited to documents, drawings, photographs, layouts, computer programs, research, technical specifications, sketches, designs and lists that are furnished to the recipient for the purpose of quoting work and jobs and contracts. In many instances these documents will have been prepared in furtherance and contemplation of specific designs and applications for the recipient customers who are the owners, operators and managers of water towers.

(5) These materials have been developed by the OWNER, Landmark Tank and Tower, other companies within the Landmark group of companies and other parties in the employ of Landmark or under contract with Landmark and they represent expertise, trade secret information, engineered drawings, work product, designs and specifications, industrial designs and accumulated know-how of employees and representatives of Landmark Tank and Tower. These materials are protected as confidential information and are disclosed for the limited and exclusive use of the customer to evaluate a design or bid of Landmark Tank and Tower.

(6) The customer shall not disclose or communicate to any third party Confidential or Proprietary information that is the subject of this Notice. Any use of this information other than to evaluate terms of contracts with the OWNER is prohibited by the owner and is a breach of the proprietary rights of the OWNER.

(7) This information is not publicly available and may additionally be protected by copyright and author's rights. Copying of these documents is prohibited by the OWNER except with the express written permission of the OWNER for the limited purpose(s) agreed upon with the OWNER.

(8) On termination of contractual relations between the parties, if requested the customer shall return or destroy all copies in its possession of confidential materials as enumerated herein.

(9) The customer acknowledges that Landmark Tank and Tower would be irreparably harmed by a breach of the terms of this Notice.

(10) Misuse of confidential or proprietary information within the enclosed documentation or breach of the terms of this Notice entitle Landmark Tank and Tower or its designates to take legal action against parties who misuse or misappropriate such information including action taken without notice to the offending party, to seek equitable relief including injunctive relief. Such remedies shall not be exclusive remedies but shall be in addition to any other remedies available at law or equity.

(11) The terms of this Notice are intended to protect the Confidential and Proprietary information included in a bid by Landmark Tank and Tower on contracts which have come to tender and form part of the documentation submitted in support of such bids. This Notice is effective for any current tender or future tender of the customer for which the expertise, trade secret information, engineered drawings, work product, designs and specifications, industrial designs and accumulated know-how of the OWNER would apply.

(12) The terms of this Notice are deemed to be sufficient notice and accepted without exception or change by any party in possession of the documents to which this notice is appended.

Landmark Tank and Tower Services

LANDMARK
TANK & TOWER SERVICES

3091 Harrison Court
Burlington, Ontario
L7R 3X4

Tel: (905) 319-7700
Fax: (905) 319-1373
www.tankandtower.com

May 12, 2005

Mr. Ralph W. Campbell
Director of Public Works
Township of North Huron
P.O. Box 90
Wingham, ON N0G 2W0

Quote # 533

Mr. Campbell:

In accordance with the attached inspection report (No. tt521), I am providing you with this estimate for the repairs to the Wingham standpipe that require your immediate attention. These deficiencies and recommendations were outlined in red in the report.

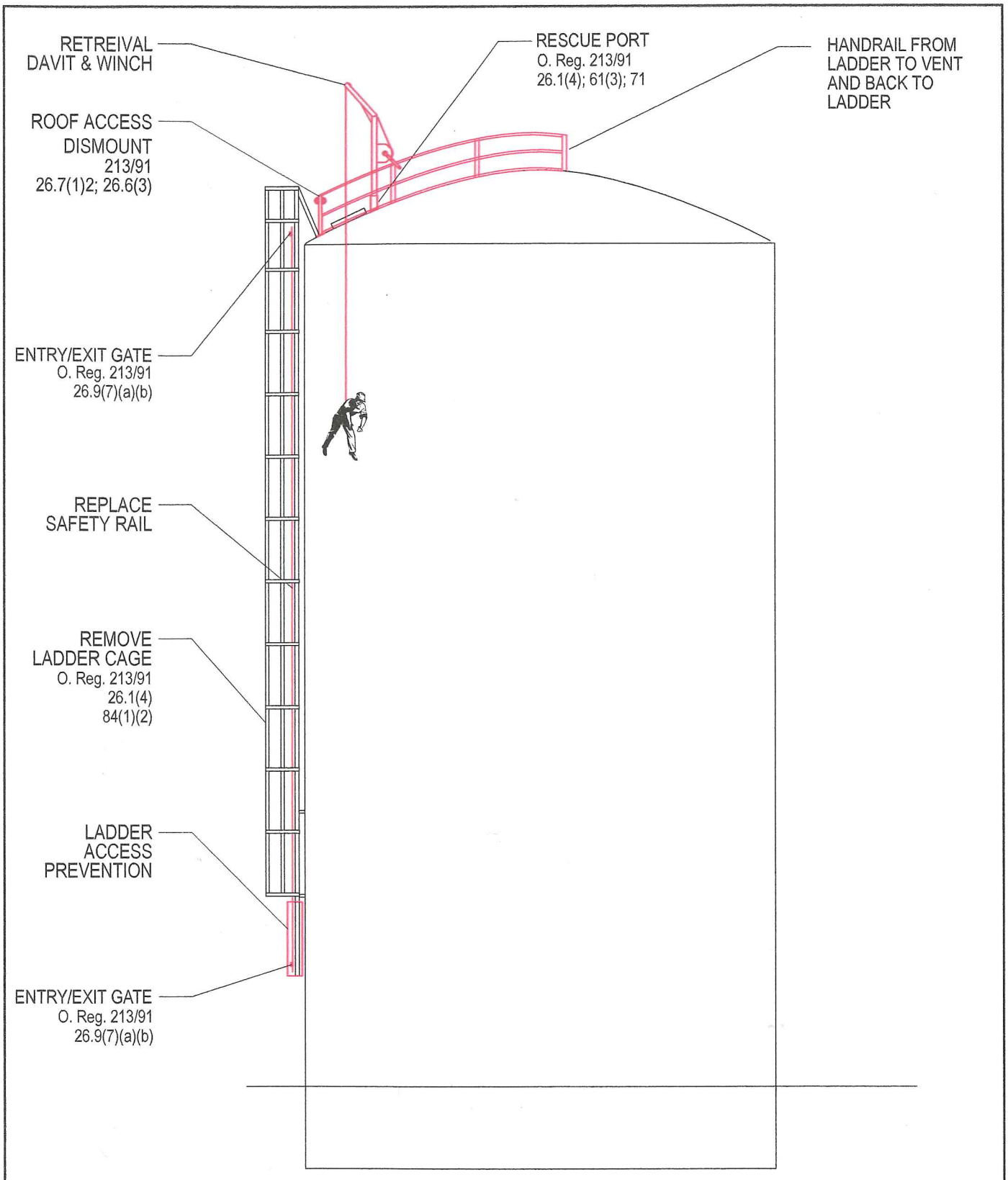
Accessories:	Replace Rooftop Hatch	4 300
	Design, Supply and Install Combination Vent/Vacuum Relief Unit	8 200
	Design, Supply and Install Stainless Steel Overflow Piping	$ 24 000
Coatings & Linings:	Interior Floor Full System Replacement	$2.00 sq ft. To Be Determined
Lightning Protection:	Tank Grounding & Upgrade Required	$ 14 500
Security:	Supply and Install Ladder Gate	$ 2 400
	Total Estimate (G.S.T Not Included)	**$ 53 400+**

