

CONTRACT DOCUMENTS

Hamilton Island Bridge Replacement Project

CONTRACT NO. 26-4001A

MOHAWK COUNCIL OF AKWESASNE

October, 2026

Prepared by

Jacobs Consultancy Canada Inc.
121 King Street West, Suite 2100
Toronto, ON M5H 3T9
Canada
Office - 416-499-9000



INSTRUCTIONS TO TENDERERS

SECTION 1

TABLE OF CONTENTS

PAGE NO.

1.	GENERAL INVITATION	1
2.	DESCRIPTION OF WORK.....	3
3.	TENDER DEPOSITS OR BID BOND	3
4.	PERFORMANCE AND PAYMENT BONDS	4
5.	SALES TAXES	4
6.	INSURANCE	4
7.	TENDER FORM REQUIREMENT	6
8.	DISCREPANCIES	6
9.	ADDENDA	6
10.	AWARD OF TENDER	7
11.	WORKPLACE SAFETY & INSURANCE BOARD	7
12.	DELETION FROM CONTRACT	8
13.	WARRANTY PERIOD	8
14.	FEES FOR CHANGES IN THE WORK.....	8
15.	CONTRACT SIGNING	8
16.	BRIDGE CROSSING TOLL CHARGE.....	9
17.	EXISTING UTILITIES.....	9
18.	LIQUIDATED DAMAGES	9
19.	RECORDS.....	10
20.	REVIEW OF SHOP DRAWINGS.....	10
21.	OPERATION AND MAINTENANCE MANUALS.....	11
22.	CERTIFICATE OF COMPLETION.....	12
23.	SCHEDULE	12

1. GENERAL INVITATION:

The Mohawk Council of Akwesasne invites qualified contractors to submit a tender for the Hamilton Island Bridge Replacement Project (Project No. 26-4001A). This tender package sets out the instructions, requirements, procedures, and conditions governing the preparation and submission of bids and the subsequent award and execution of the Contract. Tenderers are expected to carefully review all Contract Documents, drawings, specifications, addenda, and supporting information to ensure a complete understanding of the scope of work and project requirements. By submitting a Tender, the Tenderer acknowledges that it has thoroughly examined the Contract Documents, has satisfied itself as to the conditions affecting the Work, and agrees to be bound by the requirements, terms, and conditions contained herein. The Mohawk Council of Akwesasne is committed to a fair, transparent, and competitive procurement process that supports the successful delivery of a high-quality bridge replacement project for the community.

The intent of this package is to obtain an offer to perform work to complete:

The replacement of the Hamilton Island Bridge which connects Hamilton Island to County Road 2 via Hamilton Island Road. Works include the construction of a new conventional Slab-on-Steel girder bridge that will replace the existing open steel grate deck bridge.

The Contract Documents are identified as:

Mohawk Council of Akwesasne
Hamilton Island Bridge Replacement
Project No. 26-4001A

Prepared by:

Jacobs Consultancy Canada Inc.

Offers signed under seal, executed and dated, will be received by The Mohawk Council of Akwesasne at the Department of Infrastructure, Housing, and the Environment, Cornwall Island Administration Building No. 3, Cornwall Island, Ontario before **11:00 a.m. local time, on the 10th day of December, 2026**. Extension of submission will only be considered if requested in writing by contractor and approval through addendum by The Mohawk Council of Akwesasne at the Department of Infrastructure, Housing, and the Environment.

Address Bids to:

Leslie Papineau, OAA, MRAIC, Director
Department of Infrastructure, Housing, and Environment
Mohawk Council of Akwesasne
101 Tewasateni Road
Akwesasne, Ontario K6H 0G5

Title of Project:

Mohawk Council of Akwesasne
Hamilton Island Bridge Replacement
Project No. 26-4001A

- Tenders may be submitted electronically or in hardcopy , and all items must be bid, unless the tender specifically permits otherwise, with the price for every item clearly shown.
- The insertion of written or typed additions to the tender forms, by the Tenderer, will invalidate the tender.
- All bids must be submitted on the appropriate “Form of Tender” bound with this document

Directions:

Completely fill in all blank spaces in the Tender documents.

State numbers in words as well as figures where requested.

The Officer of the Bidding Firm must sign the Tender Form in longhand and affix the Corporate Seal.

Completed Tender shall be without interlineations, alterations, mathematical errors, or erasures.

Tenders which are late or which fail to comply with requirements of the Tender Documents shall be considered informal and may be rejected.

Tender Forms and enclosures, which are improperly prepared, may be declared informal.

Failure to provide security deposit and/or insurance requirements may result in the tender being declared informal.

Bids are by invitation only, from selected tenderers. Bids from unsolicited tenderers may be returned unopened.

Each item in the Tender Form shall be a reasonable price for each item under no circumstances will an unbalanced tender be considered. The Construction Manager and/or Engineer will be judges of such matters and should any tender be considered to be unbalanced, then it will be rejected.

When requested by the Owner or Consultants, satisfactory evidence of authority of any signatory on behalf of the Tenderer shall be furnished. In the event that the Tenderer is in partnership or joint venture, its execution of the contract shall constitute the agreement of each partner to be jointly and severally.

Upon obtaining Bid Documents, each Tenderer shall designate an address or telephone/fax number to which the addenda should be directed.

Before Submitting Tender, Tenderer Shall:

Carefully examine all drawings and specifications and include in the quotation sufficient sums to cover the cost of all items included in the Contract.

2. DESCRIPTION OF WORK

The work to be done under this contract consists of supplying all materials, all required equipment, labour and services for the construction of all facilities and appurtenances, as shown on the Contract Drawings and specified herein. Coordinate with the Construction Manager with respect to all other Contractors working on related works, as appropriate, to ensure the orderly replacement of Hamilton Island Bridge.

The tender covered by this document includes the following general scope of work.

Hamilton Island Bridge Replacement No. 26-4001A – The Works include the construction of a new Slab-on-Steel girder bridge that will replace the existing open steel grate deck bridge. Includes roadway realignment, temporary in-water work including installation/removal of temporary cofferdam, localized rock embankment removal, placement of rock embankment and re-grading/reinstatement/upgrade to all roadway works within the right-of-way and work zone as shown on Contract drawings.

3. TENDER DEPOSITS OR BID BOND

Each tender shall be accompanied by a tender deposit in the form of a certified cheque, bank draft or money order made payable to the Mohawk Council of Akwesasne, as follows:

- For First Nation contractors in the form of a certified cheque, bank draft or money order for **10% of the total tender price, to a maximum of \$20,000.**
- For all other contractors as a **Bid Bond for an amount equal to 10% of the total tender price.**

The tender deposit or Bid Bond **MUST BE ENCLOSED IN THE SAME ENVELOPE AS THE TENDER.** A tender which does not comply with these requirements shall be considered an improper tender and may be rejected.

The tenderer agrees that in submitting his tender, the required certified cheque, bank draft, money order or bid bond is a fair estimate of damages that may be incurred by the Council as a result of the tenderer failing to enter into the required Contract.

All tender deposits or bid bonds will be returned to the respective tenderers within ten days after the tenders have been opened, except the deposit or bid bond of the tenderer which the Council elects to retain as the successful tenderer. If the tenderer fails to enter into a contract

- where a certified cheque was provided for bid surety, the cheque will be cashed and the funds used to make up the difference between the low bid and the next acceptable bid up to the value of the cheque. Unused funds will be returned to the issuer.
- where a Bid Bond was provided for bid surety, the Bonding Company will make up the difference between the low bid and the next acceptable bid up to the value of the bond.

The tender deposit of the successful tenderer will be returned when he has fully complied with the conditions outlined in the tender documents.

4. PERFORMANCE AND PAYMENT BONDS

A performance bond in an amount equal to one hundred percent (100%) of the total tender price with a satisfactory Guarantee Surety Company, authorized to carry on business in the Province of Ontario and Quebec, will be required for the faithful performance of the Contract, including the maintenance and warranty period of one (1) year from the date of Substantial Performance.

A labour and material bond in an amount equal to one hundred percent (100%) of the total tender price with a satisfactory Guarantee Surety Company, authorized to carry on business in the Province of Ontario or Quebec, will be required for the faithful payment of all labour and materials related to this Contract.

For native contractors who, because of the Indian Act, are unable to obtain a Performance Bond, an alternate arrangement may be accepted by Council upon receipt of proof of refusal to bond from two bonding companies. The acceptable alternative arrangement will be a performance deposit in the form of a certified cheque, bank draft or money order made payable to the Mohawk Council of Akwesasne for an amount equal to 10% of the total tender price, to a maximum of \$20,000. An irrevocable letter of credit from a bank or an approved financial institution in favour of Mohawk Council of Akwesasne for the amount indicated shall also be acceptable.

5. SALES TAX

This project is to be constructed on Mohawk Territory of Akwesasne therefore is exempt from Provincial and Federal Sales Taxes including the Goods and Services Tax.

6. INSURANCE

The Tenderer shall provide proof that their personnel are fully covered under the Workers Compensation Act, and that their company and workers carry liability and property damage insurance.

Provide a signed “undertaking of insurance” on a standard form provided by the Insurance Company stating their intention to provide insurance to the Tenderer in accordance with the insurance requirements of the Contract Documents.

The Tenderer shall procure and maintain “**All Risk and Liability Insurance**” in accordance with **Sections 20 and 21** of the General Conditions and the requirements set out below unless otherwise specifically stated in the Contract.

The tenderer whose tender has been recommended to the Owner for acceptance shall, on receipt from the Owner of the Agreement for execution, procure and maintain All Risk and Liability Insurance and shall file with the Owner, together with the Agreement executed by him, a Cover Note of such All Risk Insurance and a Certificate of Liability Insurance. The Contractor shall file with the Owner prior to the first progress payment the original policy of such All Risk Insurance or a Certificate of Insurance clearly stating that the requirements hereof. Insurance shall be obtained from a company satisfactory to the Owner.

**INSTRUCTIONS
TO
TENDERERS**

- (a) The All Risk Insurance shall:
- (1) comply with the requirements of the "Specification for All Risk Insurance" as attached hereto, which specification shall form part of the said policy of All Risk Insurance.
 - (2) be maintained until the Date of Completion of the works has been established as set out in Certificate of Completion and M.C.A. has notified the Tenderer in writing that the Owner has arranged its own All Risk Insurance coverage of the permanent works.
- (b) The Liability Insurance shall:
- (1) have a limit of liability of not less than **\$3,000,000** inclusive for any one occurrence;
 - (2) be Comprehensive Liability Insurance covering all operations and liability assumed under the Contract with the Owner;
 - (3) not contain any exclusions or limitations in respect of shoring, underpinning, raising or demolition of any building or structure, pile driving, caisson work, collapse of any structure or land from any cause;
 - (4) include insurance against liability for bodily injury and property damage caused by vehicles owned by the Contractor and used on the work, and in addition, shall include insurance against liability for bodily injury and property damage caused by vehicles not owned by the Contractor and used on the work. Each such insurance shall have a limit of liability of not less than **\$5,000,000** inclusive for any one occurrence. A "vehicle" shall be as defined in the Highway Traffic Act of the Province of Ontario;
 - (5) be endorsed to provide that the policy or policies will not be altered, cancelled or allowed to lapse without thirty days written notice to the Owner;
 - (6) be endorsed to include the Owner, the Construction Manager, the Engineer and the Geotechnical Sub-consultant as additional named insured.

NOTE: All insurance shall be obtained from companies satisfactory to the Council. The Contractor will pay for all premiums and expense incurred with the insurance. A certified copy of such insurance policy shall be furnished to the Construction Manager before any work is commenced.

7. TENDER FORM REQUIREMENTS

The Contractor, in submitting the price, agrees to complete the Work by the date indicated in the Contract Documents, but may suggest a revision to the Contract Time with an adjustment to the overall price. The Owner requires that work under this contract be completed within the time period stated.

Tenderers shall be solely responsible for the delivery of their Tenders in the manner and time prescribed. Contractor shall accept sole responsibility for any error or neglect to include any sums.

Submit **one** copy of the executed Tender on the forms provided, signed and corporate sealed in a closed opaque envelope, clearly identified with tenderers name, project name, and Owners name on the outside.

A list of submitted tenders will be made public, following tender opening. Offers will be opened publicly immediately after the time for receipt of tenders.

Indicate the amount of Native content in your tender as an actual value amount.

Quotations from Tenderers shall not contain any recapitulation of work to be done. No oral or telephone proposals or modifications will be considered. Neither the Consultant nor Engineer nor Owner shall be responsible for oral instructions.

8. DISCREPANCIES

Tenderers finding discrepancies or omissions in the drawings, in the specifications, or any other documents, or doubts as to the meaning or intent of any information thereof, shall notify the consultant. Any questions or concerns must be received three (3) working days before tender close. All clarifications, instructions, or explanations will be sent to all tenderers.

Direct Inquiries To:

Augustin Yun, P.Eng.

Email: Augustin.Yun@jacobs.com

9. ADDENDA

An Addendum may be issued during the Tender period. All addenda are part of the contract documents and all costs shall be included in the final price. Verbal answers are only binding when confirmed by written addenda.

Clarifications requested by bidders must be in writing **not less than three days before date set** for receipt of bids. The reply will be made in the form of an addendum.

10. AWARD OF TENDER

The Owner will not entertain requests for gratuitous payments arising from errors alleged to have been in the accepted tender.

Amendments to a submitted offer will be permitted if received in writing prior to Tender closing and if endorsed by the same party or parties who signed and sealed the offer.

Under no circumstances will tenders be considered which are received after the local time in the advertised closing date for Tenders.

Tenders once opened in the presence of the Consultant/Owner/And Witness, shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the bid closing date. After this time, the tender may only be accepted with the consent of the successful tenderer.

The Owner has the right to accept or reject any or all offers. After acceptance, the Mohawk Council of Akwesasne will issue a letter of intent to enter into a contract for the work.

It is a condition of the tender that Mohawk labour or Mohawk sub-contractors are used for this project wherever possible. Preference will be given to tenders within the project budget, which have the highest Mohawk labour content.

The Owner may, in its sole and absolute discretion, waive any informality or irregularity. The Owner may also negotiate any of the provisions of a Bid with the respective Bidder. Negotiations may result in changes to a Bid without necessarily entering into similar negotiations with any or all other bidders.

Upon award of tender, the Contractor shall be required to submit upon request, **within 48 hours** from tender opening, additional breakdowns of the lump sum prices indicated in the Form of Tender. These additional breakdowns will be used for the purposes of establishing monthly payments. The Engineer reserves the right to modify any items that appear unbalanced.

The Contractor shall commence work at the site within **seven calendar days** of receipt of the letter of intent.

Failure by the Contractor to meet the above requirements will entitle M.C.A. to cancel the award of the contract due to the Contractor's default. M.C.A. may then award the contract to one of the other bidders or take such action as it chooses.

M.C.A. reserves the right to reject the tender of any bidder who does not furnish satisfactory evidence of sufficient experience to successfully execute and fully complete the work within the specified time.

11. WORKPLACE SAFETY & INSURANCE BOARD

The Contractor shall, at the time of entering into any contract with the M.C.A., furnish a satisfactory clearance certificate from Workers Safety & Insurance Board (WSIB) stating that all assessment or compensation payable to the WSIB has been paid. Also at any time during the performance and upon completion of such contract, upon request from M.C.A., the Contractor shall furnish a satisfactory clearance certificate from WSIB as outlined above.

12. DELETION FROM CONTRACT

The Mohawk Council of Akwesasne reserves the right to delete up to 20% of the work from the Contract should it be deemed in the interest of the Council to do so without basis for negotiation.

13. WARRANTY PERIOD

The Contractor guarantees and warrants that with ordinary wear and tear the said work shall for a period of **12 months**, unless otherwise specified, from the date of completion as set out in the Certificate of Completion, remain in such condition as will meet with the approval of the Construction Manager and the Engineer, and that he will, upon being required by M.C.A. make good, in a manner satisfactory to the Construction Manager, any imperfections therein due to materials used in the construction thereof or workmanship. The decision of M.C.A. as to the nature, extent and cause of such imperfections and the necessity for remedying the same shall be final.

Should the Contractor fail to comply with the directions of M.C.A., the latter may perform the necessary work after giving the Contractor **twenty-four (24) hours written notice**. In the event of an emergency, of which M.C.A. shall be the sole judge, M.C.A. may forthwith without notice perform the necessary work and the cost of such work in either event may be deducted or collected by M.C.A.

If M.C.A. notifies the Contractor in writing of any imperfections prior to the termination of the guaranteed maintenance period, the Contractor shall make good the imperfections as specified above, notwithstanding that the work of making good may commence after or extend beyond the end of the **12 month** period.

14. FEES FOR CHANGES IN THE WORK

The Sub-contractor performing changes in the work is entitled to 10% to cover both overhead and profit.

Duplication of overhead and profit will not be permitted between subtrades, as occurs, for example, when a plumbing subtrade is in turn a subtrade of the ventilation subtrade, or vice-versa. Fees for changes to the work will be paid on actual cost, plus percentages stated above.

15. CONTRACT SIGNING

Sole proprietorship: Signature of sole proprietorship in the presence of witness who will also sign. Insert the words "Sole Proprietorship" under signature, affix seal.

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

Limited Company: Signature of all duly authorized signing authorities in their normal signatures. Insert the capacity in which each signing officer acts against each signature. Affix the Corporate Seal.

If the tender is signed by officials other than the President and Secretary of the Company, or the President - Secretary - Treasurer of the Company, a copy of the by-law resolution of the Board of Directors authorizing them to do so must also be submitted with the tender envelope.

If the Contractor/Sub-contractor is a joint venture, each party to the joint venture shall execute the Project seal in the manner appropriate to such party.

16. BRIDGE CROSSING TOLL CHARGE / PASSPORTS

Payment of toll charges or similar fees shall be the responsibility of the Contractor/Sub-contractor /Sub-trades. As of January 2001 toll fees are not applicable when delivering materials or goods destined for Mohawk Council of Akwesasne projects.

It is the contractor's responsibility to comply with the requirements of the Canadian and US Border Agencies, security and goods transportation requirements.

17. EXISTING UTILITIES

Further to the General Conditions of Contract, the following shall apply:

No responsibilities will be assumed by M.C.A. for the correctness or completeness of the plans with respect to the existing utilities, pipes, or other objects. The Contractor shall have no claim on this account. M.C.A. does not ensure the accuracy of such information and the Contractor shall not make any claim against M.C.A. for damages or extra work caused or occasioned by his relying upon such records, reports or information either as a whole or in part.

18. LIQUIDATED DAMAGES

a) Time - Time shall be of the essence of this agreement.

b) Progress of the Work and Time for Completion

The Contractor shall substantially complete this Contract by November 3, 2028. See Item #23 for Schedule.

If the time period above specified is not sufficient to permit completion of the work by the contractor working a normal number of hours each day or week on a single day light shift basis, it is expected that additional and/or augmented daylight shifts will be required throughout the life of the Contract to the extent deemed necessary by the Contractor to ensure that the work will be completed by the completion date specified. Any additional costs occasioned by compliance with these provisions will be considered to be included in the prices bid for the various items of work and no additional compensation will be allowed therefore.

An extension of time may be granted in writing by the Council in the event of the work being delayed beyond the prescribed date for completion. Such extensions shall be for such time as the Construction Manager may prescribe and the Council shall fix the terms on which the said extension may be granted. An application for an extension of time shall be made in writing by the Contractor to the Construction Manager at least fifteen (15) days prior to the date of completion fixed by the Contract. The Construction Manager will recommend to the Council acceptance or rejection of the request. The date of expiry of all bonds or other surety furnished to the Council by the Contractor, shall be extended at the expense of the Contractor, to at least two (2) months beyond the extended date of completion, and the Contractor shall furnish the Council with evidence of such extension of the bond or other surety.

Any extensions of time that may be granted to the Contractor shall be so granted and accepted without prejudice to any rights of M.C.A. whatsoever under this Contract, and all such rights shall continue in full force and effect after the time limited in this Contract for completion of the work and whenever in this Contract power or authority is given to M.C.A. or the Construction Manager or any person to take any action consequent upon the act, default, neglect, delay, breach, non-

observance or non-performance by the Contractor in respect of the work of contract or any portion thereof.

Such powers or authorities may be exercised from time to time, and not only in the event of the happening of such contingencies before the time limited in this Contract for the completion of the work but also in the event of the same happening after the time so limited in the case of the Contractor being permitted to proceed with the execution of the work under an extension of time granted by M.C.A. In the event of M.C.A. granting an extension of time, time shall continue to be deemed of the essence of this contract.

It is agreed by the Parties to the Contract that in case all the work called for under the Contract is not finished or completed by the completion date as specified above, damage will be sustained by the Council and that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the Council will sustain in the event of, and by any reason of, such delay and the parties hereto agree that the Contractor will pay to the Council the sum of **One Thousand Dollars (\$1,000.00)** for each and every **working day** beyond the completion date specified above that the work remains uncompleted and it is agreed that this amount is an estimate of the actual damage to M.C.A. which will accrue during the period in excess of the prescribed completion date.

M.C.A. may deduct any amount due under this paragraph from monies that may be due, or payable to the Contractor on any account whatsoever. The liquidated damages under this paragraph are in addition to, and without prejudice to, any other remedy, action or other alternative that may be available to M.C.A.

The Contractor shall not be assessed with Liquidated Damages for any delay caused by Acts of God, or of the Public Enemy, Acts of the Province or of a Foreign State, Fire, Flood, Epidemics, Quarantine Restrictions, Embargoes or delays of Subcontractors due to such causes.

If the time required for the completion of the work is increased or decreased by reason of alterations or changes in the work required to be performed under this Contract, the completion date shall be increased or decreased as determined by M.C.A.

The actual completion date shall be the date on which the work is accepted by the Construction Manager and the Engineer.

19. RECORDS

As work progresses, maintain accurate records to show deviations from contract drawings. Supply one set to the Department of Infrastructure, Housing, and the Environment.

20. REVIEW OF SHOP DRAWINGS

The Contractor (or sub-contractor or equipment supplier acting on behalf of the Contractor) shall submit to the Contract Administrator in accordance with procedure/requirements in the relevant OPSS/CSA and tender items, all shop, working or setting drawings required in order to make clear the work proposed. The Construction Manager will make the submission of the drawings to the Engineer on behalf of the Contractor. The Contractor shall make all changes in such drawings that the Construction Manager or the Engineer may require and resubmit such drawings to the Construction Manager for additional review. Any drawings submitted by the Contractor (or sub-contractor or equipment supplier acting on behalf of the Contractor) directly to the Engineer, will not be reviewed and will be returned as unacceptable. Any shop drawing not reviewed and stamped by the contractor shall be returned as unacceptable.

When submitting such drawings, the Contractor shall notify the Construction Manager in writing of all respects in which such drawings differ from the requirements of the Contract or from previously notified requirements of the Construction Manager. The Construction Manager's review of such drawings shall not be construed as approval of such differences unless the Contractor has identified all changes and deviations and unless the Construction Manager has specifically approved such differences in writing.

The Construction Manager's and the Engineer's review of such drawings shall not relieve the Contractor from responsibility for the correctness of the drawings or the adequacy of the details shown on the drawings.

Work shall not be carried out before the Engineer's review of the shop and working drawings relating to such work has been completed.

The review pertains to general design only. Errors in dimensioning, quantity or inaccuracies do not relieve the Contractor from responsibility to complete work to the Consultant's satisfaction.

Do not commence manufacture nor order materials before shop drawing and samples are reviewed.

Responsibility for errors, omissions or deviations from requirements of Contract documents is not relieved by the Engineer's review of submittal.

21. OPERATION AND MAINTENANCE MANUALS

Assemble, coordinate, bind and index required data into Operations and Maintenance manuals.

Submit in binder, with identified subsections the following data:

- Maintenance Instruction for finished surfaces and materials
- Copy of hardware and paint finishes
- Written warranties of all materials used
- Written labour warranty

Supplier's names, addresses, and telephone numbers and components supplied by them must be included. All components must contain a description and be identified by manufacturer's part or supply number.

Include one complete set of final shop drawings indicating corrections and changes made during fabrication and installation.

Submit complete Operation and Maintenance manuals to Engineer **two (2) weeks prior** to application for Interim Certificate of Completion of project.

Submit copies in typed English and organize data into some numerical order as contract specifications. Drawings, diagrams and manufacturer's literature must be legible.

Material: Label each section with tabs protected with celluloid covers fastened to hard paper dividing sheets.

Binders: Vinyl, hard covered, 3 "D" ring, loose leaf, sized for 215mm x 280mm paper, with spine pockets. Identify contents of each binder on spine.

22. CERTIFICATE OF COMPLETION

1. On the date that the work has been completed, and the Contractor has complied with the contract and all orders and directions made pursuant thereto, (both to the satisfaction of the Construction Manager and the Engineer), the Construction Manager shall issue a Certificate of Completion to the Contractor.
2. If the Construction Manager and the Engineer are satisfied that the work is sufficiently complete to be acceptable for use by the Owner, the Construction Manager may, at any time before issuing a certificate referred to in 1., issue an Interim Certificate of Completion to the Contractor.
3. An Interim Certificate of Completion referred to in 2. shall describe the parts of the work not completed to satisfaction and all things that must be done by the Contractor before a certificate referred to in 1. will be issued.
4. The Construction Manager may, in addition to the parts of the work described in an Interim Certificate of Completion referred to in paragraph two, require the Contractor to rectify any or other parts of the work not completed to his satisfaction.
5. If the contract or a part thereof is subject to a Unit Price Arrangement, the Construction Manager shall measure and record the quantities of labour, plant and material, performed, used and supplied by the Contractor, and shall inform the Contractor of those measurements.
6. The Contractor shall assist and co-operate with the Construction Manager in the performance of their duties (referred to in paragraph 5) and shall be entitled to inspect any record made by the Construction Manager pursuant to 5.
7. After the Construction Manager has issued a Certificate of Completion referred to in 1., he shall, if 5. applies, issue a Certificate of Final Measurement.
 - 7.1 A Certificate of Final Measurement referred to in 7. shall contain the aggregate of all measurement of quantities referred to in 5., and is binding upon and conclusion between the Owner and the Contractor as to the quantities referred to therein.

23. SCHEDULE

The Contractor shall complete the work by November 3rd, 2028.

FORM OF TENDER

SECTION 2

FORM OF TENDER

Tender by.....
residing at (or place of business)
and
residing at (or place of business)
comprising the firm of.....
.....
a company duly incorporated under the laws of.....
and having its head office at
hereinafter called "the tenderer".

NOTE:

The Tenderer's name and residence must be inserted above, and in the case of an incorporated firm, the name and residence of each and every member of the firm must be inserted.

TENDER FOR THE HAMILTON ISLAND BRIDGE REPLACEMENT PROJECT NO. CE867300

TO: Leslie Papineau, OAA, MRAIC, Director
Department of Infrastructure, Housing, and Environment
Mohawk Council of Akwesasne
101 Tewasateni Road
Akwesasne, Ontario K6H 0G5

I (WE)
have carefully examined the locality and site of the proposed works, and all contract documents relating thereto, including: The Form of Agreement, Addendum/Addenda No. to No. * inclusive, Special Provisions, if any, Instructions to Tenderers, inclusive, Supplementary General Conditions, if any; General Conditions, Supplementary Specifications, if any; Specifications, if any, Standard Specifications, if any Contract Drawings, Standard Drawings, Form of Tender, forms of Performance Bond and Labour and Material Payment Bond, hereby tender and offer in accordance therewith to enter into a contract within the prescribed time to construct the said works in strict accordance with the contract schedule, contract documents, and such further detail drawings as may be supplied from time to time and to furnish all materials, labour, tools, plant, matters and things necessary therefore complete and ready for the use within the time specified for the sum of

..... dollars

(\$.....) or such other sum as may be ascertained in accordance with the Contract.

The Tenderer agrees to have the works completed by the time, known as the "Time of Completion".

THE AFORESAID SUM IS MADE UP AS FOLLOWS:

The Tenderer is required to submit his Tender in accordance with the following Lump Sum Prices for the bulk of the work for the contract along with Unit Prices for additional items. The Engineer may refuse to accept a breakdown containing prices which are, in his opinion, unbalanced and has the right to adjust the breakdown to correct such balancing.

* The Tenderer will insert here the numbers of the Addenda received by him during the tendering period and taken into account by him in preparing his Tender.