It is our opinion that this list constitutes the areas of the tower that are in substandard condition whereby failure to rectify the problems swiftly, will result in non-compliance with regulatory codes and/or contribute to greater structural damage. To schedule this necessary maintenance with Landmark Tank & Tower Services, please contact us at 905-719-8872.

Yours very truly,

LANDMARK TANK AND TOWER SERVICES

Jerry Stark
General Manager



Rev.	Date	WINGHAM STANDPIPE	SAFETY IMPROVEMENTS		
		CLIMB tech LIMITED	Date MAY 2005	Dwn. MRK	
				Chk.	

CLIMB tech LIMITED

May 12, 2005

Mr. Ralph W. Campbell
Director of Public Works
Township of North Huron
P.O. Box 90
Wingham, ON N0G 2W0

Quote #5-21 Wingham Standpipe

To provide tower modifications and supply safety equipment to The Township of North Huron in order to bring their Wingham standpipe water storage facility into compliance with Ontario Regulation 213/91 (in Part) of the Occupational Health and Safety Act.

Modifications

(As outlined in the Landmark Tank & Tower Services inspection report number tt521)

Accessories

Design, Supply and Install One Roof Dismount Mast
Design, Supply and Install One Rescue Port
Design, Supply and Install 40 linear feet of Rooftop Handrail
Supply and Install 85 linear feet of Fixed Rail
Supply and Install 2 Exit/Entry Gates
Supply and Install Stainless Steel Bolt Set on Ladder Standoffs
Remove Ladder Cage

$ 14 750.00

Equipment

Roof Rescue

1 UCL 10001 Centre Post
1 UCL 14587 Adjustable Off Set Upper Mast 12" to 29"
1 UCL 10757 Channel Quick Mount
1 UCL 13330 Carrying Bag

Winch

1 UCL 11649 Digital 200 Series c/w usage & brake wear indicator
1 UCL 12271 Cable 200' Stainless Steel
1 UCL 13327 Carrying Bag

Fall Arrest

1 ASR 35012C Cocoon Stretcher
2 E650-77 Miller Full Body Harnesses
4 Miller Backbiter Lanyard with Snap Hooks at both ends
2 Miller Trolleys for Aluminum Suretrac Rail
1 DMM International DSD-25 Descent Device
c/w 200' Kernmantel Rope, Bag and Carabiner
3 CDBSH106 Levitt Safety Steel Carabiner - Self Closing Manual Lock