HAMILTON ISLAND BRIDGE REPLACEMENT PROJECT

SCHEDULE OF ITEMS AND PRICES

ITEM NO.	SPEC. PROV	SPEC NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
PART 1 - GENERAL							
1	SP01	OPSS. MUNI 182	Sitework including Bird Nesting and Sweep	LS			
2	SP02	OPSS. MUNI 706	Traffic Management	LS			
3	SP03	OPSS. MUNI 805	Temporary Erosion Control and Sediment Control Measures	LS			
4	SP04		Field Office for Contract Administrator 20-34 m2	LS			
5		OPSS. MUNI 201	Clearing and Grubbing	m2			
6	SP05		Fish Rescue	LS			
SUB-TOTAL PART 1							\$

ITEM NO.	SPEC. PROV	SPEC NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
PART 2 – ROADWAY AND GRADING							
7	SP06	OPSS. MUNI 206	Earth Excavation and Grading	m3			
8	SP07	OPSS. MUNI 206	Rock Embankment	m3			
9	SP08	OPSS. MUNI 310	Asphalt - SuperPave 12.5 B 58-34	t			
10	SP09	OPSS. PROV 308, OPSS. MUNI 310	Tack Coat	m2			

ITEM NO.	SPEC. PROV	SPEC NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
11	SP10	OPSS. MUNI 312	Asphalt Curb and Gutter	m			
12	SP11	OPSS. MUNI 314	Granular 'A'	t			
13	SP12	OPSS. MUNI 314	Granular 'B', Type II	t			
14	SP13	OPSS. MUNI 353	Concrete Curb and Gutter	m			
15	SP14	OPSS. MUNI 510	Remove Asphalt Pavement (Partial Depth)	m2			
16	SP14	OPSS. MUNI 510	Removal of Asphalt Pavement - Full Depth	m2			
17	SP14	OPSS. MUNI 510	Saw Cutting of Asphalt	LS			
18	-	OPSS. MUNI 510	Removal of Concrete Curb & Gutter	m			
19	SP15	OPSS. MUNI 510	Removal of Steel Beam Guide Rail	m			
20	SP16	OPSS. MUNI 511	Rock Protection	m3			
21	-	OPSS. MUNI 539	Temporary Roadway Protection System Installation, Relocation and Removal	LS			
22	SP17	OPSS. MUNI 703	Salvage and Reinstall Hazard Signs	ea			
23	SP17	OPSS. MUNI 703	Small Sign, Removal	ea			
24	SP17	OPSS. MUNI 703	Salvage and Reinstall No Loitering on Bridge Sign	ea			
25	SP17	OPSS. MUNI 703	Salvage and Reinstall Stop Sign	ea			
26	SP17	OPSS. MUNI 703	Small Sign, Ground Mounted, New	ea			

ITEM NO.	SPEC. PROV	SPEC NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
27	SP18	OPSS. MUNI 710	Pavement Marking, Temporary	m			
28	SP18	OPSS. MUNI 710	Pavement Marking, Permanent	m			
29	SP18	OPSS. MUNI 710	Removal of Temporary Pavement Marking	m			
30	SP19	OPSS. MUNI 721	Single Rail Steel Beam Guide Rail (New)	m			
31	SP20	OPSS. MUNI 723	Temporary Concrete Barrier Energy Attenuator (Installation and Removal)	ea			
32	SP21	OPSS. MUNI 732	Steel Beam Energy Attenuating Terminal System	ea			
33	SP22	OPSS. MUNI 732	Guide Rail System Leaving End Treatment - Type M20 and M30	ea			
34	SP23	OPSS. MUNI 741	Temporary Concrete Barriers	m			
35	SP24	OPSS. MUNI 802	Topsoil, Imported (100 mm thick)	m3			
36	SP25	OPSS. MUNI 804	Seed & Erosion Control Blankets	m2			
SUB-TOTAL PART 2							\$

ITEM NO.	SPEC. PROV.	SPEC NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
PART 3 - STRUCTURAL							
37	SP26	OPSS. MUNI 405	150mm Dia. Perforated Subdrain with Rodent Guard	m			
38	SP27	OPSS. MUNI 510	Removal of Bridge Structure	LS			

ITEM NO.	SPEC. PROV.	SPEC NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
39	SP28	-	Supply Equipment for Installing Micropiles				
40	SP28	-	Pre-Production Micropile				
41	SP28	-	Production Micropile				
42	SP28	-	Production Micropile Testing				
43	SP28	-	Grout for Micropiles				
44	SP29	OPSS. MUNI 904	Concrete in Substructure				
45	SP29	OPSS. MUNI 904	Concrete in Deck				
46	SP29	OPSS. MUNI 904	Concrete in Approach Slabs				
47	SP29	OPSS. MUNI 904	Concrete in Barrier End Walls				
48	SP29	OPSS. MUNI 904	Mass Concrete				
49	SP30	OPSS. MUNI 905	Mechanical Connectors				
50	SP30	OPSS. MUNI 905	Reinforcing Steel Bar				
51	SP30	OPSS. MUNI 905	Stainless Steel Reinforcing Bar				
52	SP30	OPSS. MUNI 905	Stainless Steel Mechanical Connectors				
53	-	OPSS. MUNI 906	Fabrication of Structural Steel				
54	-	OPSS. MUNI 906	Delivery of Structural Steel				
55	-	OPSS. MUNI 906	Erection of Structural Steel				

[illegible]

SECTION	DESCRIPTION	TOTAL AMOUNT
1.00	GENERAL	\$
2.00	ROADWAY AND GRADING	\$
3.00	STRUCTURAL	\$
	SUB-TOTAL	\$
	CONTINGENCY (15%)	\$
	TOTAL TENDERED AMOUNT	\$

SUMMARY

TOTAL TENDERED PRICE – MCA CONTRACT No: _____

ESTIMATED VALUE OF NATIVE LABOUR \$ _____

ESTIMATED VALUE OF NON-NATIVE LABOUR \$ _____

ESTIMATED VALUE OF MATERIALS
FROM NATIVE SOURCES \$ _____

ESTIMATED VALUE OF MATERIALS
FROM NON-NATIVE SOURCES \$ _____

ESTIMATED VALUE OF EQUIPMENT
FROM NATIVE SOURCES \$ _____

ESTIMATED VALUE OF EQUIPMENT
FROM NON-NATIVE SOURCES \$ _____

This tender summary is to be submitted within 48 hours of a request from MCA or a delegate of MCA.

STATUTORY DECLARATION:

CANADA
PROVINCE OF QUEBEC / ONTARIO

COUNTY OF SOUTH GLENGARRY

(IN THE MATTER of a Proposed Contract for the
(HAMILTON ISLAND BRIDGE REPLACEMENT
PROJECT

TO WIT:

DO SOLEMNLY SWEAR THAT the several matters
stated in the foregoing Tender are in all respects true, **AND** _____ make this solemn
declaration, strictly believing it is to be true, and knowing that it is of the same force and effect as if made under
oath, and by virtue of “The Canada Evidence Act”.

DECLARED before me

the.....)
.....)
of)
In the County of)
This day of 2026)

.....
Tenderer

The General Conditions for this project requires that the Tenderer completes and submits this declaration with this tender. Failure to complete the Statutory Declaration may result in the tender being invalidated by Mohawk Council of Akwesasne.

STANDARD TENDER REQUIREMENTS

Period of Validity of Tender

Extra lump sum to extend the period of validity of tender from 60 days to 120 days from the date of submission = \$..... (Refer to Instructions to Tenderers - Liquidated Damages).

The aforementioned lump sum shall apply regardless of any difference between the Final Contract Price and the Original Contract Price.

M.C.A. may in its discretion take into account the extra lump sum tendered above when comparing tenders for awarding a contract.

If this tender is accepted by M.C.A., the Tenderer agrees:

1. To carry out any additional or extra work (including the supplying of any additional materials or equipment pertaining thereto) or will delete any work as may be required by the Engineer in accordance with the Contract;
2. To carry out of any work referred to in Paragraph (1) above or the issuance by the Engineer of a Contract Change Order relating to such work or the acceptance of such Contract Change Order shall not, except as expressly stated in such Contract Change Order, waive or impair any of the terms of the Contract or of any Contract Change Order previously issued by the Engineer or any of the rights of the Council or of the Engineer under the Contract;
3. To pay M.C.A. the sum specified in the Contract (as liquidated damages) for each calendar day that the work under the Contract as modified by all Contract Change Orders issued by the Engineer remains uncompleted after the expiry of the Time of Completion specified in the contract or the extended time for completion allowed in writing by the Engineer. See Instructions to Tenderers, Item No. 18.

The prices applicable to work referred to in Paragraph (1) above shall be determined as follows:

- a) The Schedule of Items and Prices shall apply where applicable;
- b) If the above Schedule is inapplicable the prices shall be determined in accordance with Section 26 of the General Conditions.

The Tenderer agrees that, if so requested in writing by M.C.A., he will enter into a contract with M.C.A. based upon his tender but jointly in the names of the Tenderer and the Tenderer's parent company, if any. The Tenderer further agrees that any request by M.C.A. as indicated above is not and shall not be deemed to be a counteroffer by M.C.A.

STANDARD TENDER REQUIREMENTS (Cont'd)

The Tenderer further declares:

This tender is subject to a formally prepared and executed contract.

This tender is made without any connection, comparison of figures or arrangements with, or knowledge of, any other corporation, firm or person making a tender for the same work and is in all respects fair and without collusion or fraud.

No member of the Mohawk Council and no officer or employee of the Council or of the Engineer is or will become interested directly or indirectly as a contracting party, partner, surety or otherwise, or in the performance of the Contract or in the supplies, work or business to which it relates.

On request, the Tenderer agrees that he will furnish to M.C.A. a copy of his latest financial statement within four (4) days after being requested to do so by M.C.A.

EVALUATION OF TENDERERS

Evaluation of Qualified Tenders

Qualified Tenders will be, at the discretion of the Mohawk Council of Akwesasne, evaluated by the Evaluation Team. The Tenderer is reminded that the lowest bid price will not necessarily be accepted and that the MCA reserves the right to reject any or all tenders.

The following criteria and weighting will be used in the evaluation of qualified tenders:

#	Criterion	Description	Weighting
1.	Total Bid Price	The total bid price as declared in the Form of Tender.	50%
2.	Native Content	The value of local Native labour, equipment, operators, and construction materials as declared in the Form of Tender.	25%
3.	Joint Venture	The bidder has formed a joint venture partnership with a local Native contractor for the purpose of undertaking the project.	15%
4.	Previous Experience	The bidder has several years of experience in work of a similar scope and complexity.	10%

QUALIFICATIONS OF SUB-CONTRACTORS

The Tenderer must list on this statement sheet the name of each proposed sub-contractor for the Tenderer's convenience and to ensure that a complete list is submitted with the Tender.

The Tenderer shall make an entry against each possible sub-trade listed whether by naming the proposed sub-trades or by entering "by own forces", whichever applies. No blank spaces shall be left.

In addition, if the Tenderer proposes to sublet a part of the work he shall add the sub-trade and the proposed sub-contractor's name to the following list:

FAILURE TO COMPLY WITH THE AFOREMENTIONED REQUIREMENTS MAY RESULT IN THE TENDER BEING DISQUALIFIED BY MCA.

MAJOR ITEM

SUB-CONTRACTOR (IF APPLICABLE)

Excavation / Backfill

Micropiling

Steel Fabrication

Concrete Works

Concrete Reinforcing

Asphalt Paving

Other (specify)

The contractor shall not, without written consent of the Owner, change a subcontractor who has been proposed above.

**CONSTRUCTION SUPERVISOR
EXPERIENCE REQUIREMENT**

Site Supervisor Experience Requirement

The tenderer will designate a proposed construction supervisor who will coordinate contractor activity full time on site for the duration of the project.

Substitution will not be allowed without the prior written approval of the MCA Department of Infrastructure, Housing and Environment Director.

The designated construction supervisor must have a minimum of ten (10) years experience in municipal infrastructure projects of a similar size and scope.

The tenderer will attach as part of their tender, a curricula vitae for the proposed construction supervisor outlining his or her experience in municipal infrastructure projects of a similar size and scope.

It is to be noted that the experience of the designated construction supervisor forms part of the contract documents and will form part of the basis of evaluation and recommendation for award of contract.

Should the tenderer not be able to provide a designated construction supervisor with acceptable experience the MCA will have the option of disqualifying the tender.

The tenderer hereby appoints _____ as designated construction supervisor (curricula vitae attached hereto).

Contractor

Date

STANDARD TENDER REQUIREMENTS
(AGREEMENT TO BOND)

The "Agreement to Bond" of the, a company lawfully doing business in the Provinces of Ontario or Quebec, to furnish a Performance Bond and a Labour and Material Payment Bond each in an amount equal to 100% of the Contract price, or in such greater amount as may be required by the Council, if this tender is accepted, is enclosed herewith.

The Tenderer agrees that M.C.A. reserves the right to reject any or all tenders and that the lowest or any tender will not necessarily be accepted. M.C.A. reserves the right to award the contract to an otherwise qualified local bidder if the local bidder's price is within five percent of the lowest total tender price.

A certified cheque in an amount equal to 10% of the total tender price to a maximum of \$20,000.00 applicable to First Nation contractors only, or a Bid Bond for 10% of the Tender amount payable to M.C.A. is attached hereto as the required tender deposit.

If the successful bidder fails to enter into a contract with the Council of Akwesasne:

- where a certified cheque was provided for bid surety the cheque will be cashed and the funds used to make up the difference between the low bid and the next acceptable bid up to the value of the cheque. Unused funds will be returned to the issuer.
- ★ where a Bid Bond was provided for bid surety, the Bonding Company will make up the difference between the low bid and the next acceptable bid up to the value of the bond.

Dated at this day of, 2026

.....
Signature of Witness

.....
Signature of Tenderer

NOTE: If the tender is submitted by, or on behalf of, a corporation, it must be signed in the name of such corporation by the duly authorized officers and the seal of the corporation, or wafer seal, must be affixed. If the tender is submitted by, or in behalf of, an individual or a partnership, a seal must be affixed opposite the signature of the individual or of each partner and each signature must be witnessed.

AGREEMENT TO BOND

**
**
**
**
Date, 2026

Mohawk Council of Akwesasne
Department of Infrastructure, Housing and Environment
101 Tewasateni Road
Akwesasne, Ontario
K6H 0G5

Dear Sirs:

**Re: Hamilton Island Bridge Replacement
Project No. 26-4001A**

In Consideration of the Mohawk Council of Akwesasne (hereinafter referred to as "the Owner") accepting the tender of and executing an Agreement with: Jacobs Consultancy Canada Inc. (hereinafter referred to as "the Tenderer") for the construction of: **Hamilton Island Bridge Replacement** subject to the express conditions that the Owner receive the Performance Bond and the Labour and Materials Payment Bond in accordance with the said tender, we the undersigned hereby agree with the Owner to become bound to the Owner as surety for the Tenderer in a Performance Bond and a Labour and Material Payment Bond each in an amount equal to 100% of the contract price or other such great amount as may be determined by the Owner, in the forms of Performance Bond and Labour and Material Payment Bond and in accordance with the said tender, and we agree to furnish the Owner with said tender, and we agree to furnish the Owner with the said Bonds within seven (7) days after notification of the acceptance of the said Agreement by the Owner has been mailed to us.

Yours very truly,

(Corporate Seal)

.....

NOTE: This Agreement to Bond must be executed on behalf of the Surety Company by its authorization officers under the Company's corporate seal. Of the two forms bound herein, one shall become a part of the tender and the other shall be retained by the Surety Company.

** Enter the name and address of the Surety company at the top of the page

GENERAL CONDITIONS

SECTION 3

INDEX TO GENERAL CONDITIONS

PAGE NO.

1.0	DEFINITIONS	1
2.0	TENDERS	2
3.0	SCOPE OF CONTRACT	3
4.0	PLANT, LABOUR AND MATERIAL	3
5.0	SAMPLES	3
6.0	CONDEMNED AND SURPLUS MATERIALS.....	4
7.0	EQUIVALENTS	4
8.0	APPROVALS AND PERMITS	4
9.0	ERRORS AND OMISSIONS BY CONTRACTOR.....	4
10.0	DELAYS	4
11.0	ORAL ARRANGEMENTS	5
12.0	DECISIONS BY THE CONSULTING ENGINEER	5
13.0	SITE REPRESENTATIVE AND SITE REVIEW	5
14.0	OCCUPANCY OF THE WORKS	5
15.0	ABSENCE OF CONSTRUCTION MANAGER AND CONSULTING ENGINEER AND ITS REPRESENTATIVE	6
16.0	CONTRACTOR'S ABSENCE.....	6
17.0	CONVENIENCES	6
18.0	PUBLIC CONVENIENCE AND SAFETY	6
19.0	LOSS OR DAMAGE	6
20.0	INSURANCE	7
21.0	CONTRACTOR'S LIABILITY	7
22.0	NIGHT, SUNDAY AND HOLIDAY WORK.....	8

	<u>INDEX TO GENERAL CONDITIONS (CONT'D)</u>	<u>PAGE NO.</u>
23.0	NOTICE TO CONTRACTOR.....	8
24.0	RELEASE OF HOLDBACK TO SUBCONTRACTORS.....	8
25.0	MEASUREMENTS	9
26.0	VALUATION OF VARIATIONS	10
27.0	BOOKS AND RECORDS OF THE CONTRACTOR.....	10
28.0	PAYMENT.....	10
29.0	PAYMENT OF INTEREST.....	12
30.0	SUSPENSION OF WORK.....	12
31.0	SUBLETTING	13
32.0	SETTING OUT	13
33.0	ASSISTANCE.....	13
34.0	MONIES DUE OWNER.....	13
35.0	DISPUTES	13
36.0	RESTORATION	14
37.0	DRAINAGE	14
38.0	BARRIERS, LIGHTS AND DETOURS	15
39.0	ALTERATIONS, EXTRAS, DEDUCTIONS AND CLAIMS.....	15
40.0	OTHERS' RIGHTS.....	16
41.0	NON-FULFILMENT OF THE CONTRACT	16
42.0	POUR RELEASE FORMS	17
43.0	MAINTENANCE SECURITY	18
44.0	CERTIFICATES OF COMPLETION	19

1.0 DEFINITIONS

Wherever used in these General Conditions, Special Conditions, Plans, Form of Tender, Instructions for Tenderers, Specifications, Statutory Declarations or other documents forming part of this Contract:

"authorized", "directed", "required", "requested", "approved", "ordered", "sanctioned", "considered" and "satisfactory", shall, unless some other meaning is obvious from the context, mean respectively authorized, directed, required, requested, approved, ordered, sanctioned or considered by or satisfactory to the Consulting Engineer.

"Owner" means the Mohawk Council of Akwesasne.

"Contract" includes the Agreement to do the work entered into with the Owner, the Specifications, the General Conditions, Special Conditions, Information for Tenderers, the Plans, the Tender and all other documents referred to in or bound with the said Agreement and identified as being part of the contract documents.

"Contractor" or a pronoun in place thereof, means the person or persons or corporation who have undertaken to carry out the Contract.

"Construction Manager / Contract Administrator" means the firm or individual designated by the Owner to tender and manage all contracts for this project.

"Engineering/Consulting Engineer" means the Consulting Engineer named in the Form of Quotation, or such other person, Firm or Corporation designated by the Owner.

"Owner" has its natural meaning except when it refers to the Owner of the project.

"period of maintenance" means the period from the date of substantial performance of the contract, as set out in the Certificate of Substantial Performance, to the date of issuance of the Final Certificate and shall be not less than 12 months.

"Plans" means all plans, profiles, drawings, sketches, or copies thereof exhibited, used or prepared for or in connection with the work embraced under the Contract.

"plant" (unless the context requires a different meaning) means every temporary or accessory means necessary or required to carry on or complete the work and extra work, in the time and manner herein provided.

"shall", "may", "herein", "person", "writing" or "written", "surety", and "security" and words used in the singular number of the masculine gender, shall have the meaning and effect as given in the Interpretation Act of the Revised Statutes of Ontario.

"Site Representative" means a site representative for the Owner acting under the direction of the Consulting Engineer.

"Solicitor" means the person for the time being acting as Solicitor for the Owner.

"Subcontractor" includes only a person, firm or corporation having a contract for the execution of a part or parts of the work included in the contract with the Owner, or a person, firm or corporation furnishing material called for in the contract with the Owner and worked to a special design according to the plans or specifications, but does not include one who merely furnishes material not so worked.

"work" or "works" (unless the context requires a different meaning) means the whole works, materials, matters and things required to be done, supplied, or installed that are mentioned or referred to in the Contract, including all extra or additional work or material, matters or things which may be ordered by the Consulting Engineer, as herein provided.

"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 will 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 the Controlling Operation, as determined by the Contract Administrator by reason of:
 - (1) any breach of Contract or prevention by the Owner, by any other Contractor of the Owner or by any employee of any one of them,
 - (2) non-delivery of Owner supplied materials;
 - (3) any cause beyond the reasonable control of the Contractor which can be substantiated by the Contractor to the satisfaction of the Contract Administrator.
- (d) Working days will not be charged during the period December 15th to May 15th inclusive, unless the Contractor opts to complete contract works during this period.

"Addendum" means a written amendment, clarification, revision, interpretation or supplement issued during the Tender Period and forming part of the Contract Documents.

"Change Order" means a written amendment to the Contract signed by the Owner and Contractor authorizing a change in the Work, Contract Price, Contract Time, or any combination thereof.

"Change Directive" means a written direction requiring a change in the Work prior to agreement on adjustments to Contract Price or Contract Time.

"Construction Act" means the Construction Act (Ontario), as amended from time to time.

"Force Majeure" means an event beyond the reasonable control of the affected party, including floods, fires, severe weather, epidemics, pandemics, labour disruptions beyond the Contractor's control, governmental restrictions, terrorism, war, or other similar events.

"OHSA" means the Occupational Health and Safety Act (Ontario), as amended.

"Electronic Communication" means communication transmitted by e-mail or other electronic means agreed to by the parties.

2.0 TENDERS

All tenders for the execution of the work herein set forth or referred to must be made on the printed forms supplied for that purpose. No others will be considered. Such tenders must be made without any knowledge,

comparisons of figures or arrangements with any other person making any tender or estimate for the same purpose, and the tenderers shall declare that such tenders are in all respects fair and without collusion or fraud, and that no employee of the Owner is, shall be, or shall become interested, directly or indirectly, as contracting party, partner, surety or otherwise in, or in the performance of, the Contract, or in the supplies, work or business to which it relates, or in any portion of the profits to be used therein or thereof, or in any of the monies to be derived therefrom. The tender must be verified by the Statutory Declaration of the party or parties making the tender that the several matters stated therein are in all respects true. Tenders must cover the cost of completion of the Contract in every respect, in accordance with the Contract, including all labour, plant, tools, etc.

The Contractor agrees that he is fully informed regarding all of the conditions, local or otherwise, affecting the work to be performed and that his information was secured by personal investigation and that he will make no claim against the Owner based on any estimate or representation of the Owner or of any representative of same.

3.0 SCOPE OF CONTRACT

Stated in general terms, and without in any way limiting the requirements and intent of the Contract, the works required to be done by the Contractor under the Contract comprises construction, completion and maintenance of the works referred to in the Plans, Specifications, General Conditions or other contract documents relating thereto and includes the provision, except where otherwise specifically stated in the Contract, of all labour, plant, materials and equipment required for the complete and proper execution of the work. The contract documents are complementary and what is required by any part thereof shall be considered as being required by the whole thereof. Materials and work which are not specifically described or shown in the contract documents but the necessity of which can reasonably be considered as inferable from the contract documents shall be supplied and performed by the Contractor at no additional cost to the Owner and the Contractor shall not claim extra payment therefore or an extension of the time for completion on account thereof.

In the event of any conflict, discrepancy or inconsistency among Contract Documents, the following order of precedence shall apply:

- (a) Agreement Between Owner and Contractor
- (b) Addenda
- (c) Special Conditions
- (d) General Conditions
- (e) Specifications
- (f) Drawings
- (g) Instructions to Tenderers
- (h) Contractor Submissions

In the event of discrepancies between drawings, written dimensions shall govern over scaled dimensions. Drawings of larger scale shall govern over drawings of smaller scale and, where scales are identical, later dated drawings shall govern.

4.0 PLANT, LABOUR AND MATERIAL

The Contractor shall provide all necessary skilled and unskilled labour, and materials, fuel, machinery, tools and all plant, so that the Contract, and all work required to be done under it, can and will be carried on continuously and expeditiously to completion, in all respects to the satisfaction of the Construction Manager and the Consulting Engineer.

All material, plant, machinery, tools and equipment acquired, possessed or provided by the Contractor for incorporation into the works shall be the property of the Owner, whether or not such material, plant, machinery, tools and equipment are brought to or upon the works or upon lands of the Akwesasne Territory and the Contractor is prohibited from removing or disposing of the same, or any part thereof, without the consent or instructions of the Consulting Engineer in writing.

No materials, plant, machinery or equipment reasonably required for the performance of the Contract and not for incorporation into the works, brought to or upon the works or upon lands of the Akwesasne Territory, shall be removed or disposed of during the progress of the works without the written consent or instruction of the Construction Manager or his authorized representative. In case of a difference of opinion between the Contractor and the Construction Manager or his authorized representative as to whether any of the aforesaid items is reasonably required on the works for the satisfactory progress of the works, the Contractor shall abide by the decision of the Consulting Engineer.

5.0 SAMPLES

Before any material of any kind is used on the work, the Contractor shall submit samples thereof for the approval of both the Construction Manager and the Consulting Engineer and must obtain such approval. No material shall be used on the work which is in any inferior to the approved samples. The giving of such approval shall not obligate the Owner to pay for any material other than in accordance with the Contract, shall not prevent the rejection of any material which may be found, in the opinion of the Construction Manager or the Consulting Engineer, to be unsound or unfit for use on the work or not in accordance with the approved samples or the requirements of the Contract and shall not be deemed to be a waiver of objection to the work or any part thereof at any time on account of the materials used not being satisfactory or on any other account. The decision of the Consulting Engineer with respect to the approval or rejection of samples shall be final.

6.0 CONDEMNED AND SURPLUS MATERIALS

Should any plant, appliances or materials which the Construction Manager or the Consulting Engineer may deem to be inferior or unfit for use in or on the works, be brought on the ground, or used, the same shall be wholly removed therefrom within twenty-four (24) hours after notification to that effect from the Construction Manager, and in case of failure or neglect on the part of the Contractor to remove the same, the Construction Manager may cause the same to be taken away at the Contractor's expense and deposited, wasted, or otherwise disposed of, in any locality, place or way he considers convenient or proper, and the Contractor shall forthwith pay to the Owner on demand, all expenses incurred, including storage, if any, or the same may be deducted or collected by the Owner, as provided in the section hereof entitled "Monies Due Owner".

No surplus or other material of any kind, arising from any portion of the work, shall be sold, thrown away, dumped, wasted, or otherwise disposed of without the written sanction of the Construction Manager, and if so disposed of the Construction Manager may ascertain as nearly as he conveniently can the quantities and value, and deduct the same from the Contractor's next progress payment certificate.

Surplus materials are to be offered to adjacent property owners. If the property owner wants the fill, then Contractor is to place and level fill to a height of not more than 2m.

7.0 EQUIVALENTS

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", **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 Specifications.** After the acceptance of a tender, the Contractor may apply to the Construction Manager, who will apply on behalf of the Contractor to the Consulting Engineer to substitute as an approved equal another article or group of related articles identified by a different trade or other name for an 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 Consulting Engineer may require.

8.0 APPROVALS AND PERMITS

The construction of the works and all operations connected therewith are subject to the approval, inspection, by-laws and regulations of Owner, provincial and federal and other authorities having jurisdiction in respect to any matter embraced in this Contract. The Contractor will obtain and pay fees, if any, for approvals and permits, unless otherwise specifically stated in the tender documents.

The Contractor shall be responsible for obtaining all permits, licenses and approvals necessary for the execution of the Work, except those specifically identified in the Contract Documents as being the responsibility of the Owner.

The Contractor shall comply with all permit conditions and regulatory requirements throughout the duration of the Work.

9.0 ERRORS AND OMISSIONS BY CONTRACTOR

Errors, mistakes, omissions or unauthorized changes made by the Contractor or its representatives, workmen or employees and all damage and delay costs that may result therefrom shall be rectified and paid for by the Contractor at his own expense.

10.0 DELAYS

If the Contractor is delayed in the performance of the Work by any act or omission of the Owner, Contract Administrator, utility owner, regulatory authority, Force Majeure event, or any cause beyond the reasonable control of the Contractor, the Contractor shall be entitled to an extension of Contract Time commensurate with the delay, provided written notice is given within seven (7) calendar days of the occurrence. The Contractor shall take all reasonable measures to mitigate the effect of any delay and shall not be entitled to compensation for delay except as expressly provided in the Contract Documents.

The Contractor shall take all steps necessary or advisable to reduce or eliminate all damage or loss by reason of delay with respect to construction of the works arising from any cause whatsoever.

11.0 ORAL ARRANGEMENTS

In all cases of misunderstandings or disputes, oral arrangements will not be considered, but the Contractor must produce written authority in support of his contentions, and shall advance no claim in the absence of such written authority, and shall not use, or attempt to use, against the Owner any conversation with any parties.

12.0 DECISIONS BY THE CONSULTING ENGINEER

Should any discrepancies appear or differences of opinion or misunderstanding arise as to the meaning of the Contract or as to any omissions therefrom or statements therein in any respect, or as to the quality or dimensions or sufficiency of the materials, plant or work or any part thereof, or as to the due and proper execution of the works, or as to the measurement or quantity or evaluation of any works executed or to be executed under this Contract, or as to extras thereto or deductions therefrom, or as to any other questions or matters arising out of the Contract, the same shall, subject to the terms of the Contract, be determined by the Consulting Engineer, who shall have the right at all reasonable times to visit, enter and carry out site reviews at any buildings, factories, workshops, works or sites of the Contractor or others wherever any materials are being prepared, manufactured or treated, or other work is being done in connection with this Contract and the right also to take such samples therefrom as he may deem necessary and the Contractor shall immediately when ordered by the Consulting Engineer, proceed with and execute the work or works, or any part thereof, forthwith in accordance with such order and with such additions to or deductions from the contract price as are provided under the terms of the Contract, without making any claim for any extension of time in completing the work, unless arranged in writing with the Construction Manager as herein provided.

Decisions of the Consulting Engineer may be referred to dispute resolution in accordance with Section 35.

13.0 SITE REPRESENTATIVE AND SITE REVIEW

All work to be done under the Contract shall be done to the satisfaction of the Construction Manager and the Consulting Engineer or of an representative or Site Representative authorized by the Construction Manager to act for him. The Site Representative is required by the Consulting Engineer to see that the provisions of the Contract are faithfully adhered to, especially as regards to the quality of the workmanship,

materials, health and safety compliance, and environmental compliance, and may stop the work entirely if there is not a sufficient quantity of suitable and approved material on the site to carry on the work properly or for any good and sufficient reason. In particular, but without limiting the powers of the Site Representative, orders given by the Site Representative relating to the quality of material or workmanship or in respect of safety or public convenience must at once be obeyed by the Contractor. The Site Representative shall have the power to suspend any worker for incompetency, impairment, substance abuse, negligence or disregard of orders and the Contractor shall ensure that any worker so suspended is forthwith removed from the site.

14.0 OCCUPANCY OF THE WORKS

The use or occupancy of the works or any part thereof by the Owner shall not be taken in any manner as an acceptance by the Owner of any work of material not in accordance with the Contract or to relieve the Contractor or his surety from liability, whether heretofore or hereafter incurred or arising, in respect of the observance or performance of any covenant or condition in the Contract not then performed, whether such covenant or condition be by way of indemnity to the Owner or otherwise, save to the extent that loss or damage is caused during such use or occupancy by the Owner or by employees of the Owner for whom the Owner is responsible. In particular, without limiting the generality of the foregoing, the use or occupancy of the work or any part thereof by the Owner shall not release the Contractor from liability to pay to the Owner, or waive or impair the right of the Owner to deduct and retain, liquidated damages and resident engineers' and inspectors' fees, in accordance with the Contract.

15.0 ABSENCE OF CONSTRUCTION MANAGER AND CONSULTING ENGINEER AND ITS REPRESENTATIVE

The Owner may appoint a Construction Manager or a Firm of Construction Management, Consulting Engineer or Firm of Consulting Engineers as representatives of the Consulting Engineer for the purpose of reviewing the work performed under this Contract. In the absence of the Consulting Engineer or his duly appointed representative, any inspector who has been designated by the representative to review the work shall have full power to decide as to the manner of conducting and executing the work in every particular and the Contractor shall follow the instructions or orders of the person so designated.

16.0 CONTRACTOR'S ABSENCE

In the absence of the Contractor from the works (whether permanent or temporary) he must provide and leave a competent and reliable superintendent in charge of the entire works for him at all times, notwithstanding the extent of subletting, and such person shall be considered as acting in his place, and all notices, communications, orders or instructions given or sent to or served upon such person shall be taken as served upon and received by the Contractor.

17.0 CONVENIENCES

The Contractor shall provide and maintain clean, sanitary washroom facilities and other required worker welfare facilities in accordance with OSHA requirements and all applicable regulations.

18.0 PUBLIC CONVENIENCE AND SAFETY, AND ENVIRONMENTAL PROTECTION

The Contractor shall be deemed the Constructor, where applicable, under the Occupational Health and Safety Act and shall be solely responsible for health and safety at the Site. Prior to commencement of construction activities, the Contractor shall prepare and implement a Site-Specific Health and Safety Plan

acceptable to the Construction Manager. All traffic protection measures shall comply with Ontario Traffic Manual Book 7 and applicable jurisdictional requirements.

If at any time the Construction Manager or his authorized representative considers the works to be unsafe he may order the Contractor to take measure forthwith to ensure adequate safety. Should the Contractor fail to take adequate measures, the Construction Manager or his representative may order the work to cease until such measures have been taken. The Contractor shall not be entitled to additional payment for, or an extension of time for the performance of the Contract by reason of, such safety measures. The fact that the Construction Manager or his representative has ordered or has failed to order additional safety measures shall not relieve the Contractor of responsibility for the adequacy of the safety measures taken.

The Contractor shall conduct all operations in accordance with applicable environmental legislation, permit requirements and environmental commitments contained within the Contract Documents.

The Contractor shall:

- (a) prevent sediment, debris and contaminants from entering watercourses;
- (b) provide and maintain erosion and sediment control measures;
- (c) immediately report, contain and clean all spills;
- (d) properly manage fuels, lubricants and hazardous materials;
- (e) properly dispose of waste materials;
- (f) minimize dust, noise and vibration impacts;
- (g) protect environmentally sensitive areas and species;
- (h) comply with all applicable federal, provincial, municipal and Mohawk Council of Akwesasne environmental requirements.

19.0 LOSS OR DAMAGE

The Owner shall not in any manner be answerable or accountable for any loss or damage by fire or otherwise that shall or may happen to the work or any part or parts thereof; or for any of the materials or other things used and employed in finishing and completing the work, or for any injury to any person or persons, including workmen and the public, or for damage to adjoining property, against all of which injuries and damages to persons or property, the Contractor shall properly guard, and shall make good all damage of whatsoever nature or origin which may arise out of, or be occasioned by any cause connected with the Contract, or the work done by the Contractor, and shall indemnify and keep indemnified the Owner against same until the completion of all the work hereunder and the termination in accordance with the Contract of the insurance which the Contractor is required by the Contract to provide.

20.0 INSURANCE

- (a) The Contractor shall insure and shall maintain insurance for, in the joint names of the Contractor, the Construction Manager, the Consulting Engineer, the Geotechnical sub-consultant and of the Owner, and in an insurance company satisfactory to the Owner, the work and all the material, plant, fuel, machinery, tools and equipment are brought to or upon the work or upon lands of the Owner, in an amount not less than 100% of the total value of such work and material, plant, fuel, machinery, tools and equipment and such additional amount, not exceeding the contract price, as may be directed by the Owner, against all risk, so that any loss under such insurance shall be payable to the Owner and the Contractor as their respective interests may appear. The Contractor shall deposit with the Owner a cover note of such insurance in the form attached hereto and the original policy of such insurance in the form attached hereto and the original policy of such insurance or a Certificate of Insurance, clearly stating that the policy of insurance provided as aforesaid complies with these provisions. The Contractor shall pay all insurance premiums as they become due; provided that the Owner may pay the premiums and deduct the amount thereof from monies due the Contractor. Any loss or damage which may occur shall not affect the rights and obligations of the Contractor or of the Owner under this Contract except that in such event the Construction Manager may in writing extend the time for completion for such period as he thinks reasonable. If the Construction Manager does not extend the time for completion, then the work must be completed within the time fixed in the Contract. Monies paid to the Contractor under such insurance shall be used for the purpose of replacing, rebuilding, repairing and completing the work, and all such material, plant, fuel, machinery, tools and equipment which have been damaged or destroyed. Such replacing, rebuilding, repairing and completion shall be carried out in every way subject to the terms and conditions of the Contract.

- (a) The Contractor shall maintain and pay for such insurance and shall pay such assessments as will protect him from claims under the Workplace Safety and Insurance Act and from any other claims for damages arising from bodily injury, including death, and from claims for property damage which may arise from his operations under this Contract. The Contractor shall deposit with the Owner a Certificate of such insurance, in the form attached hereto, clearly stating that the policy of insurance so provided complies with these provisions.

Commercial General Liability Insurance shall have limits of not less than Five Million Dollars (\$5,000,000) per occurrence.

Automobile Liability Insurance shall have limits of not less than Five Million Dollars (\$5,000,000) per occurrence.

Where Work may impact surface water, groundwater, wetlands or environmentally sensitive areas, the Contractor shall maintain Pollution Liability Insurance satisfactory to the Owner.

- (c) The insurance required under paragraphs (a) and (b) shall be maintained in full force until the Construction Manager has issued a Certificate of Completion or until the Owner has otherwise approved in writing save that if the Contractor continues to work at the site after the date of completion as established by the Certificate of Completion or returns to the site to work after such date, he shall maintain or renew for the duration of such work the Insurance required by the Contract.

21.0 CONTRACTOR'S LIABILITY

The Contractor shall assume the defence of and indemnify and save harmless the Owner and its officers and representatives from all claims relating to labour and materials furnished for the work, and to inventions, copyrights, trademarks, royalties or patents, and rights thereto, relating to or used in doing the work, or the subsequent use and operation of the work or any part thereof upon completion. In carrying out the works from their inception, and until the final acceptance of the same, the Contractor must be careful to cause as little injury or damage as possible to any adjacent property, public or private, or to any sidewalks, roadways, curbs, gutters, drains, hydrants, manholes, frames, covers or street gullies, boulevards, grass plots, sodding, trees, shrubs, or structures, works or things on or near the line or in the vicinity of the works or elsewhere, and, except as in this Contract is otherwise provided, if injury or damage is done, he must make good the same, at his own expense, in the manner directed by, and to the satisfaction of, the Construction Manager. The Contractor shall be responsible for any and all damages, or claims for damages for injury or accidents done or caused by him or his employees or representatives, or resulting from the prosecution of the works, or any of his operations, or caused by reason of the existence or location or condition of the works, or of any materials, plant or machinery used thereon or therein, or which may happen by reason thereof, or arising from any act of commission or omission on his part, or on the part of any of its representatives or employees, in connection with the Contract, and covenants and agrees to hold the Owner harmless and indemnified from all such damages and claims for damage; and in case of the Contractor's failure, neglect or omission to observe and perform faithfully and strictly, all the provisions of the Contract, the Construction Manager may, either with or without notice (except where in this Contract, notice is specially provided for, and then upon giving the notice therein provided for), take such steps, procure such material, plant, trucks and men, and do such work or things as he may deem advisable toward carrying out and enforcing the same, and any and all expenses so incurred may be deducted or collected by the Owner under the provisions of Section 34 hereof, entitled "Monies Due Owner", and any such action by the Construction Manager as he is herein empowered to take, shall not in any way relieve the Contractor or his surety from any liability under the Contract.

Notices may be delivered in person, by courier, registered mail or Electronic Communication. Electronic Communications shall be deemed received on the date transmitted unless evidence demonstrates failed delivery.

22.0 NIGHT, SUNDAY AND HOLIDAY WORK

The Construction Manager may order the work to proceed on a two or three eight-hour shift basis if he deems this necessary to speed up the work, or he may order any work to be carried out in whole or in part at night, and the Contractor shall have no claim for extra compensation in respect thereof. No work, however, shall be undertaken at night without the consent in writing of the Construction Manager.

Whenever, in the judgment of the Consulting Engineer, it may be necessary or expedient to do work at night or after or before the regular time of ending or beginning labour, such night or overtime work shall be performed by the Contractor without additional or extra cost to the Owner beyond the price bid for the work.

23.0 NOTICE TO CONTRACTOR

Any notice or communication to the Contractor shall be deemed to be well and sufficiently given and served if handed to the Contractor or any of his representatives, or if posted or sent to the address given in the Agreement, or to his domicile or usual place of business, or to the place where the work is to be or is being carried on, or if posted to or left at his last known address, and any papers so left, sent or addressed shall be considered to be, and to have been legally served upon the Contractor.

24.0 RELEASE OF HOLDBACK TO SUBCONTRACTORS

Notwithstanding that the Contract as a whole has not yet been substantially performed, the Construction Manager may, if requested in writing by the Contractor, approve the completion of a Subcontract and the release to a Subcontractor through the Contractor of the 10% holdback retained by the Owner in respect of the work covered by the said Subcontract provided that:

- (a) the Contractor certifies:
 - (1) that the said Subcontract has been completed satisfactorily, or
 - (2) that the said Subcontract has been completed satisfactorily except for work not exceeding in value the lesser of
 - (i) one percent of the Subcontract Price, and
 - (ii) \$1,000.00

and gives reasons why the uncompleted work is still outstanding.
- (b) the Construction Manager is satisfied:
 - (1) that the said Subcontract has been completed satisfactorily, or
 - (2) that the said Subcontract has been completed satisfactorily to the fullest extent reasonably possible at that date and that the work remaining to be completed does not exceed in value the sum derived from (a)(2) above.
 - (3) that all required or necessary inspection and testing of the works covered by the said Subcontract have been carried out and that the results are satisfactory.
- (c) the Contractor has furnished to the Construction Manager:
 - (1) a release by the Contractor in a form satisfactory to the Construction Manager releasing the Owner from all further claims (excepting holdback monies) relating to the said Subcontract.
 - (2) evidence satisfactory to the Construction Manager that the said Subcontractor has discharged all liabilities incurred by him in carrying out the said Subcontract and that all liens in respect of the completed Subcontract have expired or have been satisfied, discharged or provided for by payment into Court.
 - (3) a satisfactory clearance certificate or letter from the Workplace Safety and Insurance Board (WSIB) relating to the said Subcontractor.
 - (4) the required maintenance security in respect of the said Subcontract as provided in Section 39 hereof.
 - (5) as-built drawings and maintenance manuals approved by Construction Manager, Consulting Engineers and accepted as satisfactory by the Owner.
- (d) The Consulting Engineer has completed a review of the facilities and is satisfied.
- (e) the Construction Manager retains sufficient money to cover the cost of completing any work which remains uncompleted under the said Subcontract.

The Construction Manager shall, within seven days after he approves a certificate wherein it is certified that the Subcontract has been completed, give a copy of the said certificate to the Contractor and to the Subcontractor concerned.

On receipt of the holdback monies from the Owner, the Contractor shall forthwith pass to the Subcontractor concerned the payment due under the said Subcontract and shall pass to the Construction Manager a copy of the transmittal letter showing the amount of the said payment.

The period of maintenance for the work carried out under the said Subcontract shall continue until the issuance of the Final Certificate for the Contract.

Release of holdback monies by the Owner in respect of a Subcontract in accordance with the foregoing shall not relieve the Contractor or his surety of any of their responsibilities and shall not be made until a period of 45 days has elapsed from the date of approval of the certificate certifying the said Subcontract to be completed.

25.0 MEASUREMENTS

- (a) Approximate monthly accounts of the works completed under the Contract shall be made by the Construction Manager at the end of each calendar month except where the work has been delayed or suspended. An authorized representative of the Contractor shall assist the Construction Manager in taking such measurements and shall furnish all particulars required by the Construction Manager. The Construction Manager shall notify the Contractor when such a measurement will be made.
- (b) The said monthly accounts shall not bind the Construction Manager in any manner in the preparation of his final account of the works constructed by the Contractor under this Contract, but shall be construed and held to be approximate only.
- (c) The final measurement shall be prepared in detail as soon as the whole of the works have been completed, and this final measurement shall be approved and accepted in writing by the Construction Manager. Thereafter the Completion Payment Certificate shall be issued and payment shall be made in accordance with Section 39 hereof.

26.0 VALUATION OF VARIATIONS

- (a) The Construction Manager shall determine the amount, if any, to be added to, or deducted from, the sum named in the Tender, in respect of any extra or additional work done, or work omitted by his order. All such work shall be valued at the price as set out in the Schedule of Items and Prices or the Schedule of Additional Unit Prices if, in the opinion of the Consulting Engineer, the same shall be applicable.
- (b) If the Contract does not contain any prices applicable to the extra, additional, or omitted work, then the Contractor and Construction Manager may agree on a price for such work, in which case the price shall be comparable to prices quoted on work of a similar nature.

27.0 BOOKS AND RECORDS OF THE CONTRACTOR

- (a) The Contractor shall keep proper books and records showing names, trades, and addresses of all workers in his employ and wages paid to, and the time worked by, such workers; also records, books, and invoices showing all costs, expenditures, payments, settlements, receipts, and balances in connection with the construction of the works.
- (b) All records of the Contractor relevant to the valuation of the works including payrolls, time books of account, invoices, and statements, shall be maintained on the site or at some other place approved by the Construction Manager and shall be open at all reasonable times for review by the Construction Manager. The Contractor shall in every way assist such review for the purpose of

establishing and determining labour costs, the cost of extra work, and progress payments to be made.

28.0 PAYMENT

- (a) The Contractor shall submit to the Construction Manager at the end of each calendar month a fully itemized statement showing the estimated value of the permanent work executed up to the end of the month based on the unit prices shown in the Contract and the section covering Valuation of Variations, together with a fully itemized statement of the value of major items of material and equipment on site for incorporation into the permanent works.
- (b) From each monthly statement including the statement based on the final measurement, the Construction Manager will prepare a Monthly Payment Certificate and will include therein so much as he considers fair and reasonable in respect of the value of the work executed and of the major items of material and equipment on site.
- (c) Ten percent (10%) of all monies due the Contractor in accordance with the Monthly Payment Certificate up to a limit of 10% of the contract price, shall be retained by the Owner (except as may otherwise be provided for in the Contract) and shall be termed the holdback.
- (d) The Monthly Payment Certificate will show the Construction Manager's gross valuation of the work performed and materials supplied, the deduction of the appropriate amount of holdback, the previous payments to the Contractor and the amount due him.
- (e) No progress estimate or payment shall be held to bind the Construction Manager in his valuation of the work on its completion and the Consulting Engineer may on any Monthly Payment Certificate make correction or modification to any previous certificate he has made.
- (f) At the time of issuance by the Construction Manager of the Certificate of Substantial Performance in accordance with Section 44 of the General Conditions, the Construction Manager shall:
 - (1) Notify the Contractor of the value of the maintenance security required by Section 43.
 - (2) Prepare a Substantial Performance Payment Certificate showing:
 - (i) the value of work completed to-date.
 - (ii) the value of outstanding or uncompleted work.
 - (iii) the value of the required maintenance security.
 - (iv) the amount of the 10% holdback (allowing for any previous release of holdback to the Contractor in respect of completed Subcontracts and deliveries of pre-selected equipment).
 - (v) the amount due the Contractor.
 - (3) Prepare a Payment Certificate releasing to the Contractor the 10% holdback due in respect of work performed up to the date of substantial performance. Subject to the submission by the Contractor of the following documents such holdback shall become payable after 45 days from the date of publication of the Certificate of Substantial Performance:
 - (i) A written undertaking by the Contractor to complete expeditiously any outstanding work and to discharge all unfulfilled obligations under the Contract.
 - (ii) The Contractor's final claim (except in respect of outstanding work).

- (iii) A release by the Contractor in a form satisfactory to the Consulting Engineer releasing the Owner from all further claims relating to the Contract (except in respect of outstanding work).
 - (iv) A Statutory Declaration in a form satisfactory to the Consulting Engineer that all liabilities incurred by the Contractor and his Subcontractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Subcontracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.
 - (v) A satisfactory Clearance Certificate from the Workers' Compensation Board.
- (g) At the time of issuance by the Construction Manager of the Certificate of Completion in accordance with Section 44 of the General Conditions, the Consulting Engineer shall:
 - (1) Prepare a Completion Payment Certificate showing:
 - (i) the Final Contract Price.
 - (ii) the amount of the further 10% 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 in (f) above).
 - (iii) the value of the required maintenance security.
 - (iv) the amount due the Contractor.
 - (2) Prepare a Payment Certificate releasing to the Contractor the further 10% holdback. Subject to the provisions of The Construction Act and the submission by the Contractor of the documents required by Section 44 hereof, such further 10% holdback shall become payable after 45 days from the date of completion of the works as established by the Certificate of Completion.
- (h) Payment procedures shall be administered in accordance with applicable prompt payment provisions of the Construction Act where applicable.

29.0 PAYMENT OF INTEREST

Delay by the Owner in making payment to the Contractor shall be deemed not to be a breach of contract by the Owner.

In the event that, following substantial performance of the Contract or completion of the Contract as established by the relevant certificate issued by the Construction Manager, payment by the Owner to the Contractor in respect of work done or release of holdback is delayed by the Owner, the Contractor shall be entitled to payment of interest from a date or dates derived from the following:

- (a) Payment for Work Done:

A date 45 days after the date when the Contractor satisfactorily complete submission of the documentation required by the Contract and complied with the other requirements of the Contract.

- (b) Release of Statutory Holdback:

A date 30 days after the date established by Section 44 of the General Conditions, (whichever applies), as the earliest date for release of holdback.

The applicable rate of interest shall be the rate specified in the Contract Documents or, where not specified, the rate established by the Construction Act.

30.0 SUSPENSION OF WORK

The Construction Manager or Consulting Engineer may, by an order in writing, at any time stop or suspend any part of the work, or direct any portion to be commenced or completed in priority to any other part or portion, or may cancel the order to proceed with the work, or with any part thereof, and the Contractor shall not thereby be entitled to any additional payment, or to claim for loss of profit or anticipated profit, or for damages or otherwise howsoever, by reason of such order except as may be allowed in accordance with Section 12 hereof. When in the opinion of the Construction Manager or the Consulting Engineer, it is deemed advisable for any reason to discontinue the work, or any part thereof, for the winter, the Contractor must, on notice of the required discontinuation, forthwith place the work in proper and satisfactory condition for the accommodation and safety of the public and for the effectual protection of the work against damage from rain, snow, frost, ice, or other causes, and must so maintain the work.

31.0 SUBLETTING

The Contractor shall keep the work under his personal control, and shall not assign, transfer, or sublet any portion without first obtaining the written consent of the Construction Manager. The consent of the Construction Manager to any such assignment, transfer, or subletting, shall not, however, relieve the Contractor of any responsibility for the proper commencement, execution, and completion of the work according to the terms of the Contract. If the Construction Manager consents to any such assignment, transfer or subletting the Contractor shall, either in person or through an accredited representative, receive all notices, communications, orders, instructions, or legal service, as if he were performing the work with his own plant and his own workers.

32.0 SETTING OUT

The Construction Manager will provide the Contractor in writing with bench marks and points of reference to be used by him in setting out the works. The Owner will be responsible only for the correctness of the information so supplied. From these bench marks and points of reference the Contractor will do his own setting out.

The Contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works, and for the provision of all necessary instruments and labour in connection therewith.

33.0 ASSISTANCE

The Contractor is to furnish the Consulting Engineer, the Contract Manager, or any of their assistants, with any reasonable help which he or they may require at any time in checking the work. He shall also furnish the said parties, or any of the Site Representatives, at all times, with convenient means of access to all parts of the works, and also with all required assistance to facilitate thorough examination of the same, and inspection, culling and removal of doubtful or defective material, and for any other purpose required in connection with the said works or in the discharge of their respective duties, for which services no additional allowance will be made.

34.0 MONIES DUE OWNER

All monies payable to the Owner by the Contractor under any stipulation herein or to the Workers' Compensation Board, may be retained out of any monies then due, or which may become due, from the Owner to the Contractor under this or any other contract with the Owner, or otherwise howsoever, or may be recovered from the Contractor or his surety jointly or severally in any court of competent jurisdiction, as a debt due to the Owner; and the Owner shall have full power to withhold any estimate or certificate, if circumstances arise which may indicate to it the advisability of so doing, though the sum to be retained may be ascertained.

35.0 DISPUTES

(a) Contractor's Claims

Any claim which the Contractor may have against the Owner based on any dispute or difference of any kind whatsoever arising out of the Contract or work shall not be ground for delay in the work but shall be referred by the Contractor in writing to the Construction Manager not later than fifteen (15) days after the Contractor becomes aware of the circumstances giving rise to such dispute or difference. Such reference shall contain a concise statement of the relevant facts. The Construction Manager may require any additional information.

The claim shall be settled by the Construction Manager who shall communicate his decision in writing to the parties and such decision shall forthwith be given effect by the parties, and the Contractor shall proceed with the works with all due diligence in accordance therewith whether or not such claim shall be referred to arbitration as hereinafter provided.

Except in those circumstances where it is provided in the Contract that the decision of the Construction Manager shall be final, any dispute or difference persisting after the delivery of the Construction Manager's decision shall, within thirty days, be referred to arbitration in accordance with the Arbitration Act of Ontario and as herein provided. Compliance by the Contractor with the provisions of Section 39 hereof and with time limits stipulated herein shall be a condition precedent to such arbitration.

Prior to arbitration, the parties shall make reasonable efforts to resolve disputes through senior management negotiations. The arbitration shall be by a board of three members except as provided for in the following paragraph hereof. Either party shall notify the other party in writing of its desire to submit the dispute or difference to arbitration and the notice shall contain the name of the first party's appointee to the arbitration board. The recipient of the notice shall within fourteen (14) days inform the other party of the name of its appointee to the arbitration board. The two members, so selected, shall within fourteen (14) days of the appointment of the second of them appoint a third person who shall be a lawyer and who shall be the chairman of the arbitration board, unless the parties to the dispute agree that the said chairman need not be a lawyer.

Alternatively, the arbitration board may consist of a sole arbitrator provided that:

- (a) the Owner and the Contractor so agree, and
- (b) the Owner and the Contractor agree upon the person to be appointed as sole arbitrator.

If the dispute remains unresolved, the parties may participate in mediation prior to commencement of arbitration.

.

Reference to arbitration by the Contractor as herein provided shall be a condition precedent to any legal action by him with respect to any dispute or difference of any kind whatsoever which the Contractor may have with the Owner arising out of the Contract or work.

- (b) Owner's Claims

Any claim which the Owner may have against the Contractor based on any dispute or difference of any kind whatsoever arising out of the Contract or work may, at the option of the Owner, and after notification in writing to the Contractor, be settled in accordance with the procedure set out in sub-section (a) hereof and the provisions thereof shall apply 'mutatis mutandis'.

36.0 RESTORATION

Where the Contractor enters into the lands, buildings, highways or roads under the jurisdiction and control of the Owners for the purpose of making a survey, examination, investigation, inspection or lays any pipes or appurtenances and in so doing disturbs any such lands, buildings, highways or roads, such lands, buildings, highways or roads shall be restored to their original condition without delay.

37.0 DRAINAGE

The Contractor shall keep all portions of his work properly and efficiently drained during construction and until completion, and he will be held responsible for all damage which may be caused or result from water backing up or flowing over, through, from or along any part of the works, or which any of his operations may cause to flow elsewhere. The Contractor shall dewater all work sites and excavations as necessary or as directed to enable the works to be constructed in a satisfactory manner. The Contractor shall not be entitled to any additional payment for compliance with the requirements hereof beyond the prices tendered for the construction of the works.