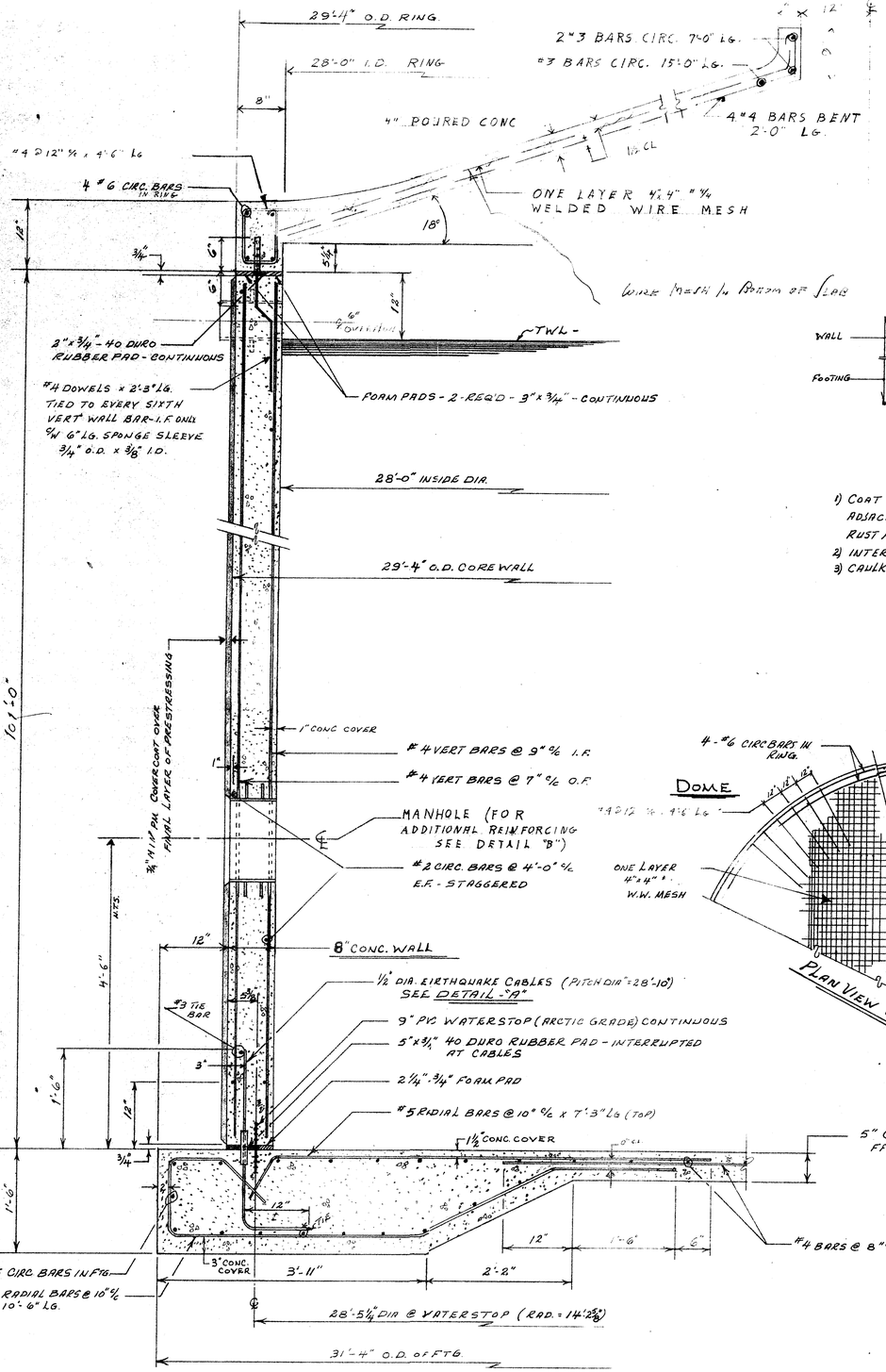
$ 10 850.00

2387 Copperwood Drive, Oakville, Ontario, L6M 4S9 ☎ 905-825-8024 905-825-3616 905-979-8104

Submittal Package Complete With Engineered Drawings And Equipment Orientation		**Included**
	Total	**$ 25 600.00**

Taxes Extra Where Applicable

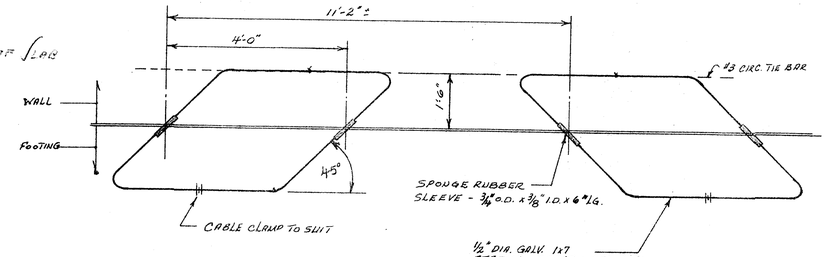
HORIZONTAL PRESTRESSING WIRE - No. 8 GA. (.162" DIA. DRAWN TO .148" DIA. OR .134" DIA DRAWN TO .122" DIA. WITH AN INITIAL STRESS = 140,000 PSI AND A FINAL STRESS = 105,000 PSI (124 KIPS/FT. @ BTM OF WALL)



TYPICAL STANDPIPE SECTION
1" = 1'-0"

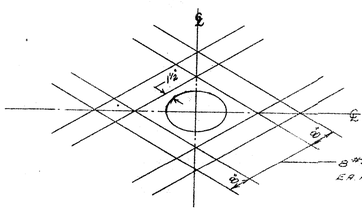
NOTES

1) P.M. DENOTES PNEUMATIC MORTAR WITH A COMPRESSIVE CYLINDER STRENGTH = 4500 PSI @ 28 DAYS
2) PS DENOTES PRESTRESSING
3) CONCRETE - FOOTING & FLOOR = 3000 PSI @ 28 DAYS
- ROOF — " — = 3500 " " "
- WALL — " — = 4000 " " "