38.0 BARRIERS, LIGHTS AND DETOURS

The Contractor must, at his own expense, and without further or other order, provide, erect and maintain all requisite barriers, fences or other proper protection; and must provide, keep and maintain watchmen and lights with red globes, as may be necessary or as may be ordered by the Construction Manager, in order to ensure safety to the public as well as to those engaged about the premises or works. Should the Contractor neglect to carry out the above requirement, the Construction Manager is hereby authorized to place such watchmen, lights, barriers, etc., as are required, and to charge the cost to the Contractor, without relieving the Contractor of any claims for damages or accident. The Contractor must (where it is practicable in the opinion of the Construction Manager) keep the roadway open for travel for the use of the public, for such width as the Construction Manager may direct. Where, in the opinion of the Construction Manager, it is not practicable to keep a roadway open for the full flow of traffic, he may permit the Contractor to close or partially close such roadway and to provide for a detour of the traffic or a part thereof. In each such case and before putting into effect the closure or detour, the Contractor shall present his proposal for closure or detour to the municipal or other authority or authorities having jurisdiction over any of the roadways which will be affected by the proposed closure or detour and shall obtain the written authorization to such proposal of the said authority or authorities. The Contractor must provide a sufficient number of "NO THOROUGHFARE", "DETOUR" or other proper notices, which he must cause to be placed and maintained in good order in conspicuous places wherever any roadway, sidewalk, or thoroughfare is torn up or dangerous, and so long as it remains unsafe or unfinished.

When any work is carried on at night, the Contractor must supply, at his own expense, a sufficient number of electric or other approved and efficient lights, to enable the work to be done in an efficient and satisfactory manner, and the Construction Manager shall have the power to order additional lights to be put on at the Contractor's expense if in the opinion of the Construction Manager, they are or may be required. Traffic control devices, signage and detour routes shall comply with Ontario Traffic Manual Book 7 and all requirements of the authority having jurisdiction.

39.0 ALTERATIONS, EXTRAS, DEDUCTIONS AND CLAIMS

The Consulting Engineer and the Construction Manager shall have the right to make or order any alterations and changes as they may deem advisable at any time before or during the execution of the works, including any line, grade, plan or detail thereof. The Consulting Engineer and the Construction Manager may suspend or omit any portion of the work, change the dimensions of any part of the works, vary the work contracted for, order any additional or extra work to be done, or order additional or extra materials to be furnished. Upon written orders from the Construction Manager the Contractor shall proceed with, carry out and execute the works as directed, shall supply such additional materials, and do such additional or extra work as the Construction Manager requires. The Contractor is not entitled to any extension of time for completion or any additional payment on account thereof, except only as herein provided.

Before commencing any work or procuring any materials required to do work beyond the requirements of the Contract, the Contractor must obtain a written order from the Construction Manager stating:

- (a) The work is an extra and will be paid for as such, clearly define the nature of such extra work or material, and the amount the Contractor is to receive, or the terms under which the work is to be paid for; or
- (b) The work is considered to be part of the Contract and not an extra and that no additional payment shall be made.

Before beginning any such work or commencing to deliver any such material, notify the Construction Manager in writing of his intention to commence work thereon or delivery thereof, so that a proper account or record of the same may be kept by the Construction Manager. If the Contractor proposes to claim additional payment for work or materials which the Consulting Engineer considers to be a part of the Contract and not an extra, the Contractor shall so notify the Construction Manager in writing before commencing such work or delivering such materials.

In case of the Contractor's neglect or failure to observe fully and faithfully the above conditions in this section contained, he shall forfeit all right to payment therefor which he otherwise might have had, and shall not make any claim in respect thereof, and if made, the Consulting Engineer may reject the same as invalid.

40.0 OTHER'S RIGHTS

The Contractor must afford all necessary and reasonable facilities to the Owner, any of its employees or workers, as well as to any company, corporation or person owning or operating any railway, tramway, wires, pipes, conduits, works or property, on, along, or near the line of the works. He shall notify all such parties before interfering with any of their property, rights or privileges and must work in harmony with them; otherwise he shall notify the Construction Manager in writing of his failure so to do, or of any difficulty that may at any time arise which he may be unable to overcome, in which case the Construction Manager shall deal with the matter as in his judgement may seem right or proper, and the Contractor shall abide by the decision and the direction of the Construction Manager. Any property of such parties which the Construction Manager orders to be moved by the Contractor must be handled with care, and must be neatly piled up and preserved free from injury or loss, and must be properly and satisfactorily replaced, all of which must be done by the Contractor without extra charge (unless specifically provided for in the Contract) and to the satisfaction of the Construction Manager. The Consulting Engineer shall have the right, at any time before or during the construction, or after the completion of the work, to open up any portion of the work or works, or the ground or roadway, or to grant permission for such opening to be made or left by the Contractor, as he, the Consulting Engineer, may deem advisable, for the purpose of examining, repairing or laying any water, gas or other pipe, sewer, drain, track or other underground or surface construction or to cause any such work as he may deem necessary or advisable to be done, and such permission, or the exercise of such rights, either by the Consulting Engineer or by any other person or corporation having the requisite authority (either statutory or otherwise) shall not relieve the Contractor from any of his responsibilities or obligations, nor shall the opening up of any portion of the work for these or any other purposes, or by any other parties, relieve the Contractor of such responsibilities or obligations, except only for the portion of the work actually torn up and destroyed, and then only in case the Contractor applies in writing for such relief at the time the work is being done, or within ten days afterwards, and can furnish sufficient cause, in the opinion of the Consulting Engineer, why such relief should be granted.

41.0 NON-FULFILMENT OF CONTRACT

If in the opinion of the Consulting Engineer or Construction Manager and at any time or times prior to the issuance of the Final Certificate, the Contractor neglects or fails to commence work, or becomes

insolvent, bankrupt, subject to receivership, creditor protection proceedings, or assignment for the benefit of creditors, or compounds with his creditors, or commits any act of insolvency, or transfers, assigns or sublets the Contract or any part thereof without the written consent of the Consulting Engineer/Construction Manager, or has not executed or is not executing the work or any part thereof in a sound and workmanlike manner and in accordance with the Contract, or is not performing the work so as to ensure its completion within the time stipulated in the Contract or has failed to complete the works within the said time, or fails or refuses to take down, rebuild, repair or rectify any imperfect work for which the Contractor is responsible, or fails to remove any condemned material or to replace such material with proper material, or fails to comply with any reasonable order given to him by the Consulting Engineer/Construction Manager, or abandons the work, or fails to observe or perform any of the provisions of the Contract, then in each and any such case the Consulting Engineer/Construction Manager shall, after giving the Contractor 48 hours written notice, have the right and power, at his discretion without legal proceeding, to take possession and control of the whole work, or any part or parts thereof specified in the said notice, from the Contractor, and the Contractor, upon receiving the said notice, shall give possession and control of the said work, or the part or parts thereof specified in the said notice, peaceably to the Consulting engineer, and the Consulting Engineer/Construction Manager may employ such means as he may deem necessary or advisable to complete the work to his satisfaction with such changes therein as in the Consulting Engineer's/ Construction Manager's opinion are necessary or advisable by reason of the Contractor's non-fulfilment of the Contract as set out herein. In the event of an emergency in any manner due to the Contractor's non-fulfilment of the Contract as set out above or in Section 30 hereof, the Consulting Engineer/Construction Manager shall have the right and power at his discretion without process or action at law or any notice to the Contractor to take possession and control of the works, or any part thereof, from the Contractor and the Consulting Engineer/Construction Manager may take such measures as he may deem necessary or advisable to deal with the emergency and the decision of the Consulting Engineer/ Construction Manager as to the existence of such an emergency and as to the measures to be taken in regard thereto shall be final. If, in the event of an emergency as aforesaid, the Consulting Engineer/Construction Manager takes measures in regard there to as provided for above, he shall notify the Contractor thereof as soon after the commencement of the emergency as is practicable. The Contractor and his surety in every case provided for above shall be liable for all loss, damage, expense, expenditures and cost which may be incurred by reason of the Consulting Engineer's/Construction Manager's exercise of the rights and powers provided for herein. If the said loss, damage, expense, expenditure or cost exceeds the sum which would have been payable under the Contract if the same had been completed by the Contractor, the Contractor or his surety shall pay the amount of such excess to the Owner together with the amount of liquidated damages from the date fixed for the completion of the work, and the same may be deducted or collected by the Owner as provided for in Section 48, entitled "Monies Due Owner". All the powers of the Consulting Engineer/Construction Manager with respect to the Determination of any doubts, disputes and differences, and the determination of the sum or sums, or balance of money to be paid to or received from the Contractor or his surety in respect of the Contract, shall nevertheless continue in force. The fulfilment by the Contractor of any stipulation in the Contract may be enforced by legal proceedings and judgement, or order of court, without prejudice to any other remedy herein contained.

In case possession and control of the work, or any part thereof, is taken from the Contractor, the completion of the work shall not be delayed. Neither an extension of time for any reason beyond the date fixed herein for the completion of the Contract, nor the payment for any portion of the work shall be deemed to be a waiver by the Consulting Engineer, Construction Manager or the Owner of their rights under this Contract. The Owner shall act reasonably in exercising remedies under this Section.

42.0 POUR RELEASE FORMS

Concrete shall not be poured until "pour release forms" have been signed by all trades, contractors and the Construction Manager.

43.0 MAINTENANCE SECURITY

The Contractor shall provide to the Owner for the duration of the period of maintenance, a maintenance security the value of which shall be derived from the following table:

CONTRACT PRICE		VALUE OF MAINTENANCE SECURITY \$
FROM \$	TO \$	
Less than 0.1 M		4% of Final Contract Price
0.1M	0.5M	4,000 on first 0.1M + 3.0% on next 0.4M
0.5M	1.0M	16,000 on first 0.5M + 2.4% on next 0.5M
1.0M	2.0M	28,000 on first 1.0M + 2.2% on next 1.0M
2.0M	4.0M	50,000 on first 2.0M + 2.0% on next 2.0M
4.0M	6.0M	90,000 on first 4.0M + 1.8% on next 2.0M
6.0M	10.0M	126,000 on first 6.0M + 1.5% on next 4.0M
Over 10.0M		186,000 on first 10.0M + 1.0% on balance

The maintenance security, which is at no time a part of the statutory holdback, shall be retained by the Owner in increments from monies that would otherwise be payable to the Contractor, commencing during the latter part of the period of construction, so that by the date of substantial performance of the contract the full value of the required maintenance security has been retained.

Except as otherwise provided hereunder, the maintenance security, less any deductions made therefrom as provided for in the Contract, plus interest thereon over the period of maintenance and compounded annually at the applicable rate(s) of interest set from time-to-time by the Minister of Finance shall be paid to the Contractor following the issuance by the Construction Manager of the Final Certificate at the end of the period of maintenance.

The Contractor may apply in writing to the Construction Manager who will request the approval of the Consulting Engineer at the time of substantial performance to substitute for the monies retained as the maintenance security an alternative maintenance security of equivalent or greater value comprising:

- (a) one or more irrevocable letters of credit, or
- (b) another readily negotiable security.

Acceptance of any such alternative shall be at the direction of the Consulting Engineer and the Solicitor for the Owner.

Following receipt and acceptance of any such alternative, the Construction Manager shall release to the Contractor the monies previously retained for maintenance security purposes.

The Construction Manager and the Consulting Engineer together may, in their discretion, allow the total maintenance security to be made up in part of monies retained under the Contract and in part of an alternative maintenance security as indicated in (a) and (b) above provided that the total value of such parts, as determined by the Construction Manager, shall be not less than the required value as derived from the table set out above.

Such alternative maintenance security or the monies derived therefrom, less any deductions made as provided for in the Contract, shall be released to the Contractor following the issuance by the Construction Manager of the Final Certificate at the end of the period of maintenance. Interest shall only be paid on monies, if any, derived from the said security and which remain unexpended in the maintenance security fund.

Where the Construction Manager proposes to release the statutory holdback to a Subcontractor through the Contractor as provided for in Section 44, hereof, the Consulting Engineer shall arrange for "the required maintenance security in respect of the said Subcontract", as referred to in Section 44 hereof, to be provided by a retention from monies that would otherwise be payable to the Contractor. The value of the required maintenance security shall be determined by applying to the value of the Subcontract work the same effective percentage retention, derived from the foregoing table, as applies to the Contract as a whole.

The Contractor may apply in writing to the Construction Manager to substitute for the maintenance security referred to in the preceding paragraph an irrevocable letter of credit in the name of the Contractor.

Following the substantial performance of the Contract, the Construction Manager may require the Contractor to consolidate all letters of credit provided pursuant to the foregoing into one or two letters of credit covering the Contract as a whole.

The Contractor shall allow his Subcontractors to provide letters of credit to the Contractor in conformity with the foregoing procedures. The Contractor shall provide the Consulting Engineer with copies of any or all such letters of credit on request.

44.0 CERTIFICATES OF COMPLETION - to be read with Section 28.0 of the General Conditions.

- (a) The Contract shall be considered as substantially performed when:
 - (1) the works have satisfactorily passed the required inspection and testing and are ready for use or are being used for the purposes intended, and
 - (2) the works are capable of being completed or, where there is a known defect, corrected at a cost of not more than:
 - (i) 3 percent of the first \$500,000 of the Contract Price plus,
 - (ii) 2 percent of the next \$500,000 of the Contract Price plus,
 - (iii) 1 percent of the balance of the Contract Price.
- (b) Where the works or a substantial part thereof are ready for use or are being used for the purposes intended but part of the works cannot be completed expeditiously for reasons beyond the control of the Contractor or where the Owner and the Contractor agree to delay completion of the works, the cost, as determined by the Construction Manager and the Engineer, of completing the outstanding work shall be deducted from the Contract Price in determining substantial performance and the value of the work completed.
- (c) As soon as, in the opinion of the Construction Manager and the Engineer, the Contract has been substantially performed in accordance with the foregoing, the Construction Manager will issue a Certificate of Substantial Performance.
- (d) The Consulting Engineer shall set out in the Certificate of Substantial Performance the date on which the Contract was substantially performed and within seven days after signing the said certificate he shall provide a copy to the Contractor.

- (e) Upon receipt of a copy of the Certificate of Substantial Performance, the Contractor shall forthwith, publish a copy of the said certificate in publication or posting in accordance with the requirements of the Construction Act. Such publication shall include placement in the publication requirements prescribed by the Construction Act.
- (f) Where the Contractor fails to publish a copy of the Certificate of Substantial Performance as required above within seven days after receiving a copy of the said certificate signed by the Consulting Engineer, the Owner may publish a copy of the certificate at the Contractor's expense.
- (g) Except as otherwise provided, the 45-day period prior to the release of holdback, shall commence from the date of publication of the Certificate of Substantial Performance as provided for in (e) and (f) above.
- (h) The works shall be deemed to be completed when:
 - (1) the works have satisfactorily passed the required inspection and testing, and
 - (2) the cost of completion of all outstanding work and known defects is not more than the lesser of:
 - (i) one percent of the Contract Price, and
 - (ii) \$1,000.00
- (i) As soon as, in the opinion of the Construction Manager, the works have been completed in accordance with paragraph (h) above, the Construction Manager will issue a Certificate of Completion on submission by the Contractor of the following documents:
 - (1) The Contractor's Final Claim.
 - (2) An up-to-date release by the Contractor in a form satisfactory to the Construction Manager releasing the Owner from all further claims relating to the Contract.
 - (3) An up-to-date Statutory Declaration in a form satisfactory to the Construction Manager that all liabilities incurred by the Contractor and his Subcontractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Subcontracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.
- (j) The Construction Manager shall set out in the Certificate of Completion the date on which the works were completed and within seven days of signing the said certificate he shall provide a copy to the Contractor.
- (k) **Payment due to the Contractor following issuance of the Certificate of Completion shall be as provided for in Section 28 hereof.**
- (l) On the expiration of a period of 12 months from the date of substantial performance, as set out in the Certificate of Substantial Performance, and after all known imperfect work has been rectified in accordance with the Contract and to the satisfaction of the Construction Manager and the Consulting Engineer to the best of their knowledge that the Contractor has discharged all his obligations under the Contract, the Construction Manager and the Consulting Engineer will issue

the **Final Certificate approving the release to the Contractor of the maintenance security (see Section 44(h) hereof)**, less any deduction as provided for in the Contract.

- (m) On the expiration of a period of 12 months from the date of substantial performance, as set out in the Certificate of Substantial Performance, the Construction Manager may approve the release to the Contractor of a part of the maintenance security on such terms and conditions as the Construction Manager deems advisable notwithstanding that the Final Certificate has not been issued and that all imperfect work has not been rectified in accordance with the Contract.
- (n) The Construction Manager may in his discretion direct or approve that the works covered by the Contract be divided into two or more parts for the purpose of issuing Certificates of Completion and releasing holdback monies. In that event, the Contractor shall submit documentation as set out above in respect of each such part.

MCA CONSTRUCTION AND SAFETY GUIDELINE

SECTION 4

CONSTRUCTION SAFETY GUIDELINES

1. **SCOPE**

This section applies to the period of construction of all projects. It concerns the safety of the worker on the project and the public affected by the project.

2. **GENERAL**

No project shall be commenced or continued unless sufficient land space is available to permit compliance with all requirements.

3. **PUBLIC WAY PROTECTION**

When work is being carried out on a dwelling or other structure within 4.6m (15') of a public way, provision shall be made to protect the public, by a strongly constructed fence or boarding at least 1.8m (6') in height around the construction site. If the structure is 2m (6'-8") or less from the public way, overhead protection shall also be provided.

Where an excavation is more than 1.2m (4') deep, it shall be shored and protected by a barricade which shall be at least 1065mm (42") high and be located a distance equal to the depth of the excavation from the top of any wall of the excavation. Where an excavation is left open over night flashing lights shall be provided in each direction of the public way.

4. **TRAFFIC CONTROL**

Temporary roadways shall be marked for the passage of vehicle traffic. Workers directing traffic during working hours shall wear approved clothing, ie: a fluorescent and coloured (blaze orange or red) vest or hat and sleeves extending from above the elbow to the wrist. Signs shall be used to direct traffic during non-working hours.

If a major traffic way is obstructed when making service connections, procedures shall be established to allow emergency vehicles access around the obstructed area. Band Police or local law enforcement agency shall be requested to provide assistance.

5. **PERSONAL PROTECTIVE CLOTHING, EQUIPMENT AND DEVICES**

Every worker shall wear appropriate clothing (no loose sleeves etc.) and shall wear or use such protective clothing, equipment or device as is necessary for personal protection. This equipment may be, but is not limited to, safety hats, safety eyeglasses, safety footwear, ear protectors, gloves, etc.

6. **EXCAVATION**

All excavations shall be well marked for pedestrian and vehicle traffic with an access route marked for the passage of emergency vehicles. A worker shall be delegated to direct emergency vehicles in case of an emergency while work is in progress on site.

Care shall be taken not to damage any existing underground system (gas, water, sewer, electrical conduits) which shall be supported where necessary to prevent failure or breaking. Call before you dig.

No vehicle or other machinery shall be driven, operated or located so near to the edge of the excavation as to endanger a person by affecting the stability of the walls of the excavation.

Every excavation shall be kept reasonably free of water at all times.

No worker shall enter or remain in an excavation which is greater than 1.2m (4') in depth unless the excavation is properly shored.

7. HOUSEKEEPING

No object shall be placed where it is likely to endanger a worker or the public.

Formwork ties or nails protruding from concrete shall be removed or cut off as soon as the formwork has been removed.

Except where the scrap material or lumber is stored in an acceptable container for removal, waste material and debris shall be removed daily.

Each trade shall respect the work of other trades and shall keep the workplace clean and safe. Incomplete work shall be left in such state as not to be a potential hazard to other workers.

No material shall be thrown or permitted to fall freely from one story to another, or from a roof.

8. STORAGE OF MATERIALS

Material to be used on a project, or to be removed from a project, shall be stored in an orderly manner so as not to endanger any worker or the public. Care shall also be taken when moving or transporting material.

No construction material shall be stored, stocked or piled within 1.8m (6') of a floor or roof opening, or the open edge of a floor or an excavation, except where they can be handled by one worker and provided that the height of a pile is less than the distance of the face of the pile from the edge.

Lumber and similar materials shall be stored so that the pile is secure against collapsing or tipping. Crosspieces shall be used to provide stability on all piles of lumber exceeding 1.2m (4') in height.

Masonry units shall be stacked on level wood planks, platforms or bases in tiers with header units in the pile where necessary to provide stability. The pile shall not exceed 1.8m (6') in height.

Bagged material shall be piled with cross – piles on the exterior of the pile and be not more than ten bags high.

Pipe and reinforcing steel shall be stocked, supported or braced as to prevent accidental movement.

9. SANITATION

A reasonable supply of potable water shall be kept readily accessible for the use of the workers.

At least one flush toilet, chemical toilet or privy shall be provided or made available to the workers.

10. FIRE PROTECTION

A 4.5 kg (10 lb.) ABC fire extinguisher shall be provided at the construction site. If running water is available, a 15m (50') garden hose with a jet spray nozzle may be used.

Consult the local fire brigade chief to establish the fire protection measures available before work starts.

11. ELECTRICAL SUPPLY

Precautions shall be taken to prevent danger to the public or workmen from any live electrical conductors (wires) or from any electrical equipment.

A panel board shall be securely mounted on a vertical surface, kept clear of any obstruction, readily accessible, located in an area where water will not accumulate and be protected from the weather.

No worker shall use any cord-connected electrical equipment or tool unless the equipment is sufficiently grounded.

No worker shall bring any object, move a back-hoe shovel, crane or other similar lifting device or its load closer than the length of the boom of the lifting device to an electrical power line of more than 750 volts unless he has another worker stationed within his view to warn him when any part of the lifting device or its load is approaching minimum distance from the power line as shown on Table 11.A.

**Table 11.A
Forming part of Article 11**

MINIMUM DISTANCE FROM LIVE POWER LINES

<u>Voltage of Live Power Line</u>	<u>Minimum Distance</u>
750-15,000 volts	3.1m (10')
15,001-250,000 volts	4.6m (15')
Over 250,000 volts	6.1m (20')

12. CONSTRUCTION EQUIPMENT

All vehicles, cranes, machines, tools or other pieces of equipment shall be maintained in such condition that they will not endanger a worker when in use. For loading lifting equipment where equipment certification is required, the manufacturer's recommendations will be followed. Regular inspections will be conducted as per manufacturer's recommendations. A logbook of inspections, repairs, tests, modifications, etc. shall accompany equipment at all times. Inspections shall be conducted by a certified person.

No worker shall operate any piece of equipment on a project unless he has the required training and experience specific to the equipment being operated. For load lifting equipment requiring operator certification, the manufacturer's recommendation shall be followed. Regular inspections will be conducted as per manufacturer's recommendations. Proof of certification will accompany the operator at all times and may be requested from time to time.

No worker shall mount a platform, bucket or load support by a crane, hoist, fork-lift, front-end loader or similar machine.

Where the operator may be exposed to overhead hazards, a cab, screen or other adequate overhead protection shall be provided.

No person shall operate a power-shovel, backhoe or similar excavating machine in such a manner that any part of its load will pass over a worker.

No person shall begin to disconnect or carry out repairs on a pipeline under pressure until he has ensured that the disconnection or repair will endanger no person.

13. EXPLOSIVES

No fire or other flame shall be taken or be within 7.6m (25') of any magazine vehicle, building or place in which explosives are stored, handled or transported.

An acceptable, competent person shall be appointed by the superintendent to be in charge of all blasting, control and storage of the explosives.

14. PLATFORMS, RUNWAYS AND RAMPS

All runways, ramps or platforms shall be designed to hold the expected loads to be applied to them and be 485mm (19") or more in width. Slopes shall not exceed more than 300mm (1') vertically to 900mm (3') horizontally. Cross-cleats must be used on runs steeper than 1:3.

15. LADDERS:

All ladders shall be securely fastened and be placed so the base of the ladder is not less than one-quarter and not more than one-third of its length from the wall face. The ladder shall extend at the upper level a minimum of 900mm (3') with at least 150mm (6") clearance behind each rung.

When a stepladder is being used, the legs shall be fully spread and locked. The top of the stepladder and pail shelf shall not be used as steps.

16. STAIRS

Temporary stairs shall have a clear width of not less than 510mm (20"), be not more than 4.6m (15') vertically between landings and shall be equipped with handrails.

17. GUARDRAILS

Guardrails shall be provided at the perimeter, open sides and ends of a floor, scaffold, working platform, runway or ramp and be not less than 910mm (36") and not more than 1065mm (41") above the surface, floor, scaffold or roof.

18. SCAFFOLDS

No worker shall use a barrel, box or other loose object to stand upon while working, or to support a scaffold or working platform.

A scaffold shall be anchored and capable of supporting at least twice the maximum load to which it is likely to be subjected, and have uprights diagonally braced, with footings, sills, or supports capable of supporting the load.

The scaffold platform or other work platform shall be at least 460mm (18") wide.

A person with scaffold use training shall be responsible for the use of the scaffold.

19. FORMS AND FALSEWORK

Forms and falsework shall have sufficient bracing in the vertical and horizontal planes to prevent movement and bucking.

Falsework shall be braced to withstand all loads during and after placing of the concrete. Falsework design shall be approved by the design engineer or consultant or otherwise acceptable.

Forms or falsework shall not be removed unless the concrete has attained sufficient strength to support any load likely to be applied to it.

20. EXPLOSIVE ACTUATED TOOLS

All explosive-actuated fastening tools shall have a safety mechanism that will prevent the tools from being fired while being loaded, during preparation for firing, or if dropped; and be capable of operation only when the muzzle end is held against a working surface.

An explosive-actuated fastening tool shall be used only by a worker who has been instructed in the proper and safe manner of its use and who is wearing safety protection equipment (safety hat, safety glasses, safety boots and ear protection)

The load for an explosive actuated fastening tool shall be so marked that the operator can identify its strength. The load and tool shall not be left unattended and when not in use, shall be stored in a locked container.

21. SMOKING

Where conditions are such as to make smoking a fire or explosion hazard, smoking shall be permitted only in specifically acceptable smoking areas.

The areas where smoking is not permitted shall be identified by signs. Signs prohibiting smoking shall have black lettering at least 50mm (2") high with a 12mm (1/2") stroke on a yellow background. Symbols at least 150mm (6") by 150mm (6") may be used in lieu of lettering.

Schedule of Fines and Procedures for Infractions of Safety Procedures

First warning will be a verbal warning to employee of breach of safety procedure and to Employer/Contractor by Safety Officer of the Department of Infrastructure, Housing, and the Environment.

Second warning must be a written warning to Employee of a continuing breach of the same safety procedure and to Employer/Contractor by Safety Officer of the Department of Infrastructure, Housing, and the Environment.

Third warning following a continuing breach of the same safety procedure results in written notice to Employee as well as to the Employer/Contractor by the Safety Officer of the Department of Infrastructure, Housing, and the Environment. This written notice documents the two previous infractions and levies the fine. The fines may not exceed a maximum of:

- a) \$500.00 for Employee
- b) \$5,000.00 for Employer/Contractor

Following the imposition of fines, further persistent breaches of safety procedures will result in termination of the contract between the Employer/Contractor and the Mohawk Council of Akwesasne.

CONSTRUCTION SAFETY PROGRAM

Introduction

All accidents in Akwesasne can be prevented.

Working to this goal is expected of each employee of the Mohawk Council and all contractors, subcontractors and their employees.

Safety Policy

Working safely is a condition of awarding contractors and for any individual's presence on Mohawk Council Construction Projects.

All contract work at Akwesasne must be performed in full compliance with Ontario Health and Safety Standards and additional procedures as set out by the Mohawk Council Technical Services Safety Department.

Failure to comply may be used as a basis for denying an individual permission to work on Mohawk Council projects.

All work performed at Akwesasne must be done in full compliance with Ontario Regulations 213/91 Construction Projects, Occupational Health and Safety Act. Also, the Construction Health and Safety manual published by the Construction Safety Association of Ontario. This manual is easy to read and well illustrated; copies are available at the Technical Services Safety Office.

Planning and Communication Safety

- Work Plan
- Hazard Identification
- Safety Meeting

All work activity must be planned as follows:

1. Work Plan

A weekly work plan for the following week must be completed each Friday, outlining the work planned.

2. Hazard Identification

A weekly work plan for the following week must be completed each Friday, identifying the safety hazards, potential accidents, safety procedures to be followed and safety equipment to be used to prevent any accident or injury when performing the planned work.

3. Weekly Safety Meeting

A safety meeting must be held on the morning of the first working day of each week. The weekly work plan and hazard ID sheet will have created the agenda, ie: the work plan for the week

- ~ hazards in performing the planned work
- ~ safety procedures to follow
- ~ safety equipment to be used

Each employee in attendance is required to sign “report of the meeting” in the space provided.

It is each contractor’s responsibility to ensure that the above procedure is strictly followed by his supervisors, foreman and subcontractors.

Copies of the weekly work plan (a) and hazard identification sheet (b) are to be delivered to the MCA Safety Office by 2:00 p.m. every Friday.

A copy of the safety meeting report is to be delivered to the MCA Safety Office by 2:00 p.m. of the first working day of each week.

Forms (a), (b) and (c) will be provided by MCA Safety Office. The MCA Safety Coordinator will provide assistance if required to complete forms (a), (b) and (c).

Safety Audits/Site Inspections

The MCA Safety Coordinator conducts random site safety audits on a daily basis and a formal safety audit every week on all MCA construction projects. Any unsafe conditions or unsafe act is recorded.

We require that the site supervisor accompany the Safety Coordinator on these weekly audits. ANY UNSAFE CONDITION OR ACT MUST BE CORRECTED IMMEDIATELY.

A written report is made of each audit and copies distributed to Project/Construction Managers and Site Supervisors.

MCA Safety Coordinator

The role of the MCA Safety Coordinator is a supportive one, providing assistance and guidance in all safety concerns. His/Her role in safety in no way relieves the contractor’s responsibility for the safety of their employees including subcontractor employees.

PLAN SAFETY INTO EVERY WORK ACTIVITY
THE BETTER THE PLAN
THE BETTER THE RESULT

AGREEMENT

I, _____
(Contractor's Name)

agree to comply with all of the above safety requirements.

Signed

WORK PLAN

Contractor _____

Foreman _____

for week starting Monday, _____

ACTIVITY #	WORK PLAN	MON.	TUES.	WED.	THURS.	FRI.	SAT.	SUN.

Contractor _____

Foreman _____

Date _____

Mohawk Council of Akwesasne

HAZARD IDENTIFICATION SHEET

NO.	WORK ACTIVITY	HAZARDOUS CONDITION	POTENTIAL ACCIDENT	PREVENTATIVE MEASURES	SAFETY EQUIPMENT REQUIRED

MOHAWK COUNCIL OF AKWESASNE

WEEKLY MONDAY MORNING

SAFETY MEETING

HAZARD IDENTIFICATION

(list of attendees to be included with minutes)

Contractor _____ Foreman _____ Date _____

SAFETY HAZARDS TODAY (refer to Hazard Identification Sheet)			
PREVENTATIVE ACTIONS AND SAFETY EQUIPMENT REQUIRED		EMPLOYEE SUGGESTIONS	
ATTENDEES	✓	ATTENDEES	✓
SAFETY DOESN'T HAPPEN BY ACCIDENT			

SPECIAL CONDITIONS

SECTION 5

NOTICE TO CONTRACTOR – WATER ELEVATIONS

Water levels shown on the Contract Documents were observed at a specific time of year. The water levels are seasonal and may fluctuate during completion of the work. The Contractor shall implement appropriate construction techniques and/or methods to complete the work based on the actual site conditions. The water level shall be reduced to 0.5 m below the proposed bottom of the abutment pile cap during pile cap construction. Continuous pumping operations, in conjunction with cofferdam installation, may be required to achieve and maintain this condition.

NOTICE TO CONTRACTOR - CONCRETE DISCHARGE TIME

For all concrete placed under this Contract, OPSS.MUNI 904, November 2023, and OPSS.MUNI 1350, November 2023, shall govern except as amended or extended as follows:

All concrete materials and mixes shall be designed for an extended discharged time from the time of initial batching. As a minimum, the mix design shall include a retarding admixture to meet a minimum discharge time of 2 hours after introduction of mixing water to cement and aggregate. These times may be further extended using a set retarder, provided the Owner approves such use.

OPERATIONAL CONSTRAINT - Notification of Emergency Service Providers, School Boards, Local Businesses & Residents

The Contractor shall notify the stakeholders below 14 days in advance of work commencing regarding the construction schedule and if any changes to traffic flow are anticipated.

All notification shall be in writing and copied to the Contract Administrator. A draft of the notification shall be submitted to the Contract Administrator for approval a minimum of five (5) days prior to distribution. The notification shall include the contact information of the Contractor and the Contract Administrator.

The Contractor shall notify the Contract Administrator of any inquiries received from the public within 48 hours. The Contractor shall prepare responses for the inquiries related to traffic staging, temporary closures and construction operation and submit them to the Contract Administrator.

Contact information is provided below:

Emergency Services	
OPP – opp.er.mailroom@opp.ca	Mohawk Police Service (AMPS) – info.amps@akwesasne.ca AMPS Non-Emergency: 613-575-2340 AMPS Central Dispatch / Emergency: 613-575-2000
EMS – SDG – emsdutyofficer@cornwall.ca	
Fire – fire@northdundas.com Fire Chief: 613-614-2450	
School Boards and Transportation	

Upper Canada District School Board (613-342-0371) Catholic District School Board of Eastern Ontario (613-258-7757)	Student Transportation General – transportation@steo.ca
Interest Groups/Businesses	
Cornwall Electric Manon Litalien Manon.Litalien@cornwallelectric.com (613-932-0123, ext. 4226)	Bell Chuck Trottier charles.trottier@bell.ca (613-930-5864)

OPERATIONAL CONSTRAINT - Installation and Relocation of Temporary Concrete Barrier and Energy Attenuators

Installation and relocation of temporary concrete barriers for staged construction, as indicated in the contract drawings, including end treatments, shall be carried out during one single lane closure period.

The Contractor may be required to adjust, reposition, or relocate the temporary barriers to accommodate the Contractor's own daily entry and exit from the work area. No additional payment will be made for any adjustments to the Temporary Concrete Barriers and Energy Attenuators, unless specified elsewhere in the Contract.

OPERATIONAL CONSTRAINT - Working Around Existing Utilities

The locations of all utilities shown are approximate only. Prior to proceeding with the work, the exact locations / depth of all utilities affected by the work shall be determined by the Contractor. The Contractor shall be responsible for locating the utilities and for providing protection to existing utilities during all construction operations. The locations of existing utilities within the project limits shall be determined by contacting the concerned utility companies.

The Contractor shall be aware of the following, but not limited to:

- a) Overhead Hydro and overhead Bell along the north side of the bridge and east approach crossing Hamilton Island Road. Bell-owned utility poles are located on either side of Hamilton Island Road at the intersection with County 2 Road and a third pole is located near the end of the steel guide rail on the northeast side of the bridge.

The Hydro lines along the east side of County Road 2 across the structure will be de-energized for the duration of construction other than emergencies as determined by Hydro One. Line markers will be placed on the east spanning lines to serve as a warning for operators. SDG will cover the costs of the Guy Wire Removal and Pole Stabilization for girder removal and erection. The Contractor shall provide 3 weeks advance notice to SDG Counties prior to Stage 1 and Stage 2 removal and erection operations. Any other Guy Wire Removal and Pole Stabilization costs as required to suit the site operations will be the responsibility of the Contractor to carry within the appropriate Item.

OPERATIONAL CONSTRAINT – Control of Emissions

This operational constraint describes the requirements for the control of emissions including but not limited to; dust, abrasive blast medium and other debris generated from work on structures involving abrasive blast cleaning of concrete, structural steel and reinforcing steel, and the cutting and grinding of concrete.

The Contractor shall give the Contract Administrator written notice 3 working days prior to the start of abrasive blast cleaning of concrete, reinforcing steel and structural steel, and of the cutting and grinding of concrete. The Contractor shall submit with the written notice a proposal describing the procedures/plans to control the emissions of dust, abrasive blast medium and other debris from these operations.

The Contractor shall take whatever measures necessary to ensure that dust, abrasive blast medium, and other debris from work on structures involving abrasive blast cleaning of concrete, reinforcing steel and structural steel, and the cutting and grinding of concrete, do not enter any watercourse; or escape beyond the right-of-way.

The measures may include:

- (a) termination of operations during periods of high wind;
- (b) the use of low dust generating technologies such as vacuum abrasive blasting;
- (c) vacuuming of surfaces to remove dust and debris; and
- (d) the use of temporary barrier walls or enclosures.

Excess materials shall be managed as specified in the Contract Documents.

Payment for the control of emissions during work on structures involving abrasive blast cleaning of concrete, reinforcing steel and structural steel, and the cutting and grinding of concrete, shall be deemed to be included in the tender items requiring such control.

OPERATIONAL CONSTRAINT – Control Measures during Removal of Concrete, Concrete Repair/Construction, and Concrete Sawcutting

This operational constraint describes the requirements for control measures during removal of concrete, concrete repair/construction, and concrete sawcutting.

The requirements of this operational constraint are in addition to those specified elsewhere in the contract.

For materials resulting from concrete removal, and materials resulting from concrete construction, the Contractor shall take the appropriate measures and provide such protection system or systems to ensure that such materials do not:

- (a) fall into or enter the waterbody;
- (b) cause damage to any portion of the structure not designated for removal.

For concrete sawcutting, the Contractor shall take appropriate measures and provide such protection system or systems to:

- (a) contain any removed material until it is disposed of; and
- (b) minimize the escape of dust such that no visible dust reaches the waterbody, adjacent wetlands, or property outside the right-of-way limits.

The following work shall not commence until the Contract Administrator has given permission to proceed in writing.

- (a) removal of concrete;
- (b) concrete pour; and
- (c) concrete sawcutting.

The Contractor shall give the Contract Administrator written notice a minimum of 14 calendar days prior to the date that permission is required to proceed with any of the above-specified work operations. The notice shall include four copies of written descriptions, drawings and schedules that provide the following:

- (a) The sequence and method of control measures during:
 - (i) removal of concrete;
 - (ii) concrete pour; and
 - (iii) concrete sawcutting

Permission to proceed with the above will be provided if the Contract Administrator determines that the details of the notice meet the requirements of this special provision.

At the conclusion of the work, the control measures shall be removed.

OPERATIONAL CONSTRAINT – Species at Risk and Wildlife Protocol

The site is deemed as low risk for encountering SAR and bird nesting. No bird nesting has been observed on the structure. No SAR have been identified at the site, however, there is habitat suitable for SAR and wildlife may be encountered within the work area. The Contractor will be required to implement provisions required to prevent entry / nesting / habitancy of wildlife on the structure.

The Contractor shall implement general provisions as outlined below.

General Provisions:

- Use caution when driving to and from the work site – watch out for turtles and other small animals on the road surface and shoulder. Avoid hitting them,
- Ensure sediment and erosion control measures (i.e., silt fencing) are in place prior to beginning work. Inspect them regularly, and particularly after storm events, to ensure their effectiveness.
- Silt fencing may also be used to prevent turtles and other small animals from entering the work area. Lightweight silt fencing is preferred for this purpose (nylon netting on heavy duty silt fencing may entrap some species of wildlife). Make sure it is securely embedded at the bottom.
- Prior to beginning work each day, check for wildlife by conducting a thorough visual inspection of the work area and immediate surroundings.
- Restrict all activities, vehicles, and materials to the designated work area.
- Litter and other waste materials must be appropriately contained and disposed of.
- Do not feed any wildlife or leave food out where it could attract them.
- Avoid or minimize disturbances to any natural features adjacent to the work area to the extent possible. DO NOT cut or damage any trees (of any size) unless the absence of Butternut (which is protected under the Endangered Species Act, 2007) has been confirmed by an expert.

Wildlife Encounters:

- Do not harass or harm any wildlife.
- Turtles are among the most likely animals to occur on or adjacent to roads, especially during the spring.
- Eastern Musk, Painted, Map and Snapping Turtles are protected under the Fish and Wildlife Conservation Act, 1997. If one is encountered within the work area, it should be gently removed and placed in the roadside ditch at a safe distance from the work site. Wear gloves or use a broom to steer the turtle into a bucket or other container. Handle with care to avoid injury to the turtle or yourself, particularly when dealing with Snapping Turtles, which may bite or scratch. Turtles may also wet themselves when handled. Inspect the silt fencing to determine whether repairs or extensions are needed.
- Blanding's, Spiny Softshell, and Spotted Turtles are protected under the Endangered Species Act, 2007. If one is seen near the work site, all work must stop immediately. Take a photograph of the animal, if possible, to confirm the sighting, and contact the Contract Administrator.
- Barn Swallows and some other birds that nest in or around culverts and bridges are protected under the federal Migratory Birds Convention Act. Bank Swallows and some bats are protected under the Endangered Species Act, 2007. Bank Swallows colonies are seen nearby, or if bird nests or roosting bats are found in or on a culvert or bridge, stop work, take a photo, and contact the Contract Administrator.
- Where work has stopped due to Endangered Species Act issues, it must remain stopped until authorised to resume by the MECP. Additional mitigation measures may be required by the Ministry.
- Snakes may also be found on or adjacent to roads. Many snakes are protected under the Fish and Wildlife Conservation Act, 1997. None of the local species are venomous, so their bites are not dangerous. Some snakes will produce a foul-smelling musk when handled, instead of biting. Snakes will usually try to escape or hide when disturbed, and only defend themselves when trapped. If a snake is found in the work area, it should be gently removed or herded out to a safe location.

Turtle Identification:

Turtles are usually found in or near water. During the spring and summer, however, turtles may travel overland to find new homes, search for food, or lay their eggs. Many turtles use the soft shoulders of roads for nesting, burying

their eggs in the gravel. Eggs are usually laid in June and hatch in September, although some turtles may overwinter in the nest.

If turtles are found within the work area, the Contract Administrator shall be notified to determine if they are protected species.

Migratory Bird Nesting Prevention:

As part of the work under this item, commencing on April 1, 2027 and extending until the completion of the Contract, the Contractor shall ensure that no migratory birds nest on the bridge structure. The Contractor shall solely determine the required methodology to ensure that no migratory birds nest (e.g., bird netting, daily sweeps, etc.). Nesting prevention shall be the responsibility of the Contractor upon execution of the signed contract, should they deem appropriate for the site.

OPERATIONAL CONSTRAINT – Environmental Requirements

The preservation, protection and restoration of the local environment will form part of the Work of this Contract.

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.

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 supply and install sediment or erosion control devices indicated on the Contract Drawings 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.

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 existing surrounding environments.

Refueling Areas

The Contractor shall undertake a detailed review of their proposed route of construction to plan access routes and fueling areas. Refueling and maintenance of equipment shall not be undertaken in or adjacent to a watercourse. Suitable fueling and maintenance areas shall be established away from the waterway and all maintenance and fueling activities shall be 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 the Work.** All materials required for clean-up of fuel spillages shall be maintained readily accessible on site.

Designated fueling and maintenance areas shall not be located 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, Conservation and Parks (MECP) District Office.

In-Water Timing Restriction

Installation of cofferdams, fish rescue, dewatering, excavation below ordinary water level, and placement of rockfill below water level shall be considered in-water work.

All in-water activity must take place between **July 16th, 2027, to March 14th, 2028 and July 16th, 2028 to March 14th, 2029** to prevent disruption of spawning fish and incubating eggs. Activities outside the waterway, road reconstruction, and site restoration can be completed outside of this time range provided precautions are taken to protect the waterway.

Migratory Bird Convention Act

The Contractor must be aware of the Migratory Birds Convention Act (1994) as it relates to harming migratory birds or destroying their habitat.

If there is evidence that migratory birds are actively inhabiting an area where these nests/birds may be affected by construction, the situation shall be reported immediately to the Contract Administrator. Work on activities that can reasonably be expected to affect the nest/birds shall stop, however, other activities that do not impact the birds/nests may continue.

The Contractor should contact the Contract Administrator and/or MCA for advice and assistance. Until permission is granted to the Contractor to proceed with construction, construction activities will remain suspended on those tasks that may affect the nests/birds.

The Contractor shall be proactive in terms of preventing or discouraging any new birds from nesting once Work begins

OPERATIONAL CONSTRAINT – Seasonal Shutdown

The Seasonal Shutdown period commences upon completion of all work as per working days schedule. The Seasonal Shutdown period ends upon remobilization for second year construction. The Contractor shall suspend its operations during the Seasonal Shutdown.

Working Days will not be assessed during the Seasonal Shutdown.

The cost of demobilizing and remobilizing before and after the Seasonal Shutdown shall be included in the Contract Price.

Prior to demobilizing for the Seasonal Shutdown, the following requirements must be met:

All excavations must be backfilled;

The site must be left clean, tidy and safe;

Road subgrade and/or road granulars shall not be exposed during the Seasonal Shutdown, unless approved by the Owner upon written request from the Contractor. The Work shall be scheduled such that the asphalt base course is completed on any completed road granular base prior to the Seasonal Shutdown. Gravel or milled pavement surfaces will not be permitted for the traveled roadway;

Roadways must have temporary pavement markings and appropriate traffic signage installed in accordance with the Ontario Traffic Manual (OTM) and item “Pavement Markings – Organic”, and any construction work

areas shall be properly protected from the traveled lanes;
Cut or fill slopes left without vegetative cover or erosion control blankets shall be treated before the onset of winter with hydraulic mulch ground cover;
Repairs to the roadway, interim drainage conditions, erosion control, signage and delineation shall be performed by the Contractor, as required, throughout the Seasonal Shutdown;
The guide rail shall be installed.
The cost of this work shall be included in the lump sum price for Item "Site Work".
The Owner will provide snow clearing and perform de-icing operations for the roads open to the public during the Seasonal Shutdown .

SP01 - SITEWORK

Payment at the Contract Lump Sum Price for the Item "Sitework" shall be full compensation for all labour, materials and equipment required to complete the following work:

- Mobilization and demobilization of equipment, material and Contractor's forces;
- Provisions for insurance;
- Site preparation for work;
- Site security;
- Obtain all necessary approvals and permits as applicable;
- Preparation of construction lay down area in location acceptable to Owner;
- Locating, protection, temporary support or temporary relocation and reinstallation of utilities, as applicable and not specified in other areas of the Contract;
- Coordination with Hydro One as required during construction particularly for de-energizing of utility line(s), guy wire removal(s), support/stabilization of hydro utility pole(s) and providing flagging/warning markers for hydro lines;
- Installation and removal of temporary barricades, hoarding and other protection required, unless specified elsewhere in the Contract;
- Installation, maintenance and removal of preventative bird netting or wildlife preventative measures .
- Layout of Work including any required survey;
- Contractor's office;
- Supplying and maintenance of adequate sanitary facilities;
- Submission of shop drawings, product submissions etc;
- Obtaining access to private properties as required and obtaining written release from the affected property Owners. Copy to be submitted to Contract Administrator prior to entering the property.
- Maintaining and reinstatement of existing road signs, mailboxes, etc;
- Advertising of Substantial Completion in the Daily Commercial News;
- Reinstatement of the Contractor's lay down area and office sites to their original conditions;
- Localized vegetation and tree removal and reinstatement required for execution of the work, including at the southwest quadrant to facilitate girder erection;
- All driveway removal and reinstatement required for execution of the work, including the salvage and reinstatement of brick driveway;
- All incidental work not specifically mentioned in the Contract Documents but required by virtue of the work;

- All work associated with environmental protection or species at risk mitigation measures except as specifically mentioned for other Items of work;
- Quality Control testing and reporting; and
- Submission of required reports, releases, and documentation for the release of holdback.

All work is to be carried out within right of way without encroachment onto private properties, unless specified otherwise. Advise Contract Administrator where construction of work is to interfere with private property and seek direction prior to the work being undertaken.

The Contractor shall submit a Baseline Work Schedule to the Contract Administrator at the Pre-Construction Meeting and provide an updated schedule on a monthly basis or as directed by the Contract Administrator.

The Contractor is advised that no additional payment will be made for repeated mobilization and demobilization for any of the construction activities covered by this Contract, interrupted by weather, or by any other construction activity within this Contract.

BASIS OF PAYMENT

Payment for this Item shall be full compensation for all labour, materials and equipment required to carry out the work. A 30% portion shall be paid in first progress payment. Remainder will be prorated over the scheduled duration of the Contract per the approved schedule.

Contractor shall bear all immediate, subsequent and consequential costs associated with change in the schedule, staging, and methodology of the work, unless Contract Administrator requested such change.

SP02 – TRAFFIC MANAGEMENT

OPSS.MUNI 706, April 2018, shall govern except as amended or extended herein.

706.01 SCOPE

Section 706.01 of OPSS 706 is amended by the addition of the following:

Work under this tender item shall include, but not be limited to the following:

- Preparation and submission of a Traffic Control Plan (TCP);
- Supply, installation, monitoring, operation, maintenance and removal of all temporary construction signage;
- Coordination and execution of all traffic control activities required to complete the work;
- Temporary road closures. .

The Contractor shall be responsible for construction means, methods, techniques, sequences, procedures, coordination and maintenance of all requirements for traffic signing.

706.02 REFERENCES

Section 706.02 of OPSS 706 is amended by the addition of the following:

Ontario Traffic Manual (OTM): All reference in this Special Provision and the Contract Documents to the Ontario Traffic Manual will indicate the most recent version(s) of the OTM including, and not necessarily be limited to, as applicable:

Book 1 – Introduction of the Ontario Traffic Manuals
Book 5 – Regulatory Signs
Book 6 – Warning Signs
Book 7 – Temporary Conditions
Book 11 – Markings and Delineations
Book 12 – Traffic Signals.

706.03 DEFINITIONS

Section 706.03 of OPSS 706 is amended by the addition of the following:

Traffic Control Device(s) (TCD): A generic term used to describe any person, sign, signal, marking or device placed upon, over or adjacent to a roadway by or at the direction of a public authority or official having jurisdiction (such as The United Counties of Stormont Dundas and Glengarry) or their designate, for the purpose of regulating, warning, guiding or informing a vehicle operator or pedestrian of an existing condition or hazard.

Traffic Control Plan (TCP): A detailed plan for the control of traffic, including vehicular and pedestrian movements, required to allow the Contractor to fulfil all conditions of the contract, taking into account the organized, systematic safe conduct of the project. This includes, as applicable, staging sequences, work, public and emergency vehicle access and egress, public access and separation from hazardous areas, temporary barriers, removal of old pavement markings, and the selection of appropriate typical layouts and devices necessary for traffic

control. The traffic control plan shall contain the information respecting how the applicant intends to complete the work and satisfy the requirements of the Contract including but not limited to the following:

- a) start and completion times of work;
- b) specific location of work;
- c) lane use requirements;
- d) requirements for road closure;
- e) public notification undertaken;
- f) requirement for temporary no stopping signs;
- g) traffic routing and traffic control requirements where required

Traffic Control Persons (TCP's): A person duly trained and authorized to direct traffic at a work zone through the use of the Traffic Control Sign (STOP/SLOW Paddle)

Traffic Protection Plan (TPP): A plan required by the Occupational Health and Safety Act and its regulations for the protection of workers in a work zone. The plan must contain a written description of the traffic hazards to which workers may be exposed and measures used to protect them.

706.04 DESIGN AND SUBMISSION REQUIREMENTS

706.04.01 Submission Requirements

Subsection 706.04.01 of OPSS 706 is deleted and replaced with the following:

Two (2) weeks prior to commencing construction, the Contractor shall prepare and submit to the Contract Administrator a Traffic Control Plan that details the specific traffic control layout(s) necessary for the completion of the works. The Traffic Control Plan shall be in the form of drawing(s) and written description(s) of how the Contractor intends to control traffic through and around the work zone. The TCP shall include, and not necessarily be limited to:

- Monitoring and Repair (24 hour contact number);
- Reference to Applicable OTM Book 7 Typical Layouts;
- Traffic control signs (regulatory, warning and temporary);
- Traffic control delineation;
- Traffic Control vehicles and devices (TC-12, Crash Trucks, Temporary Lighting etc.);
- Contract-specific operational requirements;
- Traffic staging and scheduling;
- Construction vehicle access/egress;
- Maintaining public access/egress for all existing entrances and side roads and for riverbank access at the structure.
- Pedestrian safety; barriers and barricades;
- Emergency Vehicle access;
- Locations for removal of existing line painting and proposed temporary pavement markings;
- Parking for Contract Administrator; and
- Any other traffic control measures.

The Contract Administrator will accept the submission of the TCP, and review it to identify any errors, omissions, or improvements as it relates to maintaining public safety and mobility. The acceptance and review of the TCP by the Contract Administrator will make no representation and/or warranty that the document is accurate, complete, or compliant with all applicable legislation. Any errors, omissions or deficiencies within the TCP will remain the sole responsibility of the Contractor. Work shall not commence until the Contract Administrator has reviewed the TCP and the Contractor has addressed all comments.

OPSS 706 is amended by the addition of Subsection 706.04.02 as follows:

706.04.02 General Requirements

The Ontario Traffic Manual supersedes all references to the Ministry of Transportation, Manual for Uniform Traffic Control Devices, or MUTCD in the Contract Documents.

The Contract Administrator reserves the right to ask for revisions to the Traffic Control Plan at submission time or reject it if the Plan does not meet the Contract language. In addition, the Contract Administrator reserves the right to instruct the Contractor to revise it at any time during the Contractor's execution of the plan, when the Contract Administrator finds that the Contractor is not providing the commitments shown in the original Traffic Control Plan submission, or the Contractor's Traffic Control Plan proves to be insufficient to address the field conditions.

The Contractor shall be required to review and modify the TCP for errors, omissions, deficiencies, or because of any new hazards that are identified and not previously addressed within the document.

It is the responsibility of the Contractor to ensure that all necessary training has been provided prior to commencement of the work.

The Contractor shall ensure that all workers, including sub-contractors, in the Working Area are aware of the importance of the Traffic Control Plan measures.

706.07 CONSTRUCTION

Section 706.07 of OPSS 706 is amended by the addition of the following subsections:

706.07.07 Additional Requirements

Prior to commencing any construction, on or adjacent to the Road, the supply and placement of all necessary temporary traffic control devices shall be performed under the sole direction of the Contractor and in accordance with the Contractors submitted/reviewed TCP. The TCP shall be developed in accordance with guidelines established by the most recent version of the OTM, the Occupational Health and Safety Act (OHSA), and the Contract Documents which details the required contents and submission of the TCP.

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 knowledge, training, and experience to perform the duties; is familiar with Book 7 of the OTM; and 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 and telephone numbers of the designated person, and update as necessary. The

designated person may not be present in the Working Area at all times but shall be available within 24 hours when requested to be on site by Contract Administrator.

The condition of all traffic control devices shall be maintained for the duration of the Contract, in accordance with the OTM.

The Contractor shall immediately repair, replace or otherwise make good the practice deemed unsafe or non-compliant when the Owner (or his delegated authority) makes the Contractor aware of any violation of the TCP (or applicable regulations). Should the Contractor disagree, the Ministry of Labour will be consulted to provide clarification of the observed deficiency.

Vehicular and pedestrian traffic control shall remain the sole responsibility of the Contractor as the County delegates this authority to the Contractor in accordance with the submitted/reviewed TCP. Notwithstanding the foregoing, the Contractor shall, at his own expense, remove any equipment or material, which in the Contract Administrator's opinion constitutes a hazard to traffic or pedestrians.

The Contractor shall be fully and solely responsible to ensure the development and implementation of a submitted/reviewed traffic control plan as specified elsewhere in the Contract. The TCP and all required traffic control devices shall be designed/installed, monitored, operated/maintained and removed by the Contractor, utilizing only competent persons and workers as defined under the OHSA.

The Contractor shall not store any equipment or materials on the road or the roadway shoulders or boulevards, unless the storage areas are identified in the TCP and appropriate traffic control devices protect the equipment or materials. The Contract Administrator shall review and approve any storage of equipment and /or materials within the right of way.

The Contractor shall remove all dirt and debris from all paved or concrete surfaces at the close of each workday, to the satisfaction of the Contract Administrator.

Lane Closures

Lane closures are permitted and shall be limited to 15 minutes. Any longer road/lane closures shall be coordinated with MCA and local property owners. The Contractor shall give forty-eight (48) hours notice to the Contract Administrator prior to the day on which the road/lane closures will be required.

Traffic Control Delineation and Operation

Prior to commencing any construction pursuant to this Contract, the Contractor shall supply and place all necessary temporary traffic control devices.

Vehicle Access to Entrances and Side Roads

The Contractor shall not block access to private entrances. Should temporary loss of access/egress be necessary to complete the work outlined in the Contract, the Contractor must provide a minimum of 24 hr prior notification to the business or resident(s), notifying them of the work being undertaken. Such notification regarding the temporary loss of access/egress is the sole responsibility of the Contractor.

This requirement will not be considered for separate payment.

Line Painting

Temporary line painting treatments required for this Contract shall be in accordance with OTM Book 7 and 11 and shall be shown in the TCP. Payment for the temporary line painting shall be paid under the appropriate item, as defined elsewhere under the Contract.

Signage

The Contractor shall be responsible for all aspects of traffic control during construction. This includes the removal, installation or modification of any necessary regulatory signage due to the requirements of the traffic control plan and the supply, installation, maintenance and removal of all temporary regulatory/construction signage.