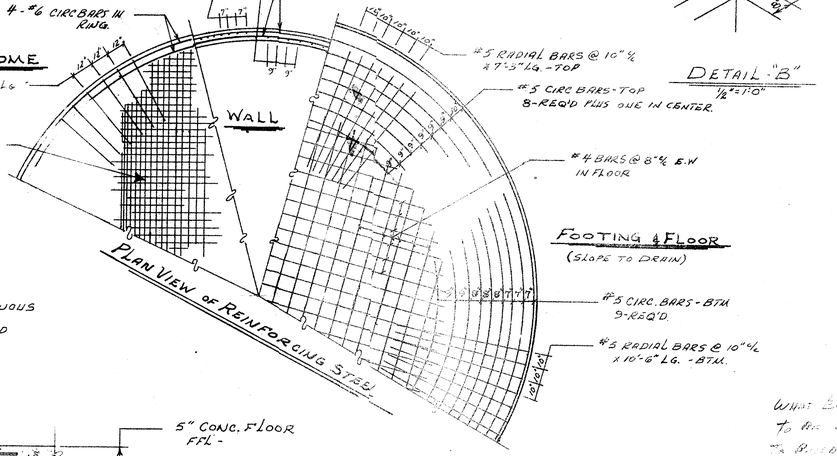


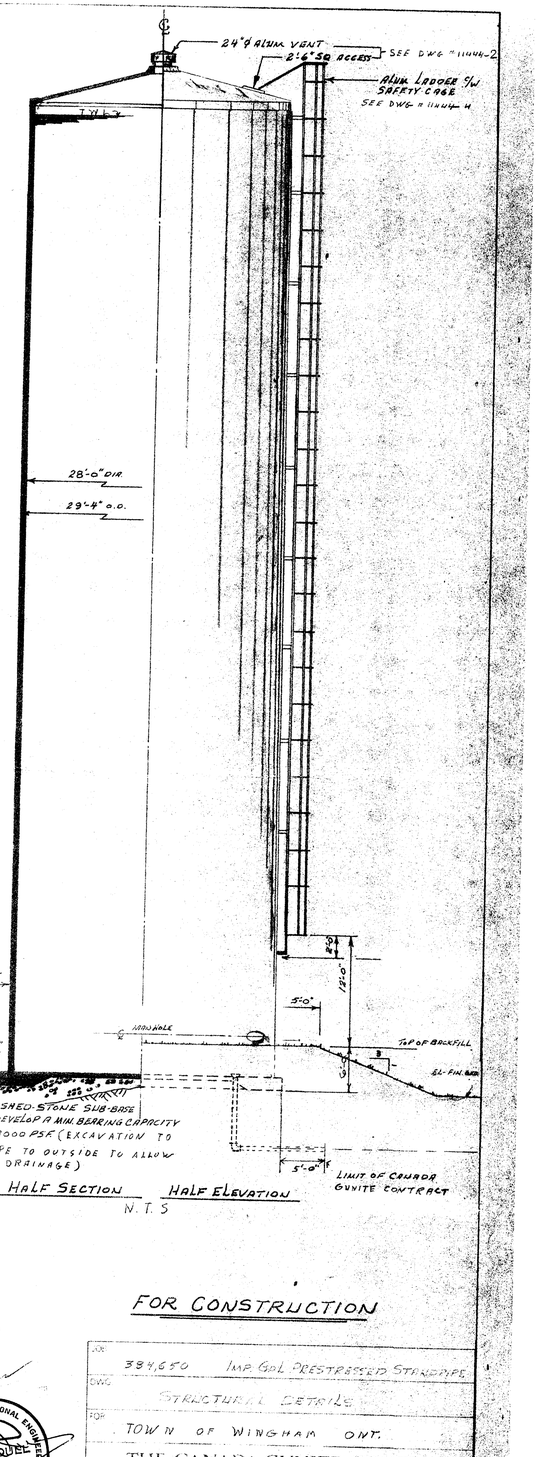
DETAIL "A"
N.T.S.

1) COAT CABLES UNDER SLEEVE AND 6" ADJACENT TO SLEEVE WITH AN APPROVED RUST PROTECTIVE COATING.
2) INTERRUPT RUBBER PAD AT SLEEVES
3) CAULK ALL CREVISES WITH AN APPROVED MASTIC



DETAIL "B"
1/2" = 1'-0"





HALF SECTION HALF ELEVATION
N.T.S

What Blocks in the Tank
to be Set At-15 ft Apart
To be Based on Compacted Gravel
At Completion to Original Depth!

June 2/77
Checked Footing Loads + Capacity, Dome Loadings
Cursory Check of Walls, Not Dir. Not Op.
Detail Check on Prestressing Wire in Walls

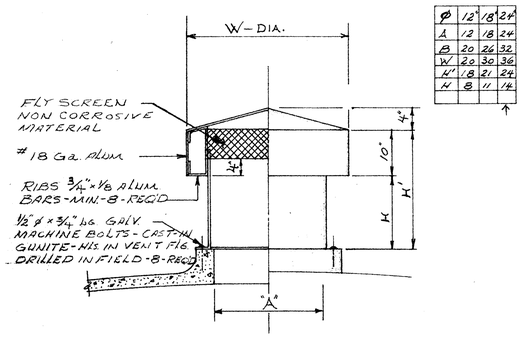
REGISTERED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

FOR CONSTRUCTION

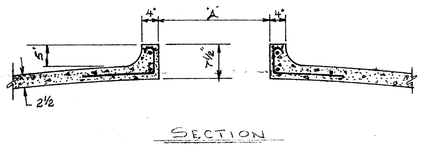
JOB	384,650 IMP. GAL PRESTRESSED STANDPIPE
DWG	STRUCTURAL DETAILS
FOR	TOWN OF WINGHAM ONT.
	THE CANADA GUNITE CO. LTD.
	TORONTO MONTREAL BURLINGTON CALGARY
DRAWN	G-6615
SCALE	11444 - 1

REVISION

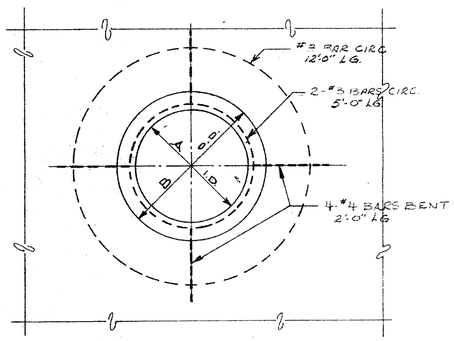
Ø	12"	18"	24"
A	12	18	24
B	20	26	32
W	20	30	36
H'	18	21	24
H	8	11	14



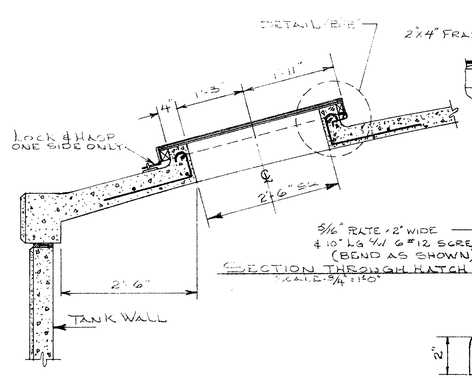
DOME VENT
SCALE - 3/4" = 1'-0"

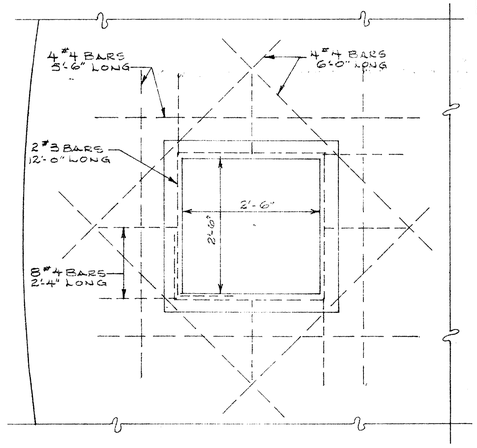


SECTION



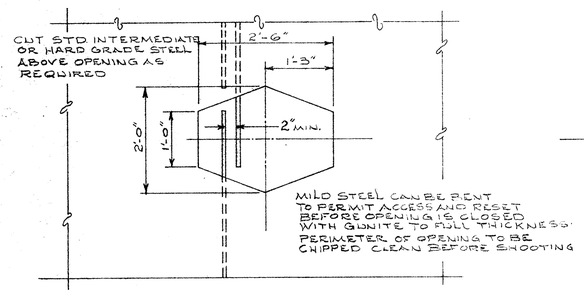
PLAN VIEW OF OPENING AND ADDITIONAL REINFORCING



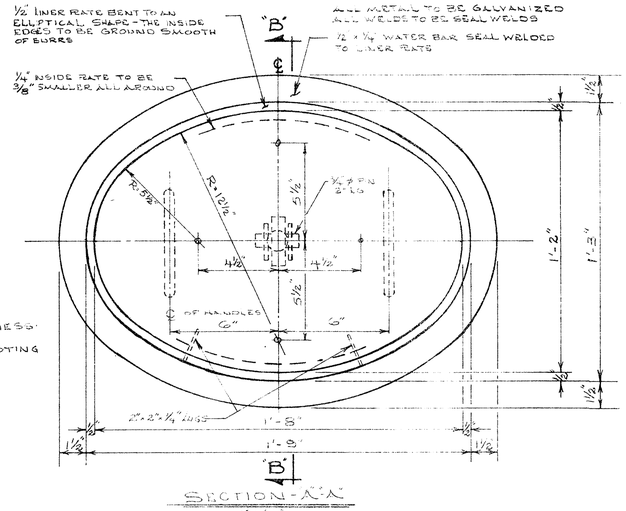


PLAN OF DOME HATCH SHOWING REINFORCING STEEL
SCALE 3/4" = 1'-0"

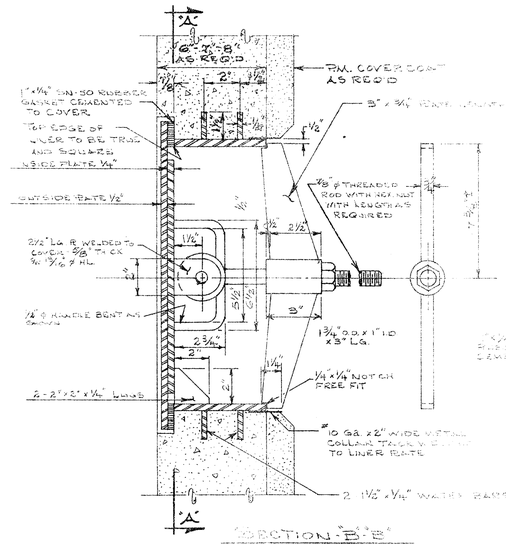
REPLACE STD. INTERMEDIATE OR HARD GRADE BARS WITH MILD STEEL BARS-SAME DIA.-LAPAS SHOWN AND SHOOT IN AROUND OPENING