The Contractor shall post no parking signs throughout the limits of the Construction Zone.

Project information signage will be supplied and installed by the County. The County will provide and install all regulatory signage required after the completion of construction.

The Contractor shall not make any claim for extra compensation for the cost of fulfilling the obligations set out in this Special Provision.

Notification to Concerned Bodies

The Contractor shall notify emergency services, applicable school boards and stakeholders of the construction duration and restrictions to regular traffic conditions as specified elsewhere in the Contract.

This requirement will not be considered for separate payment.

706.10 BASIS OF PAYMENT

706.10.01 Traffic Control Signing

Subsection 706.10.01 of OPSS 706 is deleted in its entirety and replaced by the following:

Payment at the Contract price for the above item shall be full compensation for all labour, equipment and material required to do the work. All research, preparation, implementation of the TCP, supply, installation, monitoring, operation, maintenance and removal of required traffic control devices, including signage, are deemed to be included with the item.

Payment shall be based upon the following schedule:

- a) 25% upon satisfactory submission of the TCP and installation of the control measures; and
- b) 75% pro-rated into equal payments over the term of the contract.

This payment schedule may only be modified as agreed upon in writing between the Contractor and the Contract Administrator.

SP03 – TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

OPSS.MUNI 805, November 2021, shall govern except as amended or extended herein.

805.01 SCOPE

Section 805.01 of OPSS 805 is amended by the addition of the following:

The items within this scope include the temporary cofferdams. The cofferdams must be robust and watertight.

805.04 SUBMISSION AND DESIGN REQUIREMENTS

Section 805.04 of OPSS 805 is amended by addition of the following:

Before commencing the Work, the Contractor shall submit to the Contract Administrator two (2) copies of a detailed Erosion and Sediment Control Plan (ESCP). The ESCP will consist of a written description and detailed drawings indicating the on-site activities and measures to be used to control erosion and sediment movement for each step of the Work, including provisions outlining the debris containment as part of the structure removal operations.

805.07 CONSTRUCTION

Section 805.07 is amended by the addition of the following subsection:

805.07.19 General

The Contractor acknowledges that surface erosion and sediment runoff resulting from his construction operations will have a detrimental impact to any downstream watercourse, and that all construction operations that may impact upon water quality shall be carried out in a manner that strictly meets the requirements of all applicable legislation and regulations. As such, the Contractor shall be responsible for carrying out his operations, and supplying and installing any appropriate control measures, to prevent sediment laden runoff or construction debris from entering watercourses within or downstream of the Working Area.

Where, in the opinion of the CA or Mohawk Council of Akwesasne, the installed control measures fail to perform adequately, the Contractor shall supply and install additional or alternative measures as directed by the CA or Mohawk Council of Akwesasne. As such, the Contractor shall have additional control materials on site at all times which are easily accessible and may be implemented by him at a moment's notice.

The Contractor shall ensure that all workers, including sub-contractors, in the Working Area are aware of the importance of the erosion and sediment control measures and informed of the consequences of the failure to comply with the specifications detailed herein.

The Contractor shall periodically, and when requested by the CA, clean out accumulated sediment deposits as required at the sediment control devices, including those deposits that may originate from outside the construction area. Accumulated sediment shall be removed in such a manner that prevents the deposition of this material into any watercourse and avoids damage to the control measure. The sediment shall be removed from the site at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract.

The Contractor shall immediately report to the Contract Administrator any accidental discharges of sediment material into a watercourse. Failure to report will constitute a breach of this specification and the Contractor may also be subject to the penalties imposed by the Mohawk Council of Akwesasne. Appropriate response measures, including any repairs to existing control measures or the implementation of additional control measures, shall be carried out by the Contractor without delay.

The sediment control measures shall only be removed when, in the opinion of the Contract Administrator, the measure or measures is no longer required. No control measure may be permanently removed without prior authorization from the Contract Administrator. All sediment and erosion control measures shall be removed in a manner that avoids the entry of any equipment, other than hand-held equipment, into any watercourse, and prevents the release of any sediment or debris into any sewer or watercourse within or downstream of the Working Area. All accumulated sediment shall be removed from the Working Area at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract.

805.09 MEASUREMENT FOR PAYMENT

Section OPSS 805.09 of OPSS 805 is deleted in its entirety. No measurement for payment shall be required.

805.10 BASIS OF PAYMENT

Section 805.10 of OPSS 805 is deleted in its entirety and replaced by the following:

Payment at the contract price shall be full compensation for all equipment, materials, and labour to do the work. Partial payment shall be made on the following basis:

- 15% upon receipt of SNCA approval of designed ESCP;
- 15% for the submission of the ESCP and initial installation;
- 60% for maintenance, pro-rated over the course of the project;
- 10% for removal.

Where, in the opinion of either the Contract Administrator or the Mohawk Council of Akwesasne, any of the terms specified herein have not been complied with or performed in a suitable manner, or at all, the Contract Administrator or the Mohawk Council of Akwesasne have the right to immediately suspend work at the site until appropriate measures are implemented to rectify the defaults or deficiencies at the site. No compensation will be owed or paid to the Contractor for suspension of the work resulting from noncompliance with the requirements of this specification.

SP04 – FIELD OFFICE FOR CONTRACT ADMINISTRATOR 20-34 M²

SCOPE

Under this tender item, the Contractor shall supply and maintain a field office (20-34m²) and its associated items for the sole use of the Contract Administrator and staff.

LOCATION

Prior to the commencement of work on this tender item, the Contractor shall receive approval from the Contract Administrator for the location of the field office and shall have the field office installed and operational.

FIELD OFFICE DIMENSIONS AND CONDITION

The field office shall have a minimum floor area as specified in the Schedule of Items and Prices. It shall have an inside minimum clearance of two (2) metres.

All doors shall be solid and capable of being locked with a 25 mm throw dead bolt lock, and two sets of keys will be supplied to the Contract Administrator.

The inside of the field office shall be moisture tight and capable of being lit to a level that is satisfactory to the Contract Administrator. It shall have adequate windows, heating and ventilating equipment capable of maintaining the working area at 21°C during both summer and winter weather conditions.

It is the Contractor's responsibility to provide and maintain adequate sanitary facilities in accordance with Sections 28 and 29 of the Ontario Regulation 145/00 under the Occupational Health and Safety Act.

FIELD OFFICE EQUIPMENT

The Contractor shall supply for the sole use of the Contract Administrator the following furnishings for the appropriate trailer size:

Floor Area 20-34 m²

- 1 desk
- 2 meeting tables (2 m² ea.)
- 5 chairs

The Contractor shall supply or arrange to supply a water cooler capable of maintaining a water supply at 7 deg C. Water shall be potable and supplied at a minimum rate of 18L/week.

UTILITIES

The Contractor shall provide within the floor area of the field office hydro facilities for the sole use of the Contract Administrator. The Contractor shall provide a generator large enough to power all trailer requirements.

The field office is to have a high-speed internet connection for the sole use of the Contract Administrator.

MEASUREMENT FOR PAYMENT

Measurement for the supply of a field office, its utilities, services and associated equipment shall be by the week. The Contractor shall also be paid for any portion of a week as one week. Measurement for payment will be made when all utilities and services have been provided.

BASIS OF PAYMENT

Payment at the Contract price for the tender item "Field Office for Contract Administrator" shall be full compensation for all labour, equipment and materials required to supply and maintain a field office.

The Contractor shall bear all expenses in connection with the above facilities, including but not limited to:

- a) Service and connection charges for utilities and services.
- b) Heating and ventilating costs.
- c) All rental costs for the field office.
- d) The provision of at least five (5) parking spaces adjacent to field office, with at least a gravel surface.
- e) Removal of the field office, clean-up and reinstatement of the area occupied by the field office and parking area.

SP05 – FISH RESCUE

SCOPE

Under this tender item and for the Contract price bid, the Contractor shall supply all labour, materials and equipment required to retain a qualified biologist or technician with a valid “License to Collect Fish for Scientific Purposes” from the Ontario Ministry of Natural Resources and Forestry (MNR) to remove and relocate downstream stranded fish as required from isolated instream work areas as noted on Contract Drawings. All amphibians and reptiles shall also be transferred to a safe location away from the construction area. The fish rescue must also be completed in accordance with all conditions and requirements stated in the Letter of Advice from the Department of Fisheries and Oceans Canada. Unwatering from, and work within the isolated work area, shall not commence until fish rescue has been completed. A fish collection permit will be required to complete this work and is the responsibility of the Contractor’s Qualified Biologist to obtain.

BASIS OF PAYMENT

Payment shall be made at the lump sum price and shall be full compensation of all labour, equipment and materials required to complete this work. The total value of the item shall not exceed 100% of the lump sum price for this item.

SP06 – EARTH EXCAVATION, GRADING

OPSS.MUNI 206, April 2019 shall govern except as amended or extended herein.

206.01 SCOPE

The work under this item includes the excavation of existing earth and rock embankment at the project site for the removal of the existing road embankment, rock embankment, rockfill and rock protection as per contract drawings.

SP07 – ROCK EMBANKMENT

OPSS MUNI 206, April 2019, shall govern except as amended or extended herein.

206.01 SCOPE

Work under this item shall include: supply, delivery, installation and compaction of rock embankment including any necessary rock chinking in accordance with gradation requirements outlined in contract drawings.

206. MEASUREMENT FOR PAYMENT

Measurement of rock embankment shall be by weight in metric tonnes.

SP08 – SUPERPAVE 12.5B 58-34

OPSS.MUNI 310, November 2017 shall govern except as amended or extended herein.

The Contractor is hereby advised that the Owner invokes Appendix 310-B, November 2017 of OPSS.MUNI 310. The supplementary requirements of Appendix 310-B shall apply to the Contract.

Under this item and for the Contract Unit price, the Contractor shall supply all labour, equipment, materials and transportation necessary to complete the item.

The pavement structure on the bridge deck shall be as follows:

- Two (2) lifts of 40 mm of SP 12.5B; over
- 10 mm of waterproofing membrane.

The pavement structure on the approach slabs shall be as follows:

- One (1) lift of 40 mm of SP 12.5B; over
- One (1) lift of 50 mm of SP 12.5B.

The pavement structure beyond the approach slabs tying into the existing roadway shall be as follows:

- One (1) lift of 50 mm of SP 12.5B; over
- 150 mm of Granular 'A'; over
- 300 mm of Granular 'B' Type II.

Material

1. **Asphalt: Superpave 12.5B as per OPSS.MUNI.1151: where specified in the 'Form of Tender'**

2. Performance Graded Asphalt Cement: PG-AC 58-34 as per OPSS.MUNI.1101

Amendment to OPSS.MUNI 1101 November 2016 – Material Specification for Performance Graded Asphalt Cement

1101.04 Design and Submission Requirements

1101.04.01 Submission Requirements

1101.04.01.01 PGAC Test Documentation

Clause 1101.04.01.01 of OPSS.MUNI 1101 is amended by the addition of the following:

- Test results for the product demonstrating compliance to the requirements of Table 1.
- A two (2) litre sample of the asphalt cement for each grade of asphalt cement for possible owner testing.

The Contract Administrator shall review the test results submitted and may elect to have quality assurance testing undertaken at the same time on the sample(s) provided. No asphalt mix shall be placed until the Contract Administrator provides written confirmation of the conformance of the PGAC to the requirements of the Contract Documents based on the submitted test results and owner quality assurance testing. Within ten (10) Business Days of receipt of the Contractor samples and test results, the Contract Administrator shall provide confirmation of conformance or shall advise of any non-conformance to the Contract requirements. Confirmation of conformance to Contract requirements does not constitute any guarantee that the mix can be produced or constructed or both to Contract requirements and does not relieve the Contractor of the responsibility for ensuring the specified quality of materials and workmanship.

1101.05 Materials

Delete:

“The asphalt cement shall not contain any of the following additives added for PGAC modification: atactic polypropylene; carbon black; polyisobutylene; polyisoprene; natural rubber; alkaline bases; insoluble particulates or fibres; salts of iron, copper, manganese and/or cobalt; silicates; styrene-butadiene rubber (random copolymer latex); synthetic waxes (paraffin waxes, naphthenic waxes); synthetic and saturated oils (including but not limited to the following: vegetable oils or modified vegetable oils; (paraffin oils, polyalphaolefins (PAO), lube oils, and re-refined lube oils.); waste oils (including but not limited to the following: cracked residues, re-refined high vacuum distillate oils; tall oils, vacuum tower asphalt extenders; waste cooking oils, waste engine oils, waste engine oil residues). Asphalt cement supplier shall declare in writing that they have not added the PGAC additives listed”

And replace with:

“The asphalt cement shall not contain any of the following additives added for PGAC modification: atactic polypropylene; carbon black; polyisobutylene; polyisoprene; natural rubber; alkaline bases; insoluble particulates or fibres; salts of iron, copper, manganese and/or cobalt; silicates; styrene-butadiene rubber (random copolymer latex); synthetic waxes (paraffin waxes, naphthenic waxes); synthetic and saturated oils (including but not limited to the following: vegetable oils or modified vegetable oils; (paraffin oils, polyalphaolefins (PAO), lube oils, and re-refined lube oils.); waste oils (including but not limited to the following: cracked residues, re-refined high vacuum distillate oils; tall oils, vacuum tower asphalt extenders; waste cooking oils, waste engine oils, waste engine oil residues). The asphalt cement supplier shall declare in writing that none of the PGAC additives listed above are contained within the asphalt cement”

1101.08 Quality Assurance

1101.08.03 Sampling

1101.08.03 is amended by the addition of the following:

It shall be the responsibility of the Contractor when using RAP to ensure the liquid asphalt cement in the final mix complies with Table 1.

1101.08.04 Quality Assurance Testing

1101.08.04 is amended by the addition of the following:

The Owner reserves the right to complete quality assurance testing on asphalt cement extracted from the HMA laid in the field as part of this contract. The test results obtained from the extracted asphalt cement may be used by the owner for acceptance.

Table 1 of OPSS.MUNI 1101 is deleted in its entirety and replaced with the following:

Table 1 – Additional testing requirements and acceptance criteria for PGAC grades

PGAC Grade	Property and Attributes (Unit)		Test Method	Results Reported Rounded to the Nearest	Acceptance Criteria	Rejectable
All PGAC Grades	Ash Content, % by mass of residue (%)	PG XX-28	LS-227	0.01	≤ 0.6	> 0.6
		PG XX-34			≤ 0.6	> 0.6
		PG XX-40			≤ 0.6	> 0.6
	Low temperature limiting grade (LTLG) (°C)		LS-308	0.5	$\leq -YY$	$> -YY$
	Grade Loss (°C)		LS-308	0.5	≤ 6.0	> 6.0
	Non-recoverable creep compliance at 3.2 kPa ($J_{nr-3.2}$) (kPa ⁻¹)		AASHTO T 350 For testing temperature see Note 1	0.01	< 4.5	≥ 4.5
	Average percent recovery at 3.2 kPa ($R_{3.2}$) (%)			0.1	$\geq$ the lesser of [(29.371) ($J_{nr-3.2}$) ^{-0.2633}] or 50	$<$ the lesser of [(29.371) ($J_{nr-3.2}$) ^{-0.2633} -10] or 50
	CTOD, δ_t (mm)	PG XX-28	LS-299	0.1	≥ 8.0	< 8.0
		PG XX-34			≥ 12.0	< 12.0

		PG XX-40			≥ 16.0	< 16.0
Notes: 1. The testing temperature shall be 58°C (Zone 2)						

Amendment to OPSS.MUNI 1150 November 2008– Material Specification for Hot Mix Asphalt

1150.04.01.01.01 Reclaimed Asphalt Pavement Proportions

Clause 1150.04.01.01.01 Reclaimed Asphalt Pavement Proportions, is amended by the addition of the following:

The use of RAP shall not be permitted in top course mixes. The use of RAP is permitted in base course mixes (where applicable) provided that it can be demonstrated that the extracted AC from the RAP conforms with OPSS MUNI 1101 (above).

Equipment Requirements

Material Transfer Vehicle

Cat AP1000 Paver (Or brand of equivalent size and capabilities)

310.07.11.04 Paving on Bridge Decks

The temperature of the HMA immediately after spreading shall not be less than 115 degrees C. The temperature of the HMA mat ahead of initial rolling shall be measured and recorded. Compaction shall be accomplished using, as a minimum,

- a) a Class S roller with a minimum mass of 9 tonnes and minimum mass of 4.5 kg per mm total roll width, and
- b) Class R roller with a minimum mass of 18 tonnes and minimum mass of 2,500 kg per tire.

The operating speed of Class S rollers shall not exceed 5 km/h and shall be operated in a manner to avoid undue displacement of the HMA. If Class V rollers are used, they shall be used in static mode. Rollers shall operate with the drive wheel forward in the direction of paving.

The mixture shall be uniformly compacted as soon after placing as it can support the rollers without checking or undue displacement. Rolling shall start longitudinally at the lower edge and proceed towards the higher edge of the course, overlapping on successive passes. Alternate passes of the roller shall be staggered.

Passes by the Class R roller shall overlap previous passes. The roller shall be operated to prevent pick-up of the HMA on the tires.

SP09 – TACK COAT

Tack coat Reference: OPSS.PROV 308 OPSS.MUNI 310 and 1103

Subsection 310.07.03 of OPSS.MUNI 310 is amended by the addition of the following: Tack coat shall be applied using self-propelled or tow-along pressure distributors capable of applying the product at the specified rate and in a continuous and uniform manner both longitudinally and transversely for the full lane width. The distributors shall be equipped with a volume-determining device of sufficient sensitivity to measure the quantity of tack coat

dispensed, measurable to the nearest five litres.

Also include: .1 Apply tack coat to milled pavement and previously paved surfaces prior to new paving. .2 Apply tack coat according to OPSS.MUNI 310 and Subsection 308.07.01 of OPSS.PROV 308.

Note: .1 The use of a hand-held pressure wand is acceptable only for tack coating small irregularly shaped areas such as tapers. .2 The Contractor shall consider the use of alternative products for nighttime operations and cold temperatures. The use of any alternative product requires the approval of the Contract Administrator. Contract Administrator may require, at any time, testing of the diluted emulsion.

MEASUREMENT FOR PAYMENT

.1 Measurement of tack coat shall be by area applied in square metres.

BASIS OF PAYMENT

Payment at the Contract price for the above tender item shall be full compensation for all labour, equipment, and material to do the work. .2 Payment for the tack coating of protection board shall be included under the Tack Coat tender item. .3 Payment for the tack coating of concrete surfaces completed in association with bridge deck waterproofing shall be included in the bridge deck waterproofing item according to OPSS.MUNI 914.

SP11 – GRANULAR ‘A’ (PAD FOR APPROACH SLAB AND ROAD BASE COURSE)

OPSS.MUNI 314, November 2023, shall govern except as amended or extended herein.

314.01 SCOPE

The work under this item includes the supply, delivery, installation and compaction of Granular ‘A’ below approach slabs and under the new roadway and shoulders as shown in the contract drawings.

SP12 – GRANULAR ‘B’, TYPE II

OPSS.MUNI 314, November 2023, shall govern except as amended or extended herein.

314.01 SCOPE

The work under this item includes the supply, delivery, installation and compaction of Granular ‘B’ Type II below new roadway as shown in the contract drawings.

SP13 – CONCRETE CURB AND GUTTER

OPSS.MUNI 353, November 2021, shall govern except as amended or extended herein.

All earth excavation, disposal of excess material, replacement Granular ‘A’, watering and compaction of all foundation materials and base preparation required to receive the new curb and gutter shall be included in this item

353.01 SCOPE

The work under this item includes the requirements and construction of concrete mountable curb and narrow gutter as shown in the contract drawings

SP14 – REMOVAL OF ASPHALT PAVEMENT – FULL DEPTH REMOVAL OF ASPHALT PAVEMENT – PARTIAL DEPTH CUTTING EXISTING PAVEMENT

OPSS.MUNI 510, November 2018, shall govern except as amended or extended herein.

510.01 SCOPE

Section 510.01 of OPSS 510 is amended by the addition of the following:

Work under the tender item ‘Removal of Asphalt Pavement – Full Depth’ shall include the full depth removal of the asphalt at the structure approaches to the limits detailed in the Contract Documents.

Work under the tender item ‘Removal of Asphalt Pavement – Partial Depth’ shall include the partial depth removal of the asphalt at the limits of asphalt removal at the approaches to the limits detailed in the Contract Documents.

Work under the tender item ‘Cutting Existing Pavement’ shall include the following:

- a) Transverse full depth saw cutting of the existing asphalt at the limits of removals at the approaches as identified in the Contract Documents; and
- b) Longitudinal partial depth saw cutting of the existing asphalt on the approaches between stages.

510.07 CONSTRUCTION

510.07.06 Pavement Work

510.07.06.02 Cutting Existing Pavement

Clause 510.07.06.02 of OPSS 510 is amended by the addition of the following:

The thickness of asphalt for removals at the approaches shall be assumed to vary up to a maximum thickness of 150 mm which shall be validated by the Contractor upon commencement of saw-cutting operations.

SP15 – REMOVAL OF STEEL BEAM GUIDE RAIL

OPSS.MUNI 510, November 2018, shall govern except as amended or extended herein.

All removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

SP16 – ROCK PROTECTION

OPSS.MUNI 511, November 2019, shall govern except as amended or extended herein.

511.01 SCOPE

Under this item, the Contractor shall supply and install rock protection over the new rockfill embankment as indicated on the Drawings and as directed by the Owner.

The Contractor shall supply all materials required for this item. Stone substrate should be round (river stone) to subangular, have a gradation as specified on the Drawings, be washed and clean of all fines prior to placement. The unit price for this item shall be full compensation for the supply of the stone substrate, the hauling and placing of the stone substrate, and all items incidental to the completion of the work as shown on the Contract Drawings and in accordance with these Specifications.

At all times the Contractor shall ensure that all proper erosion and sediment controls installed are fully functional.

Work under this item shall also include any necessary excavation, shaping, re-shaping as necessary to satisfy MCA's environmental specialist, and the removal and disposal of any surplus material.

511.05.01 Rip-Rap, Rock Protection, and Granular Sheeting is amended by the addition of the following:

The stone placed under this item shall meet the following requirements:

- Be less than 10 times the Leachate Quality Criteria as defined by Schedule 4 in Reg. 347 (General – Waste Management) under the Ontario Environmental Protection Act
- Not contain any sulphides
- Have a Neutralization Potential/Acid Potential ratio greater than 5.0
- Be either a limestone, dolomitic-limestone or dolomite containing no deleterious material such as shale, sandstone, argillite, siltstone or other similar sedimentary units
- Be a washed product and free of dirt
- Be composed of graded aggregate between 50 mm and 150 mm in size
- Consist of sound, natural, washed river run stone with a uniform gradation with minimum 50% by volume 150 mm in diameter
- Not be used on slope greater than 2:1

The Contractor shall advise the Owner of the stone source location. The Owner shall inspect and approve the source materials prior to delivery to the Site.

SP17 – SALVAGE AND REINSTATE HAZARD SIGNS

SMALL SIGN, REMOVAL

SMALL SIGN, GROUND MOUNTED, NEW

SALVAGE AND REINSTATE NO LOITERING ON BRIDGE SIGN

SALVAGE AND REINSTATE STOP SIGN

OPSS.MUNI 703, April 2019, shall govern except as amended or extended herein.

703.01 SCOPE

The Work under item 'salvage and reinstate hazard signs' shall include: The removal and storage of hazard signs at a location determined by the contractor, followed by a reinstatement of the signs once the project is completed.

The work under the item 'small sign removal' shall include: the removal and disposal of small signs at the project site.

The work under the item 'salvage and reinstate no loitering on bridge signs' shall include: the removal and storage of no loitering signs at a location determined by the contractor, followed by a reinstatement of the signs once the project is completed.

The work under the item 'salvage and reinstate stop sign shall include: the removal and storage of the stop sign at a location determined by the contractor, followed by a reinstatement of the sign once the project is completed.

**SP18 – TEMPORARY PAVEMENT MARKING,
PERMANENT PAVEMENT MARKING,
PAVEMENT MARKING OBLITERATING**

OPSS.MUNI 710, November 2021, shall govern except as amended or extended herein.

710.01 SCOPE

Section 710.01 of OPSS 710 is amended by the addition of the following:

Work under this item 'Pavement Marking, Temporary', shall include all temporary pavement markings required for temporary condition, including, but not limited to, temporary removable stop bars and short-term pavement markings demarcating the travelled lanes between stages (as required).

Work under this item 'Pavement Marking, Permanent' shall include reinstatement of all existing pavement markings that are removed or eliminated as part of the construction activities.

Work under item 'Pavement Marking Obliterating' shall include the complete removal of all temporary pavement markings created.

710.07 CONSTRUCTION

Subsection 710.07.01 of OPSS 710 is amended by the addition of the following:

The Contractor shall document the location and nature of all existing pavement markings prior to construction. All existing pavement markings are to be reinstated.

SP19 – SUPPLY AND INSTALL STEEL BEAM GUIDE RAIL

OPSS.MUNI 721, April 2024, shall govern except as amended or extended herein.

721.01 SCOPE

Work under this item shall be fabrication, supply and installation of steel beam guide rail as shown on the contract

drawings.

SP20 – TEMPORARY CONCRETE BARRIER ENERGY ATTENUATING TERMINAL SYSTEM

SP21 – STEEL BEAM ENERGY ATTENUATING TERMINAL SYSTEM

OPSS.MUNI 732, November 2024, shall govern except as amended or extended herein.

732.01 SCOPE
732.01.01 GENERAL

The work under this item shall include the installation of steel beam energy attenuating terminal systems at the ends of steel beam guidrails.

732.07 CONSTRUCTION
732.07.01 GENERAL

SBEAT systems shall be installed according to manufacturer's instructions at locations specified in the Contract Documents.

The contractor shall use MASH SoftStop Terminal Systems as noted in the contract drawings.

SP22 – LEAVING END TREATMENT

OPSS.MUNI 732, November 2024, shall govern except as amended or extended herein.

732.01 SCOPE
732.01.01 GENERAL

The work under this item shall include the installation of guide rail end treatments at the ends of steel beam guidrails as shown on the contract drawings.

SP23 – TEMPORARY CONCRETE BARRIER (INSTALLATION AND REMOVAL)

OPSS.MUNI 741, November 2021, shall govern except as amended or extended herein.

741.01 SCOPE

Section 741.01 of OPSS 741 is amended by the addition of the following:

Work under the tender item "Temporary Concrete Barrier, Relocation" shall include the relocation of temporary concrete barriers from the Stage 1 alignment to the stage 2 alignment.

Work under this item shall include the supply, installation, relocation, maintenance and removal of temporary

concrete barrier units required for staged construction.

741.09 MEASUREMENT FOR PAYMENT

741.09.01 Actual Measurement

741.09.01.02 Temporary Concrete Barrier, Relocation (m)

Clause 740.09.01.02 is amended by the addition of the following:

Should the Contractor be required to relocate or reposition the barriers to suit the Contractor's own daily entry and exit from the work area or for other operations not specified above, no measurement will be made for any adjustments to the Temporary Concrete Barriers.

SP24 – TOPSOIL, IMPORTED (100MM THICK)

OPSS.MUNI 802, November 2019, shall govern except as amended or extended herein.

802.05.01 Topsoil is amended by the addition of the following:

Soil quality must meet the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition) under the Ontario Environmental Protection Act.

802.07.03 Placement of Topsoil is amended by deleting the first paragraph and replacing it with the following: Only screened topsoil is permitted unless otherwise indicated in the Contract Documents. Top soil thickness shall be as specified on the Drawings and shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

802.09.01 Actual Measurement is deleted and the replaced with the following:

Measurement for payment shall be by volume in cubic metres (m3). This volume shall be calculated by multiplying the area measured for payment for seeding and/or sodding and/or erosion control blanket by the depth of topsoil specified in the Contract Documents.

Areas that have been damaged by the Contractor beyond the slope limits shall be restored with topsoil where necessary prior to carrying out sod or seed repairs. No measurement or payment will be made for this repair work. Topsoil will be free of foreign debris and waste of any nature.

SP25 – SEED AND EROSION CONTROL BLANKET

OPSS.MUNI 804, November 2014, shall govern except as amended or extended herein.

804.05.01 Seed is amended by the addition of the following:

Seed for all applications in this Contract shall consist of seeded compost material applied to a minimum depth of 5 cm using a pneumatic blower.