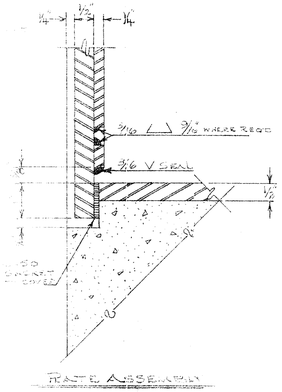
TEMPORARY ACCESS OPENING FOR PRESTRESSED TANKS



SECTION-"B"-"B"
1" = 1'-0"



SECTION "A"-"A"



RATE ASSEMBLY

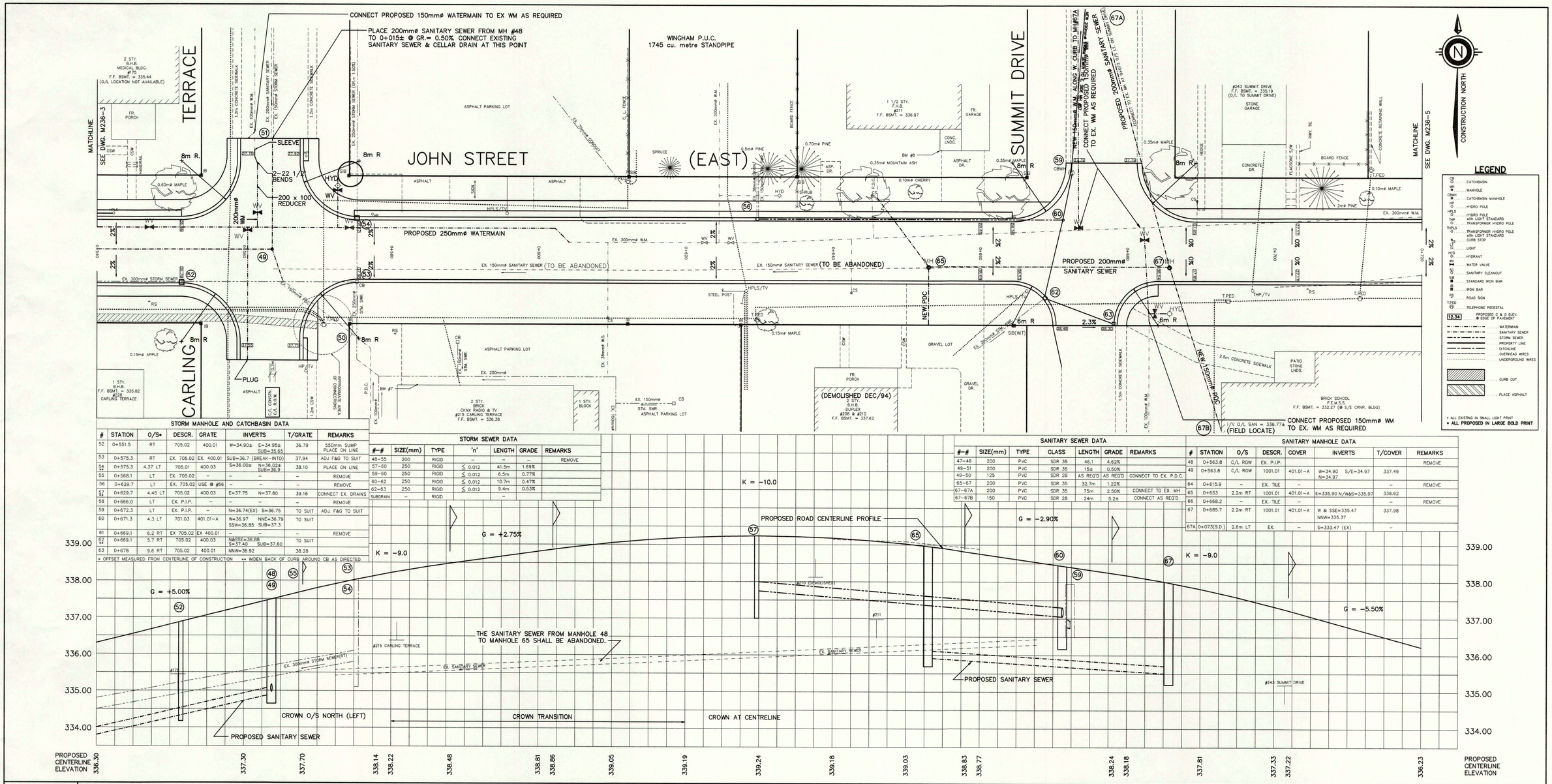
REGISTERED PROFESSIONAL ENGINEER
R. M. DOULL
PROVINCE OF ONTARIO

FOR CONSTRUCTION

JOB 384,650 IMP GAL. PRESTRESSING STANDARD
DWG STD. STRUCTURAL DETAILS OF OPENINGS
FOR TOWN OF WINGHAM ONT.

THE CANADA GUNITE CO. LTD.
HALIFAX MONTREAL BURLINGTON CALGARY

DRAWN	DATE	SCALE	ORIG. FILE G 6515	JOB NO
[illegible]		AS NOTED	ORIG. FILE NO 1144	DWG NO - 2
S-14-74				



STORM MANHOLE AND CATCHBASIN DATA

#	STATION	O/S*	DESCR.	GRATE	INVERTS	T/GRATE	REMARKS
52	0+551.5	RT	705.02	400.01	W=34.90± E=34.95± SUB=35.65	36.79	550mm SUMP PLACE ON LINE
53	0+575.3	RT	EX. 705.02	EX. 400.01	SUB=36.7 (BREAK-INTO)	37.94	ADJ F&G TO SUIT
54 **	0+575.3	4.37 LT	705.01	400.03	S=36.00± N=36.02± SUB=36.8	38.10	PLACE ON LINE
55	0+568.1	LT	EX. 705.02	–	– –	–	REMOVE
56	0+629.7	LT	EX. 705.02	USE @ #56	– –	–	REMOVE
57 **	0+629.7	4.45 LT	705.02	400.03	E=37.75 N=37.80	39.16	CONNECT EX. DRAINS
58	0+666.0	LT	EX. P.I.P.	–	– –	–	REMOVE
59	0+672.3	LT	EX. P.I.P.	–	N=36.74(EX) S=36.75	TO SUIT	ADJ. F&G TO SUIT
60	0+671.3	4.3 LT	701.03	401.01–A	W=36.97 NNE=36.79 SSW=36.85 SUB=37.3	TO SUIT	
61	0+669.1	6.2 RT	EX 705.02	EX 400.01	– –	–	REMOVE
62 **	0+669.1	5.7 RT	705.02	400.03	N&SSE=36.88 S=37.40 SUB=37.60	TO SUIT	
63	0+678	9.6 RT	705.02	400.01	NNW=36.92	38.28	

* OFFSET MEASURED FROM CENTERLINE OF CONSTRUCTION ** WIDEN BACK OF CURB AROUND CB AS DIRECTED

STORM SEWER DATA

#–#	SIZE(mm)	TYPE	'n'	LENGTH	GRADE	REMARKS
48–55	200	RIGID	–	–	–	REMOVE
57–60	250	RIGID	≤ 0.012	41.5m	1.69%	
59–60	250	RIGID	≤ 0.012	6.5m	0.77%	
60–62	250	RIGID	≤ 0.012	10.7m	0.47%	
62–63	250	RIGID	≤ 0.012	9.4m	0.53%	
SUBDRAIN	–	RIGID		–		

SANITARY SEWER DATA

#–#	SIZE(mm)	TYPE	CLASS	LENGTH	GRADE	REMARKS
47–49	200	PVC	SDR 35	46.1	4.62%	
49–51	200	PVC	SDR 35	15±	0.50%	
49–50	125	PVC	SDR 28	AS REQ'D	AS REQ'D	CONNECT TO EX. P.D.C.
65–67	200	PVC	SDR 35	32.7m	1.22%	
67–67A	200	PVC	SDR 35	75m	2.50%	CONNECT TO EX. MH
67–67B	150	PVC	SDR 28	24m	5.2±	CONNECT AS REQ'D

SANITARY MANHOLE DATA

#	STATION	O/S	DESCR.	COVER	INVERTS	T/COVER	REMARKS
48	0+563.8	C/L ROW	EX. P.I.P.				REMOVE
49	0+563.8	C/L ROW	1001.01	401.01–A	W=34.90 S/E=34.97 N=34.97	337.49	
64	0+615.9	–	EX. TILE	–		–	REMOVE
65	0+653	2.2m RT	1001.01	401.01–A	E=335.90 N/W&S=335.97	338.92	
66	0+668.2	–	EX. TILE	–		–	REMOVE
67	0+685.7	2.2m RT	1001.01	401.01–A	W & SSE=335.47 NNW=335.37	337.98	
67A	0+673(S.D.)	2.6m LT	EX.	–	S=333.47 (EX)	–	

67B √V O/L SAN = 336.77± (FIELD LOCATE) CONNECT PROPOSED 150mmø WM TO EX. WM AS REQUIRED

NOTES

BENCH MARKS :

BM #7 – TOP NORTHEAST CORNER OF CONCRETE DOOR SILL @ NORTHWEST MANDOOR TO CKNX
ELEVATION = 339.052

BM #8 – TOP SOUTHWEST CORNER OF CONCRETE LANDING @ SOUTHEAST MANDOOR @ HOUSE #211
ELEVATION = 339.301

ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH THE MUNICIPALITIES STANDARDS OR APPLICABLE ONTARIO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. SEE SPECIFICATIONS FOR DETAILS.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