804.05.04.05 Erosion Control Blanket (ECB) is amended by the addition of the following:

Erosion control blanket shall contain a fibre density of at least 350 g/m2 and consist of wood or coconut based

fibres/materials. Erosion control blanket shall be free of any synthetic, jute, or straw based fibres or materials. Erosion control blankets shall not be installed over gullies, rills, stones, tree roots or any other foreign objects which protrude from the ground surface.

804.07 Construction is amended by the addition of the following:

Topsoil, seed, fertilizer and mulch or erosion control blanket shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

804.07.05 Cover Applications is amended by the addition of the following:

Temporary ground cover applied to all areas that may be left without vegetative cover/erosion control blanket for more than 30 Days shall be included under Item R204 – Earth Excavation, Grading.

804.07.05.04 Erosion Control Blanket (ECB) Application is amended by the addition of the following:

Erosion control blanket shall be provided on all slopes steeper than 2:1 (H:V) and higher than 1.0 m, in accordance with OPSS.MUNI 804 and the Drawings.

Blankets shall be rolled out flat, even and smooth without stretching and be properly anchored to the sub grade. Installation of erosion control blankets shall not take place over snow covered, frozen or saturated soils.

804.08 Quality Assurance is deleted in its entirety and replaced with the following:

804.08 Quality Assurance

Total Performance of the Contract shall not be issued until seeded areas have established growth as per the performance measures and acceptable to the Owner.

Performance Measures at Total Performance:

- The specified permanent seed species shall be at an average height of 50 mm in an evenly dispersed, uniform cover.
- There shall not be any significant bare areas, both in terms of quantity and size.
- Non-seeded, non-specified vegetation shall not exceed 20% of the seeded earth area.

The Contractor shall be responsible for the maintenance of seeded areas which shall include the repair of any seeded area with additional seeding, including the repair of the slope itself and the supply of additional topsoil, until Total Performance of the Contract.

For areas that need to be repaired, the following requirement shall be met:

- All slippages and wash-outs must be repaired with acceptable topsoil.
- Surface preparation as specified in subsection OPSS.MUNI 804.07.02 shall be carried out.
- Reseeding must be carried out as indicated in OPSS.MUNI 804.07.04 and OPSS.MUNI 804.07.05.

804.09.01 Actual Measurement is deleted in its entirety and replaced with the following:

804.09.01 Actual Measurement

Measurement for payment shall be by area in square metres (m2) as directed by the Owner. Areas where the

original ground cover is damaged by the Contractor beyond the slope limits shall be restored at the Contractor's own expense and shall not be included in the area measured for payment. Areas of overlap shall not be measured for payment.

If the Contractor requests a re-measurement of the seeded area and the re-measured area differs from the area measured for proposed payment, the re-measured area shall be used for payment.

SP26 – 150MM DIA. PERFORATED SUBDRAIN WITH RODENT GUARD

OPSS.MUNI 405, November 2017, shall govern except as amended or extended herein.

405.05.01 General is amended by deleting the first paragraph and replacing it with the following:

Subdrain pipe shall be perforated, dual wall, polyethylene pipe with a smooth inner surface, equipped with rodent guard features and having a minimum stiffness of 320 kPa. Subdrains shall also be wrapped in non-woven geotextile as specified in OPSS.MUNI 1860, Table 1 Class II Non-Woven.

405.07.06.02.02 Marking of Outlets is deleted in its entirety and replaced with the following:

405.07.06.02.02 Marking of Outlets

Each outlet location shall be marked by a 2.1 m steel fence post driven 0.6 m to 1.0 m into the ground and painted fluorescent green, paint number CGSB 603-401.

405.09.02 Plan Quantity Measurement is amended by the addition of the following:

The 150 mm diameter pipe subdrain connection into storm structures as specified in OPSD 809.010 shall be included in this item.

405.10.01 Pipe Subdrain – Item is amended by deleting the second and third paragraphs and adding the following:

The unit price for this item shall include all costs associated with the excavation and material disposal, Granular 'B', Type II, bedding and backfill, geotextile, coring into maintenance holes and catch basins where necessary and all other work as specified.

After a random 5% of the entire length of pipe subdrain is inspected the Owner will decide if an additional length will require inspection. No separate payment will be considered for this work, regardless of the amount of pipe subdrain inspected.

SP27 – REMOVAL OF BRIDGE STRUCTURE

OPSS.MUNI 510, November 2018, shall govern except as amended or extended herein.

510.01 SCOPE is amended by the addition of the following:

Work under the above tender item includes full removal of the existing superstructure and substructure, as shown in the Contract Drawings. The scope of substructure removal shall include the complete removal of the east

abutment and footing (if any) including all associated elements and components such as wingwalls, concrete ballast structures and cement pasted stones at the bridge.

Work shall include but not be limited to the following:

- a) Review of reference drawings pertaining to bridge structures designated for removal and field-verification of all dimensions, details and elevations relevant to the work;
- b) Design, construction, maintenance, monitoring and removal of all required temporary support systems, shoring, falsework, temporary protection systems, including protection platforms, temporary bracing and debris containment systems to suit the Contractors removal operations/sequencing.
- c) Development and submission of detailed work plan as specified in Section 510.04.02.01 and amended herein.
- d) Removal of steel grate deck, steel girders, bearing assemblies, steel beam guiderail and all other existing bridge structure elements to the limits shown in the Contract Documents.
- e) Disposal off site of all removed materials and debris in accordance with OPSS 180.
- f) Collection, containment, and disposal of effluents associated with cutting of concrete (as required).
- g) Earth excavation, grading and backfilling required to facilitate structure demolition that is not specified as earth excavation elsewhere in the Contract Documents.
- h) Pre-construction survey to confirm all existing and theoretical-new elevations reported in the Contract Drawings.

Where stockpiling materials on site is required, the Contractor shall submit a plan to the Contract Administrator for approval prior to construction. The stockpile plan shall detail the type of material, and location where the materials shall be stored with approximate dimensions and distances from roadways, ditches, creeks, rivers, streams, etc. The plan shall also outline the environmental mitigation measures that shall be implemented to prevent sediment and other deleterious materials from being transported beyond the stockpile boundaries.

510.07.10 Management of Excess Material is amended by the addition of the following:

Excess material resulting from the removal work or associated construction activities shall remain the property of the Contractor and shall be removed at the Contractors expense.

SP28 – SUPPLY EQUIPMENT FOR INSTALLING MICROPILES

PRE-PRODUCTION OF MICROPILES

PRODUCTION OF MICROPILES

PRODUCTION MICROPILE TESTING

GROUT FOR MICROPILES

1.0 SCOPE

This Special Provision covers the requirements for the installation and testing of grout flush, hollow bar micropiles for Hamilton Island Bridge Replacement.

1.01 Qualifications of the Contractor

The minimum pre-qualification requirements of the micropile Contractor are specified as follows:

- i. The Contractor shall be fully experienced in all aspects of grout flush, hollow bar micropile construction and with the execution of pile load tests. The Contractor shall demonstrate that he has successfully completed at least three grout flush, hollow bar micropile (3) projects in the previous five (5) years of similar scope, complexity and size.
- ii. The micropile superintendent, micropile project manager and the foreman driller and grout operators responsible for installation of the micropile system must have micropile installation experience on at least three (3) successfully completed grout flush, hollow bar micropile projects over the past five (5) years. The Contractor shall provide resumes of key personnel who will be present full time on site (and will be substantially involved) and who will each have at least five (5) years of relevant experience. Key personnel shall include the Contractor's Engineer.
- iii. The micropile work shall be carried out in whole by a specialist Contractor having the qualifications stated above.

2.0 REFERENCES

This Special Provision refers to the following standards, specifications or publications:

Ontario Provincial Standard Specifications, General and Construction:

OPSS 180	Management of Excess Material
OPSS 903	Deep Foundation
OPSS.PROV 904	Concrete Structures
OPSS 905	Steel Reinforcement for Concrete
OPSS 906	Structural Steel for Bridges

Ontario Provincial Standard Specifications, Material:

OPSS.PROV 1002	Aggregates – Concrete
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1303	Admixtures for Concrete
OPSS.PROV 1350	Concrete – Materials and Production
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1442	Epoxy Coated Reinforcing Steel Bars for Concrete
OPSS 1840	Non-Pressure Polyethylene (PE) Plastic Pipe Products

Canadian Standards Association Standards, CSA:

A23.1-14/A23.2-14	Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practice for Concrete
A283-06 (R2016)	Qualification Code for Concrete Testing Laboratories
G30.18-09 (R2014)	Billet-Steel Bars for Concrete Reinforcement
G40.20-13/G40.21-13	

(R2018)	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels
W59-18	Welded Steel Construction (Metal Arc Welding)

American Society for Testing and Materials Standards, ASTM:

A722/A722M	Uncoated High-Strength Bar for Prestressing Concrete
A252	Standard Specification for Welded and Seamless Steel Pipe Piles
C144	Standard Specification for Aggregate for Masonry Mortar
D1784	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
D3689	Standard Test Methods for Deep Foundations Under Static Axial Tensile Load
D4380	Standard Test Method for Density of Bentonite Slurries

American Welding Society (AWS):

D1.1/D1.1M:2020	Structural Welding Code - Steel
D1.4/D.14M:2018	Structural Welding Code – Reinforcing Steel

American Society of Civil Engineers (ASCE):

ASCE 20-96	Standard Guidelines for the Design and Installation of Pile Foundations
------------	---

International Organization for Standardization/International Electrotechnical Committee, ISO/IEC

DIS-17025:2017	General Requirements for the Competence of the Testing and Calibration Laboratories
----------------	---

Others:

Post Tensioning Institute Publications – Recommendations for Prestressed Rock and Soil Anchors – 2014.
Canadian Foundation Engineering Manual (CFEM), 4th Edition.
Federal Highway Administration Publication No. FHWA NHI-05-039: Micropile Design and Construction Reference Manual, December 2005 (FHWA 2005).

3.0 DEFINITIONS

For the purposes of this Non-Standard Special Provision, the following definitions apply:

Admixture means a substance added to the grout to either control bleed and/or shrinkage, improve flowability, reduce water content, retard setting time, or resist washout.

Alignment Load (AL) means a nominal load applied to a micropile during testing to keep the testing equipment correctly positioned.

Apparent Free Micropile Length means the length of micropile that is not bonded to the surrounding ground, as calculated from the elastic movement data during testing.

Bond Length means the length of the micropile that is bonded to the ground and capable of transferring the applied

axial loads to the surrounding soil or rock.

Bond-Breaker means a sleeve placed over the reinforcement steel to prevent load transfer.

Casing means a steel pipe introduced during the drilling process to temporarily stabilize the drill hole and/or permanently reinforce the pile.

Centralizer means a device used to centrally locate the reinforcing element(s) within the casing and/or drillhole to ensure that minimum grout cover is provided.

Central Bar or Central Steel means steel reinforcing bars (solid or hollow-core) or pipes used to strengthen or stiffen the pile, excluding any left-in drill rod or casing.

Contractor's Engineer means an Engineer who has a minimum of five (5) years of experience in the field of design and/or installation of micropiles or alternatively has demonstrated expertise by providing satisfactory verification services of at least two (2) projects of similar scope to the Contract. The Contractor's Engineer shall be retained by the Contractor to certify that the work is in general conformance with the Contract Documents.

Coupler means a device used to transmit load from one partial length of reinforcement to another.

Creep Movement means the movement that occurs during the creep test of a micropile under a constant load.

Design Engineer means the Engineer retained by the Contractor who produces the Working Drawings and designs the pile load test system(s).

Design Load (DL) means the anticipated final maximum service load in the micropile. The design load includes appropriate factors to ensure that the overall structure has adequate capacity for its intended use.

Duplex Drilling means a drilling system involving the simultaneous rotation and advancement of (inner) drill rod and (outer) drill casing in which the cuttings from the inner drill rod exit the borehole via the annulus between the rod and the casing.

Elastic Movement means the recoverable movement measured during a micropile load test.

Encapsulation means a corrugated or deformed tube protecting the reinforcing steel against corrosion.

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

Flush Grout means a suitably thin Portland cement based grout that is injected through the micropile hollow-core central reinforcing bar during drilling.

Free (Unbonded) Length means the designed length of the micropile that is not bonded to the surrounding ground or grout during testing.

Low Mobility Grout means a low slump grout with a mix design that typically contains sand or a suitable admixture (thixotropic agent) in order to control its travel from its point of injection.

Micropile means a bored, cast-in-place pile containing steel reinforcement, designed to accept load (axial, bending or lateral) directly, and transfer it to an appropriate bearing stratum.

Maximum Test Load (TL) means the maximum load to which the micropile is subjected during testing.

Overburden means a non-lithified material, natural or placed, which normally requires cased drilling methods to provide an open drillhole to underlying strata.

Post-Grouting means the injection of additional grout into the load transfer length of a micropile after the primary grout has set.

Pre-Production Micropile means a sacrificial micropile that is not part of the final foundation system and is subjected to load testing to verify the design and installation procedures.

Primary/Structural Grout means a Portland cement based grout that is injected into the micropile hole through the hollow-core central reinforcing bar after completion of drilling and installation of the reinforcement to provide the load transfer to the surrounding ground along the micropile and affords a degree of corrosion protection when the micropile is in compression.

Production Micropile means a micropile that forms part of the final foundation support system to a structure.

Proof Load Test means the incremental loading of a production micropile, recording the total movement at each increment.

Reinforcement Steel means the steel component(s) of the micropile which accepts and/or resists applied loadings. This includes the hollow-core central reinforcing bar and the permanent steel casing on this project.

Residual Movement means the non-elastic (non-recoverable) movement of a micropile measured during load testing.

Rotary Percussive Duplex (Concentric) means a drilling system involving the simultaneous rotation, percussion and advancement of an (inner) drill rod and an (outer) drill casing in which the cuttings from the inner drill rod exit the borehole via the annulus between rod and casing.

Rotary Percussive Duplex (Eccentric or Lost Crown) means a drilling system involving the simultaneous rotation, percussion and advancement of an (inner) drill rod combined with an eccentric underreaming bit and an (outer) drill casing in which the cuttings from the inner drill rod exit the borehole via the annulus between rod and casing. Previously called the Overburden Drilling Eccentric (ODEX) System.

Sheathing means a smooth or corrugated piping or tubing that protects the reinforcing steel against corrosion.

Spacer means a device used to separate elements of a multiple-element steel bar reinforcement.

Tremie Grouting means the placing of grout in a borehole via a grout pipe introduced to the bottom of the hole.

Ultimate Grout-To-Ground Bond Value means the estimated ultimate geotechnical unit grout-to-ground bond strength selected for use in design.

Verification Load Test means a pile load test performed to verify the design of the pile system and the construction methods proposed, prior to installation of production piles.

4.0 DESIGN AND SUBMISSION REQUIREMENTS

4.01 Design Requirements

The Contractor shall be responsible for the design of the pile load testing set-up including the reaction system(s), the reaction piles/ground anchors and all loading frame connections.

The reaction piles/ground anchors and the reaction system(s) shall be designed to safely withstand the applied loads specified in the Contract Documents.

The design assumptions of the reaction piles/ground anchors, the reaction system(s) and all loading frame connections shall accurately represent the subsurface conditions prevalent at the site.

Except as specified herein, the reaction piles/ground anchors shall be designed in accordance with the design recommendations of the Post Tensioning Institute Recommendations for Prestressed Rock and Soil Anchors (2004).

4.02 Submission Requirements

4.02.01 Site Survey

One (1) week prior to commencing any work associated with the micropile operation, the Contractor shall submit to the Contract Administrator, a condition survey of property and structures that may be affected by the work. The survey shall include, but not be limited to, the locations and conditions of adjacent properties, buildings, underground structures, utility services and structures such as bridges at or adjacent to the site.

4.02.02 Working Drawings

At least four (4) weeks prior to the commencement of the micropile operations, the Contractor shall submit three (3) copies of the Working Drawings to the Contract Administrator. These Working Drawings shall bear the seal and signature of the Contractor's Engineers. The Contract Administrator will review the Work Drawings and provide written comments if changes are necessary to meet Contract requirements. The Contractor shall submit to the Contract Administrator three (3) copies of the final Working Drawing which meets all Contract requirements within one (1) week with a Request to Proceed.

The final Working Drawing shall be submitted to the Contract Administrator with a Request to Proceed. The installation of pre-production micropiles and associated load tests shall not proceed until a Notice to Proceed has been received from the Contract Administrator.

Information to be shown on the Working Drawings shall describe and illustrate the complete details of the micropile installations for each stage of construction (including traffic staging), as well as the micropile testing equipment, test set-up, and reaction system(s) for the pre-production and production test micropile(s). The information on the Working Drawings shall include the following:

- a) Plans, Elevations and Sections (at each of the south and north abutments)

- i. micropile spacing
- ii. orientation
- iii. minimum total micropile length
- iv. casing plunge length
- v. uncased bond length
- vi. design load
- vii. a unique identification number for each micropile
- viii. micropile components and details

b) Materials

- i. physical properties of reinforcement steel (central bar and casing)
- ii. physical properties of pile top attachment
- iii. bond length grout materials and mix proportions
- iv. corrosion protection material physical/mechanical properties

c) Micropile Installation

- i. construction methods
- ii. work restrictions
- iii. schedule of major equipment resources
- iv. sequence of pile installation and coordination of work
- v. procedures for monitoring micropile installation
- vi. type, number and location of pre-production load tests
- vii. method of evaluation of load test results

d) Micropile Construction Details

- i. Detailed description of the proposed construction procedures.
- ii. Method of drilling the micropile holes and maintaining the stability of the holes, through artesian conditions, during the micropile installation.
- iii. Method to be employed to penetrate the overburden, including cobbles and boulders, during the micropile installation.
- iv. Detailed description of the drilling equipment and materials including drill bit/auger diameter and lengths, casing diameter and lengths, flush type, slurry materials or other materials to facilitate the construction of the micropile hole.
- v. Method of verifying the lengths of micropile holes.
- vi. Detailed description of the grout mixing procedure and the method of grout installation and placement. The description shall include the grout pressures and details of the grout mix design(s).

e) All design assumptions, loads, parameters and bond stresses used for the micropile load tests.

f) Testing records and evaluation when testing has been completed to assess bond stress and micropile movement.

4.02.03 Mill Certificates

The Contractor shall submit to the Contract Administrator at the time of delivery to the job site, one (1) copy of the

certified mill test reports, indicating that the steel meets the requirements for the appropriate standards for casing and central bar reinforcement, plates and shapes. The ultimate strength, yield strength, elongation, and material properties composition shall be included. For steel pipe used as permanent casing, or core steel, the Contractor shall submit a minimum of two (2) representative coupon tests or mill certifications on each load delivered to the project.

Where mill test certificates originate from a mill outside Canada or the United States of America, the Contractor shall have the information on the mill certificate verified by testing by a Canadian laboratory. The laboratory shall be accredited by a Canadian National Accreditation Body to comply with the requirements of ISO/IEC 17025 for the specific tests or type of tests required by the material standard specified on the mill test certificate. The mill test certificates shall be stamped with the name of the Canadian testing laboratory and appropriate wording stating that the material conforms to the specified material requirements. The stamp shall include the appropriate material specification number, the date and the signature of an authorized officer of the Canadian testing laboratory.

One copy of the stress-strain curves representative of the lots to be used shall be submitted to the Contract Administrator together with the mill test certificates detailed in OPSS 1440.

4.02.04 Grout

The Contractor shall submit to the Contract Administrator a suitable, site specific grout mix design(s), including details of all materials to be incorporated, and the procedure for mixing and placing the grout. This submittal shall include certified test results verifying the acceptability of the proposed mix design(s). The acceptability of the mixes will be further verified on site prior to production.

4.02.05 Installation Records

The Contractor shall submit micropile installation records, signed by the Contractor's Engineer, to the Contract Administrator, within three (3) business days after each pile installation (including all test piles and production piles) is completed. The installation records shall include the following information:

- a) Pile identification number and location;
- b) Pile drilling duration, including date of installation and start and finish time;
- c) Pile drilling observations, including nature of and variation in cuttings return, penetration rates for each 0.5 m of penetration, presence of cobbles or boulders or obstructions or voids, connections between holes;
- d) Information on depth of drilling and soil types encountered, including description of strata, depth to water, etc.;
- e) Sequence of installation;
- f) Inclination and direction;
- g) Final tip elevation;
- h) Casing tip elevation;
- i) Cut-off elevation;
- j) Length and diameters of all components;
- k) Bar length, spacers/coupler details;
- l) Casing length, joint location details;
- m) Description of unusual installation behaviour, conditions, voids, high grout takes;
- n) Any deviations from the intended parameters, exceptions and "unusual" events;
- o) Grout pressures attained, where applicable;
- p) Grout mix proportions;

- q) Grout quantities pumped, including depths were larger than normal grout takes occur;
- r) Pile materials and dimensions;
- s) Micropile test records, analysis and details;
- t) As-built drawings showing the location of the piles, their depth and inclination, and details of their composition shall be submitted within thirty (30) calendar days of each pier completion.

4.02.06 Micropile Load Testing

The Contractor shall submit to the Contract Administrator details of the micropile load testing, three (3) weeks prior to construction. The details shall include the following:

- a) Detailed description of the proposed load testing procedures.
- b) Shop drawings and structural calculations for the design of the pile load testing, including reaction system(s). The structural calculations shall confirm that the materials will meet the specified load and movement criteria.
- c) Detailed plans for the set-up method proposed for testing the pre-production and production micropiles including all necessary drawings and details to clearly describe the test method, means for providing reaction, equipment proposed including independent reference beams for measuring micropile head movement. Special attention shall be paid to ensuring safety and providing adequate structural stability of the reaction piles/ground anchors and loading frame connections.
- d) Calibration reports for each test jack, pressure gauge, and master pressure gauge to be used. The calibration tests shall have been performed by an independent testing laboratory and tests shall have been performed within one (1) year of the date submitted. Testing shall not commence until the Contract Administrator has approved the jack, pressure gauge and master pressure gauge calculations.

4.02.07 Quality Control

4.02.07.01 Interim Inspections During Installation of Micropiles

The Contractor's Engineer shall carry out Interim Inspections of the:

- a) drilling and casing installation (including cleanliness of casing); and,
- b) drilling and grouting with hollow-core central bar reinforcement steel (including depth, diameter and length of penetration).

The above shall be carried out for each individual micropile to verify that the works are constructed in general conformance with the Contract Documents and Working Drawings.

4.02.07.02 As-Constructed Drawings

As-constructed drawings shall be submitted to the Contract Administrator in a reproducible format prior to final acceptance of the work.

The as-constructed drawings shall be dated and bear the seal and signature of the Contractor's Engineer.

5.0 MATERIALS

5.01 Water

Water for mixing grout shall be according to OPSS 1302.

5.02 Admixtures

Admixtures shall be according to OPSS 1303. Admixtures which control bleed, improve or control flowability, reduce water content, and retard set may be used in the grout only if the admixture manufacturer certifies that their use will not affect the required properties of the grout. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations (if used). Accelerators and admixtures with chlorides shall not be permitted. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations.

Admixtures shall be selected by the contractor, when required, to construct the micropiles as specified in the contract documents.

5.03 Cement

All cement shall be Type GU General Use hydraulic cement conforming to OPSS 1301.

5.04 Fillers

Inert fillers, such as sand, may be used in the grout in special situations (e.g., presence of large voids in the ground) to limit grout take and travel and only if the QVE certifies that their use will not affect the required properties of the grout.

5.05 Grout

The grout mix materials and procedures for placement and testing shall conform to OPSS 1301, OPSS 1302, OPSS 1303, OPSS 1350 and CSA A23.2-1B.

The Contractor shall provide a stable, homogenous neat cement grout or a sand-cement grout. The grout shall be free of any lumps and not contain any evidence of poor or incomplete mixing. The grout shall be mixed to the supplier's specification. The water/cement grout ratio of the thin/flush grout (by weight) shall not exceed 0.90. The water/cement ratio of the structural grout (by weight) shall not exceed 0.45. The structural grout shall have the following physical properties:

- a) A minimum compressive strength of 25 MPa at 7 Days.
- b) A minimum compressive strength of 35 MPa at 28 Days.
- c) No segregation and a bleed of less than 2% when allowed to stand for 1 hour.

5.06 Reinforcement Steel

5.06.01 Central Bar

The central bar reinforcement steel shall be continuously threaded Titan Hollow Bar or approved equivalent,

according to OPSS 1440 with minimum yield strength of 572 MPa.

5.06.02 Couplers

Couplers for the central bar reinforcement steel shall be as specified by the supplier of the central bar and shall develop at least 100% of the guaranteed minimum ultimate strength of the central bar.

5.06.03 Casing

The steel casing shall meet the requirements of ASTM A252, Grade 3 with minimum yield strength of 552 MPa.

New “Structural Grade” (a.k.a. “Mill Secondary”) steel pipe meeting the above but without Mill Certification is acceptable for use as permanent casing provided it is free from defects (dents, cracks, tears) and is accompanied by two (2) coupon tests per truckload confirming it meets the above requirements.

All casing joints shall be threaded or comprised of full penetration field welds. The casing joints shall develop at least the required compressive, tensile and/or bending strength used in the design of the micropile.

5.07 Plates and Shapes

Structural steel plates and shapes for pile top attachments shall be according to OPSS 906 Grade 300W.

5.08 Centralizers and Spacers

Centralizers shall be fabricated from schedule PVC pipe or tube, steel, or material that is non-detrimental to the reinforcement steel. Wood shall not be used.

6.0 EQUIPMENT

6.01 General

All equipment for the installation, testing and monitoring of the pre-production (verification) and production micropiles shall be suitable for the intended purposes and capable of working on the site under the prevailing access and clearance conditions.

The equipment used shall be capable of installing and grouting the micropiles to the prescribed depths or elevations without damage to the pile materials or to the adjacent structures.

6.02 Grouting Equipment

All grout mixers, pumps and hoses shall be of an adequate capacity and shall be sized to enable the grout to be pumped in one continuous operation, while keeping the grout in constant agitation prior to pumping, and to allow continuous grouting of an individual micropile with the final structural grout within one (1) hour.

A high speed, high shear, colloidal grout mixer with a gauge to measure the quantity of water discharged into the mixer shall be used. A paddle mixer is not acceptable.

The grout pump(s) shall be equipped with a pressure gauge to monitor grout pressures of at least 1 MPa or twice

the actual grouting pressures used, whichever is greater.

6.03 Micropile Testing Equipment

The equipment shall be capable of loading the test piles to the maximum specified test load (TL) within the rated capacity.

The equipment shall be capable of loading the pile in increments so that the load on the pile can be increased or decreased in accordance with the test procedures outlined in the Contract Documents.

Dial gauges shall have at least a 75 mm travel and longer gauge stems or sufficient gauge blocks shall be provided to allow for greater travel where required. Gauges shall have precision of at least 0.02 mm.

Dial gauges shall allow the measurement of total micropile movement at every load increment to be read to the nearest 0.02 mm increment. The gauge shall have sufficient travel to record the total pile movement at Test Load without the need to reset at an interim point.

Loading equipment shall be calibrated within an accuracy of $\pm 2\%$ immediately prior to use.

Current calibration records, dated and bearing the seal and signature of an Engineer, shall be provided for all gauges and jacks.

7.0 CONSTRUCTION

7.01 General

The Contractor shall be responsible for the material, fabrication, installation, testing and monitoring of the test micropiles and the production micropiles. The Contractor shall be responsible for design parameters and the design of the reaction piles/ground anchors.

The Contractor's attention is specifically drawn to the following details:

- a) The drilling, grouting and micropile installation will be carried out immediately adjacent to the existing bridge abutments. The Contractor is alerted to the limited available working space within each construction staging of the replacement bridge structure as well as the presence of overhead Hydro line(s) within the right-of-way. The Contractor shall select construction techniques that will prevent settlement or heave of the existing structure during construction.
- b) The Contractor is alerted that micropiles will be installed through rockfill embankment. The lower layers may contain boulders. The factual information contained in the foundation investigation reports (that are available as specified elsewhere in the Contract) provide information on the subsurface conditions at the sites.

The Contractor shall select drilling and grouting methods and be prepared with suitable equipment and procedures (including the use of hollow-core central steel reinforcement bars, with sacrificial drill bits, to allow the simultaneous drilling and injection of grout during installation of the micropiles) to penetrate through the overburden soils containing cobbles and boulders, prevent basal heave and soil cave in and surface ground movement at the adjacent bridge structures so as to avoid causing an unacceptable level of disturbance as defined elsewhere in the Contract Documents.