NO.	REVISIONS	APP'D	DATE
1	AS CONSTRUCTED – 0+480 TO EAST CORPORATE LIMIT	BVO	NOV 1, 1995

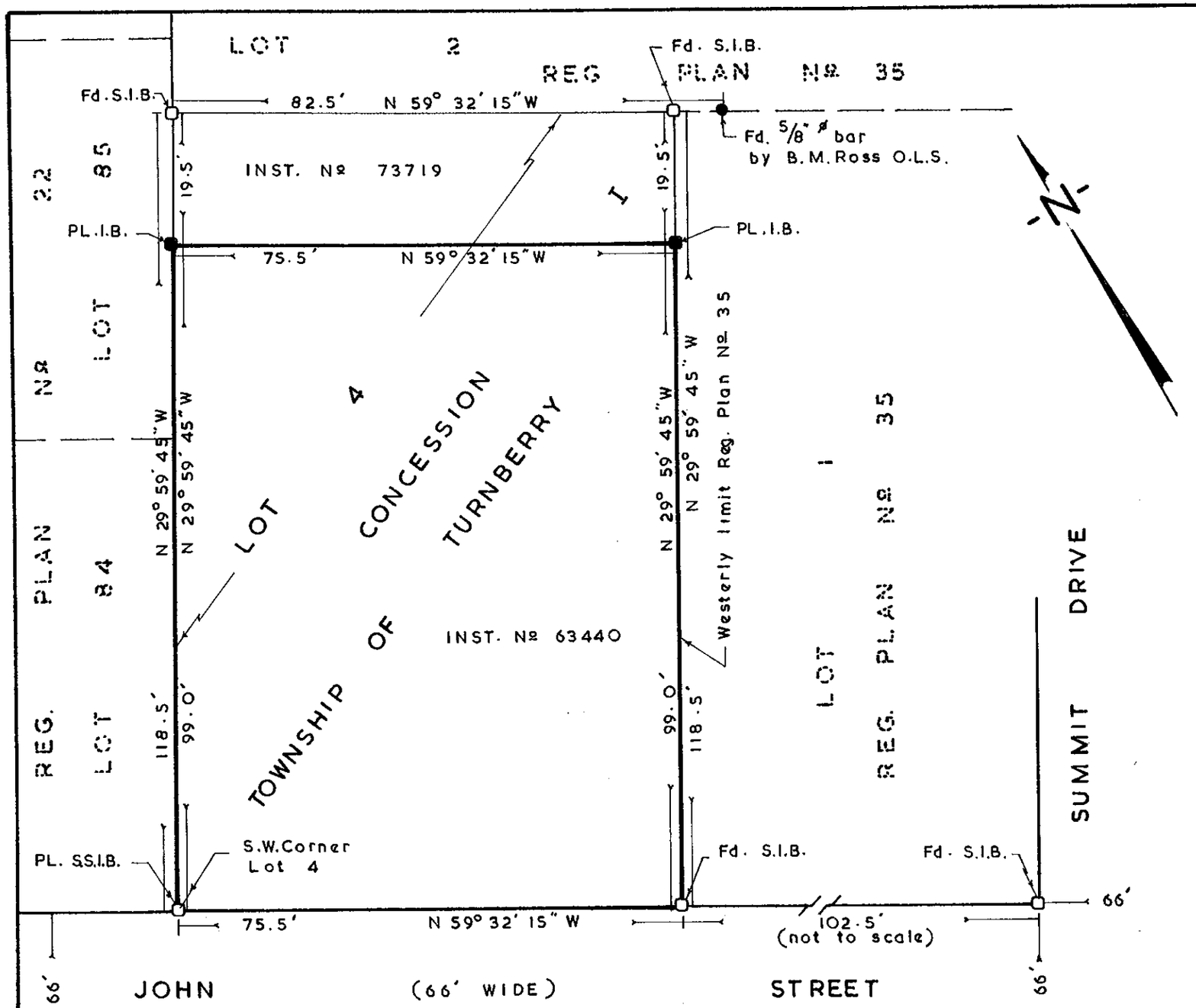
A.W.CLARK P.ENG. J.A.McBRIDE P.ENG.

CLIENT
CORPORATION OF THE TOWN OF WINGHAM

MAITLAND ENGINEERING SERVICES LTD.
WINGHAM, ONTARIO

TITLE
PLAN & PROFILE
JOHN STREET EAST RECONSTRUCTION
(STATION 0+540 TO 0+720)

DRAWN	B.V.O.	DWG.NO.	M236-4
DESIGNED	B.V.O./J.R.D.	SCALE	HORZ. = 1:250 VERT. = 1:50
CHECKED	J.R.D./J.A.M.	DATE	JANUARY 1995
ISSUED			



PLAN OF SURVEY

OF PART OF LOT 4, CONCESSION I
TOWNSHIP OF TURNBERRY
NOW IN THE TOWN OF WINGHAM
COUNTY OF HURON
SCALE - 1" = 20'

NOTE:

1. ⊕ S.I.B. denotes 1" square by 4' long iron bar
2. ● I.B. denotes 5/8" square by 24" long iron bar
3. Fd. S.I.B. and Fd. I.B. denotes bars previously pltd. by B.M. Ross O.L.S.
4. Bearings shown hereon are astronomic and are referred to the west boundary of Lot 4, Con. I, Township Of Turnberry having a bearing of N 29° 59' 45" E

SURVEYOR'S CERTIFICATE

I hereby certify that:

1. This survey & plan are correct and in accordance with The Surveys act, The Registry act and the regulations made thereunder.
2. The survey was completed on the 20 th. day of September 1973

16 Oct 73
Dated
Goderich Ontario

C. R. Kiar
C. R. Kiar
Ontario Land Surveyor

B. M. Ross O.L.S.
Goderich Ontario

13012061

73 – 212