The use of rotary percussion drilling with compressed air flush to advance the micropile through the overburden soil will not be allowed.

The Contractor shall control all drilling fluids, grout, water and drill cuttings during micropile installation and upon completion of the micropile installations shall clean up, and off-site dispose of all excess fluids and cuttings in accordance with the requirements of OPSS 180.

The Contractor shall comply with all environmental provisions as specified elsewhere in the Contract Documents.

7.02 Subsurface Conditions

The “Geotechnical Investigation, Proposed Hamilton Island Bridge Replacement Report, April 2024, 2026” describes the subsurface conditions at each bridge site for the project is available, as specified elsewhere in the Contract Documents. The Ministry warrants that the information provided in the Geotechnical Investigation Report can be relied upon with the following limitations and exceptions:

- a) Any interpretation of data or opinions expressed in the reports is not warranted.
- b) Although the raw measured data presented is warranted, the Contractor must satisfy itself as to the sufficiency of the information presented for the intended construction purpose and obtain any updating or additional information as required to facilitate the deep foundation works.

The Contractor is alerted that the micropiles will be installed through rockfill embankment, Sand layer and Glacial Till that may contain boulders. The factual information contained in the Geotechnical Investigation Reports (that is available as specified elsewhere in the Contract Documents) provide information on the subsurface conditions at each site.

7.03 Transportation, Handling, Storage

Casings and central bar reinforcement shall be transported, stored and handled in such a manner that damage and distortion is prevented and that the strength and integrity are maintained.

All materials, including cement, additives for grout and pile reinforcement steel (central bar and casing) shall be stored off-ground, under cover and protected against moisture and directly from the elements.

Lifting of any casings and bar reinforcement shall not cause excessive bending.

7.04 Installation of Micropiles

7.04.01 General

The Contractor shall install the micropiles in accordance with the diameter, orientation and length specified in the Contract Documents and as detailed on the Working Drawings.

The micropile installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project.

The micropiles will be installed in close proximity to each other near the foundation of the existing bridge structures. The Contractor shall carry out the drilling and grouting works in such a manner to prevent any damage to previously installed micropiles, to prevent any loss of ground, and to prevent ground movement at the existing bridge structures. The Contractor shall monitor movements of the existing structure during the installation of the micropiles from commencement and continue through to the end of substantial completion of the Contract. The Contractor shall adopt established method(s) of monitoring such as the use of monitoring pins or electronic devices, and record and report movements and readings in general on a weekly basis, and more frequently on a daily basis during active drilling and grouting operations, with copies forwarded to the Contract Administrator. Where movements of 15 mm are observed, the Contractor shall stop work and re-evaluate and modify the micropile installation and grouting method prior to continuing work.

The available working space is limited. The Contractor shall inspect the work area to ensure that adequate access and headroom are available for the proposed equipment and procedures for the micropile installation work.

7.04.02 Drilling

The Contractor shall employ drilling equipment and methods suitable for drilling through the anticipated subsurface conditions to be encountered and cause no damage or disruption to these conditions or any overlying or adjacent structure or service. The Contractor shall use steel casing during drilling and installation. Drilling shall be conducted under full head of water. Bentonite slurries to stabilize the holes are not permitted.

The upper cased sections of the micropiles shall be drilled using duplex drilling techniques with the cuttings returning up the inside of the casing. The lower uncased sections of the micropiles shall be installed using the hollow-core central reinforcing bars with sacrificial drill bits that allow the simultaneous drilling and injection of grout.

Drilling shall be conducted in a manner that does not result in significant loss of ground beyond the hole diameter. Disposed cuttings from the upper cased sections of the micropiles shall not exceed 110% of the theoretical borehole volume based on the outside diameter of the casing. Disposed cutting from the micropile installation/grouting process shall be collected at top of the upper cased sections of the micropiles to minimize the amount of chipping/cleaning required before the construction of the pile cap.

The Contractor shall determine and schedule all installation techniques such that there will be no interconnection or damage to previously installed micropiles.

7.04.03 Reinforcement Steel

7.04.03.01 General

Pile reinforcement steel (central bar and permanent casing) shall be installed as specified in the Contract Documents and detailed on the stamped Working Drawings.

7.04.03.02 Placement

The Contractor shall be responsible for determining the number of centering devices required. As a minimum, centralizers shall be provided at 3 m centre maximum spacing on the central bar reinforcement. The uppermost centralizer shall be located a maximum of 1.5 m from the top of the micropile. Centralizers shall permit the free flow of grout without misalignment of the reinforcement.

All pile top elevations shall be checked and adjusted to ensure all installed micropiles are installed to the planned elevations.

7.04.03.03 Connections

The pile reinforcement steel connections (splices and joints) shall be constructed to develop the required design strength of the pile section. The central bar reinforcement steel connections (splices) shall be constructed using mechanical connectors only. The casing connections shall be constructed using either mechanical connectors (e.g., threaded joints) or full penetration field welds.

The proposed pile splice/connection details shall be submitted to the Contract Administrator, for information purposes, prior to use.

Reinforcement steel central bar connections shall not be in the same plane as casing connections/splices.

Secure lengths of casing and reinforcement steel central bar shall be joined in proper alignments and in such a manner that causes no eccentricity between the axes of the two joined lengths or the angle between them.

7.04.04 Grouting

7.04.04.01 General

The grout shall be installed as specified in the Contract Documents and as detailed on the stamped Working Drawings.

The Contractor shall provide systems and equipment to measure the grout quality, quantity and pumping pressure during the grouting operations.

During advancement of the hollow-core central reinforcement bar (with sacrificial drill bit), the Contractor shall continuously flush the hole using the thin flush grout. Flushing with water is not permitted.

Upon completion of drilling of the uncased section of the micropile to the design tip elevation, the Contractor shall inject the final structural grout from the lowest point of the drill hole until clean, pure structural grout flows from the top of the micropile (to be verified by specific gravity testing with a Baroid mud balance).

Subsequent to completion of grouting, all installation operations associated with completion of the micropile must ensure complete continuity of the grout column. The use of compressed air to directly pressurize the fluid grout is not permissible. The grout pressures and grout take volumes shall be controlled for each stage of each pile to prevent excessive heave or fracturing in the foundation soils or existing bridge structures. The entire micropile shall be grouted to the design cut-off level.

The grout within the micropiles shall be permitted to attain the minimum design strength prior to being loaded.

Any micropiles not installed according to the specifications shall be replaced, or otherwise remediated appropriately. The cost of replacement and any required foundation modifications are to be carried out at no additional cost to the Owner.

If necessary, the Contractor shall undertake cold weather protection requirements, preparation and protection in accordance with CSA CAN3-A23.1. The temperature of the grout during mixing and pumping shall be maintained between 10°C and 30°C.

7.04.04.02 Quality of Grout Mixture

7.04.04.02.01 General

Any grout mixture showing evidence of dampness, lumps, harden pieces, or contamination shall not be incorporated into the work.

The Contractor shall be responsible for testing of bleed, preparation and initial storage of grout cubes for determination of compressive strength, and delivery of the grout cubes to a testing laboratory designated by the Owner.

The Contractor shall employ staff from a testing company certified according to CSA A283 – Certification for Additional Tests 1B, by an organization accredited by the Standards Council of Canada, to carry out testing for bleed, making and curing of grout cubes and early strength determination.

Making of grout cubes for compressive strength test and testing of bleeding, shall be done on a level, vibration free surface.

The Contractor shall perform and record specific gravity testing using a Baroid mud balance following ASTM D4380 on the structural grout utilized for each and every micropile.

7.04.04.02.02 Bleed Requirements

The testing for bleed of the grout shall be according to CSA A23.2-1B.

Prior to the grouting operation, in the presence of the Contract Administrator, a trial batch shall be mixed and the grout tested for bleed, to ensure that the grout meets the requirements specified in the Contract Documents. The trial batch of grout shall not be used in the actual grouting operation unless it meets the requirements for bleed as specified herein.

During the grouting operation, bleeding measurements shall be performed on the grout sampled at the mixer. The measurements shall be performed and recorded at least once a day and as requested by the Contract Administrator.

The bleed test results shall be submitted to the Contract Administrator in writing at the end of each working day. The test results that indicate the grout is not meeting the requirements of the Contract Documents shall be reported immediately to the Contract Administrator and the grouting operation halted until the cause of the problem is identified and corrected.

7.04.04.02.03 Strength Requirements

Grout cubes shall be prepared as follows on site from the grout pumped into the micropile:

- a) Three (3) sets of grout cubes, consisting of three (3) cubes each, shall be made each day the grouting operations are carried out.

- b) The grout cubes shall be prepared and stored according to CSA A23.2-1B, and shall not be moved prior to demoulding.
- c) The grout cubes shall be demoulded and transported to the laboratory within 24 hours $\pm$ 4 hours.
- d) The grout cubes shall be transported in a sealed white opaque plastic bag containing at least 250 mL of water and maintained at a temperature between 15°C and 25°C.
- e) Compressive strength testing shall be carried out on the grout cubes according to CSA A23.2-1B at 3, 7 and 28 days and the test results provided to the Contract Administrator.
- f) The Contractor shall prepare and test additional grout cubes to determine when the grout has attained a compressive strength of 25 MPa.

7.05 Tolerances

The allowable tolerances are as follows:

- a) Centreline of the installed micropiles shall not be more than 75 mm from that shown on the Contract Drawings.
- b) Micropile hole alignment shall be within 2% of the total-length plan alignment.
- c) Top elevation of micropiles shall be within +25 mm or -50 mm of maximum of the vertical design elevation.
- d) Centreline of central bar reinforcement shall not be more than 19 mm from centerline of micropile casing.

7.06 Testing of Micropiles

7.06.01 General

Verification load tests shall be carried out on pre-production test micropile(s), and proof load tests shall be carried out on selected production micropiles. The micropile load testing shall be carried out according to the Working Drawings and as specified herein.

The Contractor shall provide to the Contract Administrator a minimum of three (3) Working Days' notice of when the load tests will be carried out. The load tests shall be conducted at a time mutually acceptable to the Contractor and Contract Administrator.

The maximum load in the reaction piles/ground anchors shall not exceed 80% of the guaranteed minimum ultimate tensile strength of the central bar reinforcement.

The testing shall not be performed until after the grout in the micropiles (or reaction piles/ground anchors) has reached a minimum seven (7) days unconfined compressive strength of 25 MPa.

The load tests shall be undertaken under the supervision of the Contractor's Engineer, and the test results recorded and submitted to the Contract Administrator. The load test results shall include a plot of the load versus deformation.

7.06.02 Reaction System

The reaction system(s) for the pre-production and production micropile load tests shall be designed by the Contractor and shall be installed as detailed on the Working Drawings.

The Contractor shall determine the number of reaction piles (or ground anchors) required for proper execution of the axial tensile load tests. The reaction piles or ground anchors shall be located no closer than 2 m to the micropile to be tested under axial tensile conditions.

The Contractor shall make provisions, as appropriate and necessary, to ensure safety and structural stability of the reaction piles, ground anchors and their connection to the load frame and load apparatus.

7.06.03 Reference System, Testing Equipment and Procedures

The layout of the reference systems and testing equipment required for testing shall be as detailed on the Working Drawings and as specified herein.

The Contractor shall supply a suitable means for providing independent reference beams for measuring micropile head movement, jack, electronic load cell, dial gauges or electronic displacement transducers, anchor extension, and any other hardware necessary to carry out the load tests. A minimum of three (3) dial gauges or electronic displacement transducers and piano wire is required. Dial gauges or displacement transducers shall have an accuracy of ± 0.0254 mm (0.001 in). Load cells shall have an accuracy of $\pm 2\%$ of the maximum test load. The calibration curve between the jack pressure and the load shall be submitted to the Contract Administrator for information purposes.

All reference beams shall be independently supported with the support firmly embedded in the ground at a distance of not less than 2.5 m from the reaction system. Reference beams shall be sufficiently rigid to support instrumentation such that variations in readings do not occur.

All gauges, scales and reference points attached to the micropile (or reaction piles/ground anchors) shall be mounted to prevent movement relative to the micropile (or reaction piles/ground anchors) during the test.

The jacks shall be secured (with chains or other protective housing(s)) to provide adequate protection to personnel in the event of breakage of the micropile, ground anchor or loading system.

The Contractor shall perform the micropile tensile load tests according to ASTM D3689, superseded where applicable by the procedures specified in this Special Provision, and indicate the minimum following information:

- a) Type and accuracy of apparatus for measuring load.
- b) Type and accuracy of apparatus for applying load.
- c) Type and accuracy of apparatus for measuring the micropile displacement.
- d) Type and capacity of reaction load system, including sealed Working Drawings.
- e) Hydraulic jack calibration report.

7.06.04 Pre-Production Micropile Load Tests

7.06.04.01 General

The Contractor shall perform pre-production tension load tests on sacrificial micropiles to verify the design assumptions and the appropriateness of the proposed construction procedures, prior to installation of production micropiles.

Upon completion of the pre-production micropile load testing, the Contractor shall submit the load test results to the Contract Administrator with a Request to Proceed. The installation of production micropiles shall not proceed until a Notice to Proceed has been received from the Contract Administrator.

7.06.04.02 Installation of Pre-Production Sacrificial Test Micropiles

The pre-production test piles will be installed near each abutment at minimum of 3 m of the proposed micropile group cap at the abutments, at a location selected by the Contract Administrator in communication with the Contractor.

The Contractor shall employ the drilling and grouting methods, casing and other reinforcement details, and depth of embedment for the test micropiles identical to those to install the production micropiles, except where specified otherwise by the Contract Administrator. In this regard, the upper portion of the pre-production test micropile, down to approximately the same elevation as bottom of new abutment footing.

The details of the test pile set-up area (including any excavation, over-drilling and/or bond-breaker) shall be submitted to the Contract Administrator.

The Contractor shall be responsible for logging the holes for the pre-production micropiles to be tested. The subsurface conditions in terms of stratigraphy at the test locations are required for proper interpretations of the load test results. The Contractor shall also make provisions, as appropriate, to facilitate the Contract Administrator in carrying out his own logging of the holes for the pre-production sacrificial micropiles and the associated reaction piles.

Upon completion of the sacrificial, pre-production micropile load tests, and prior to demobilization from the site, the test section area is to be restored to near original conditions as per the direction of the Contract Administrator.

7.06.04.03 Test Procedures and Measurement

The Contractor shall apply an Alignment Load (AL) to the piles prior to setting the movement recording devices. This Alignment Load shall be no more than 10% of the Design Load (i.e., 0.1 DL); dial gauges shall be zeroed at the first setting of the AL. For the purposes of this test, the Alignment Load shall be taken as 30 kN.

The Contractor shall carry out an axial tension load test on each of the pre-production piles in a manner that induces uplift failure, to enable assessment of the ultimate grout-to-ground bond strength. To achieve this, a minimum tension load equal to two times the axial compression load specified in the Contract Drawings shall be applied for 5 minutes.

7.06.05 Production Micropile Load Tests and Target Criteria

7.06.05.01 General

The Contractor shall carry out proof load tests (under tensile conditions) on a minimum of one (1) production micropile at each abutment (i.e. a minimum of 2 proof load tests). The Contractor shall submit to the Contract Administrator a proposal recommending the production micropile(s) to be selected for testing, however, the final selection will be up to Contract Administrator.

The selected micropiles for proof testing will be tested no sooner than seven (7) days after installation to allow the grout to reach sufficient strength. It is noted that the use of adjacent vertical micropiles as reaction anchors is acceptable, provided that the minimum spacing requirements between the reaction piles and the test pile (as defined in Section 7.06.02) can be satisfied. The reaction system, including any reaction anchors, if necessary, is to be entirely designed by the Contractor and submitted to the Contract Administrator for information purposes.

The Contractor shall set-up the reaction frame and load test set-up, complete with jacks, load cells and gauges in a manner similar to the pre-production load tests. The Contractor shall repair any previously installed production micropiles that may have been damaged during the course of proof load testing to the approval of the Contract Administrator and at no cost to the Owner.

The Contractor shall perform a production micropile proof load test no later than 25% of the production micropiles are installed at each abutment.

Upon completion of a production micropile proof load test, the Contractor shall submit the load test results to the Contract Administrator with a Request to Proceed. The load test results shall include a plot of the load versus deformation. The installation of the remaining production micropiles at each abutment shall not proceed until a Notice to Proceed has been received from the Contract Administrator.

The test procedure shall be the same as that used for the pre-production tension load test.

7.07 Management of Excess Material

Management of excess material shall be according to OPSS 180.

7.08 As-Constructed Drawings

As-constructed drawings shall be prepared by the Contractor for all installations of pre-production and production micropiles as follows:

- a) For all work incorporated in the completed structure that required the submission of Working Drawings.
- b) For all changes from the original Contract requirements.

The as-constructed drawings shall be submitted to the Contract Administrator in a reproducible format prior to final acceptance of the work.

The as-constructed drawings shall be dated and bear the seal and signature of the Contractor's Engineer.

8.0 MEASUREMENT FOR PAYMENT

8.1 Pre-Production Micropile Testing

A count will be made of the number of pre-production micropiles that are load tested and satisfy the Contract requirements.

8.2 Production Micropile

Measurement will be made in metres of the micropiling left in place after cut-off.

8.3 Grouting

Measurement will be made in cubic metres of primary/structural grout pumped into the subsurface during the installation of the micropiles.

8.4 Production Micropile Testing

A count will be made of the number of production micropiles that are load tested and satisfy the Contract requirements.

9.0 BASIS FOR PAYMENT

9.1 Supply Equipment for Installing Micropiles – Item

Payment at the Contract price for the above items shall be full compensation for all labour, equipment and material required to do the work.

It will be assumed, for payment purposes, that 20% of the work under this item has been completed when the satisfactory performance of the equipment has been demonstrated to the Contract Administrator by the installation of one (1) pre-production micropile and one (1) production micropile. The remaining 80% will be paid on the satisfactory completion of the installation.

9.2 Primary/Structural Grout for Micropiles – Item

Payment at the Contract price for the above items shall be full compensation for all Labour, Equipment and Material required to do the work.

9.3 Pre-Production Micropile – Item

Payment at the Contract price for the above items shall be full compensation for all labour, load testing, equipment and material (including flush grout) required to do the work.

No payment will be made for micropiles that fail the load test.

For pre-production micropiles that fail the load test, payment for any additional work directed by the Contract Administrator shall be made as Extra Work.

No payment will be made for additional work for pre-production micropiles that fail to meet the Design Acceptance Criteria for Pre-Production Load Tests.

9.4 Production Micropile – Item

Payment at the Contract price for the above items shall be full compensation for all labour, equipment and material (including flush grout) required to do the work.

9.5 Production Micropile Testing – Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, equipment and materials required to do the work.

SP29 – CONCRETE IN STRUCTURES

OPSS.MUNI 904, November 2023, shall govern except as amended or extended herein.

904.01 SCOPE

Section 904.01 of OPSS 904 is amended by the addition of the following:

This specification also covers the requirements for the placement of tremie concrete on rockfill beneath the abutment footings, concrete curbs on structure, railing system concrete end walls, and EVA Foam

904.03 DEFINITIONS

Section 904.03 of OPSS 904 is amended by the addition of the following:

Ethylene Vinyl Acetate (EVA) Foam means a closed-cell, flexible cellular foam product with a low density, cross-linked copolymers, and containing ethylene vinyl acetate.

904.04 DESIGN AND SUBMISSION REQUIREMENTS

904.04.01.06 EVA Foam

Section 904.04 of OPSS 904 is amended by the addition of the following clause for the EVA foam:

A minimum of seven Days prior to installation, a product data sheet for the EVA foam to be used in the work shall be submitted to the Contract Administrator. The data sheet shall clearly identify that the supplied EVA foam meets the requirements of this specification.

904.05 MATERIALS

Section 904.05 of OPSS 904 is amended by the addition of the following subsection:

904.05.15 EVA Foam

EVA foam shall have a compression-deflection range of 34 to 90 kPa when compressed by 25% of its original thickness. The material does not require any specific resistance to the action of petroleum base oils. Adhesive shall be commercial construction grade as recommended by the EVA foam manufacturer and shall be compatible and appropriate for its intended use.

904.07 CONSTRUCTION

904.07.04.03 Pre-wetting

Clause 904.07.04.03 of OPSS 904 is amended by deleting the first paragraph in its entirety and replacing it with the following:

All concrete surfaces to receive concrete shall be maintained in a wet condition for a period of two (2) hours prior to placing any new concrete.

904.07.04.04 Bonding Agent

Clause 904.07.04.04 of OPSS 904 is deleted in its entirety and replaced with the following:

Bonding agents shall not be permitted. Existing concrete shall be saturated surface dry (SSD) at the time of placement.

Section 904.07 of OPSS 904 is amended by the addition of the following subsections:

904.07.20 Installation of EVA Foam

EVA foam shall be installed at locations specified on the Contract Drawings. EVA foam shall be uniformly attached to all fixed concrete surfaces by means of an adhesive. Adhesive for EVA foam installation shall be applied to concrete surfaces that are free of dust, dirt, debris, and loose concrete.

When EVA foam thickness specified in the Contract Drawings is greater than thickness commercially available, multiple layers of EVA foam may be used to meet the specified thickness. Multiple layers of EVA foam shall be fully bonded to each other using adhesive.

The minimum length of continuous EVA foam shall be the lesser of the element length or 1.2 m.

904.07.21 Preparation for Concrete Placement

Prior to the first concrete pour, the Contractor shall prepare appropriate concrete “wash-out” areas or sumps for discharge of extra/waste concrete and washing out of concrete delivery trucks. The location and construction of the “wash-outs” shall be subject to the approval of the Contract Administrator. The Contractor shall ensure that proper environmental controls are installed as required to ensure that concrete and cement laden wash-out water are not permitted to directly enter storm sewers, ditches or watercourses. All “wash-outs” shall be cleaned out/maintained as required with all hardened waste concrete disposed off-site. The Contractor shall ensure that all

concrete delivery truck drivers are informed of the “wash-out” areas and instructed to use them. Following completion of all concrete construction, all “wash-out” areas/sumps shall be removed and restored.

Prior to each pour, a Concrete Pour Form must be completed and signed by the Contractor, Contract Administrator, and other signatories as identified on the form. At the same time, the Contract Administrator will review with the Contractor’s superintendent, the placement, finishing, curing and protection procedures to be implemented for the pour and ensure that all required materials and equipment are on-site, prepared and functioning prior to commencing pour.

No concrete shall be placed without appropriate notification to the Contract Administrator (48 hours minimum) so as to permit adequate time for proper inspection of formwork and rebar, corrections/adjustments as required and to make arrangements for appropriate inspection staff to be on-site during the pour.

No water shall be added to the concrete once it has been delivered to site unless approved by the concrete supplier, subject to the conditions of OPSS.MUNI 1350 and CAN/CSA A23.1-19. The maximum water/cement ratio for the specified exposure class of concrete is not to be exceeded. Alternatively, slump and workability of the concrete may be adjusted if required through the site addition of a super-plasticizer at the discretion of the Engineer. Maximum slump after the addition of super-plasticizer shall not exceed 200 mm unless approved by the Engineer.

904.07.22 Early Loading of Structural Concrete

Full design loads shall not be applied to the structure until the specified 28-day compressive strength has been attained. Early loading of a structural component is not permitted unless expressly stated otherwise in the Contract Documents, subject to the following conditions:

- a) Prior to any early loading the Contractor shall demonstrate that the concrete has reached a compressive strength of 20MPa, by preparing, curing and transporting early strength cylinders, in addition to the cylinders required for 28-Day compressive strength, according to the Testing for Early Strength requirements of this specification.
- b) Subsequent placement of reinforcement, formwork, falsework and concrete on all other structural components shall not be carried out until the concrete has reached a compressive strength of 20MPa, unless otherwise specified in the Contract Documents.
- c) Early loading of concrete is not permitted where cold weather protection is required, with the exception of working slabs.
- d) Construction vehicles shall not be permitted on concrete that has not reached a compressive strength of 20MPa.
- e) Full curing is to be maintained at all times as specified in the Contract Documents, regardless of attainment of design strength prior to the end of the curing period.

904.08 QUALITY ASSURANCE

OPSS 904.08 is amended by the addition of the following:

The Contractor shall be responsible for field sampling and testing of concrete as follows:

- Slump, air content and temperature of plastic concrete;

- The making and curing of concrete cylinders for compressive tests;
- Transportation of the cylinders to the approved testing facilities; and
- All destructive testing including 7- and 28-day strength tests and all early breaks.

Compressive strength tests shall be undertaken at 7 and 28 days at a minimum. Any additional early strength testing shall be undertaken in accordance with OPSS 904.07.16 and this Special Provision.

Persons sampling and field-testing concrete shall have a card issued by the certifying agency in their possession verifying the status of the individual's certification.

904.10 BASIS OF PAYMENT

The heading for Section 904.10 of OPSS 904 is amended by the addition of the following:

904.10.01 Concrete in End Wall – Item

Subsection 904.10.01 is amended by the addition of the following:

Concrete placed in curbs on structures shall be considered incidental to the item Concrete in Deck.

SP30 – REINFORCING STEEL MECHANICAL CONNECTORS **REINFORCING STEEL BAR** **STAINLESS STEEL REINFORCING BAR** **STAINLESS STEEL MECHANICAL CONNECTORS**

OPSS.MUNI 905, November 2017, shall govern except as amended or extended herein.

905.04 SUBMISSION AND DESIGN REQUIREMENTS

Subsection 905.04.01.02.01 of OPSS 905 is amended by deleting the first paragraph and replacing it with the following:

At least three (3) weeks prior to commencing fabrication of reinforcing bars, the Contractor shall submit to the Engineer for review, six (6) copies of the shop (working) drawings and bar lists, conforming to the requirements of OPSS.MUNI 905. The Working Drawings shall include at least the following: quantity, bar size, grade, mark number, location, spacing for all steel reinforcement and type if applicable.

Subsection 905.04.01.02.02 of OPSS 905 is amended by deleting the first paragraph and replacing it with the following:

At least three (3) weeks prior to commencing fabrication of reinforcing bars, the Contractor shall submit to the Engineer for review, six (6) copies of the shop (working) drawings and bar lists, conforming to the requirements of OPSS.MUNI 905. The Working Drawings shall include at least the following: quantity, bar size, grade, mark number, location, spacing for all steel reinforcement and type if applicable.

905.05 MATERIAL

Subsection 905.05.01 of OPSS 905 is deleted in its entirety and replaced with the following:

Steel reinforcement shall be according to OPSS 1440, except that the grade of all reinforcing steel bars and stainless steel reinforcing bars shall be as specified in the Contract Drawings.

SP31 – BARRIER WALL RAILING

OPSS.MUNI 908, November 2022, shall govern except as amended or extended herein.

908.07 CONSTRUCTION

Subsection 908.07.02.01 of OPSS 908 is amended by deleting it in its entirety and replacing with the following:

Anchorage assemblies for curb mounted traffic railings shall be installed before concrete placement. All railing anchorages shall be installed using plywood templates prior to placing concrete.

908.07 BASIS OF PAYMENT

The basis of payment shall be in meter installed satisfactory to Contract Administrator

SP32 – COATING NEW STRUCTURAL STEEL

OPSS.MUNI 911, November 2022, shall govern except as amended or extended herein.

911.05 MATERIAL

Subsection 911.05.01 of OPSS 911 is amended by the addition of the following:

The paint coating shall be a Low VOC, three-coat Epoxy-Zinc / Epoxy / Polyurethane (EZEP) system, and shall be listed in the Ministry of Transportation Ontario's (MTO) Designated Sources for Materials (DSM) List # 9.20.39.

911.07 CONSTRUCTION

Subsection 911.07.03.07 of OPSS 911 is amended by the addition of the following:

The faying surface of a splice plate shall only be blast cleaned to SP6 but not coated. The primed faying surfaces of the girder and the primed exposed surfaces of splice plates shall be solvent cleaned, and power-tool cleaned to SP3 immediately prior to connection. Coatings damaged by the bolting operations shall be repaired accordingly to OPSS 911.

SP33 – BRIDGE DECK WATERPROOFING

MEMBRANE REINFORCEMENT

FORM AND FILL GROOVES

OPSS.MUNI.914, November 2014 shall govern except as amended herein.

The Contractor is hereby advised that the Owner invokes Appendix 914-B, November 2014 of OPSS 914. The supplementary requirements of Appendix 914-B shall apply to the Contract.

914.07 CONSTRUCTION

914.07.05 Membrane Reinforcement

Subsection 914.07.05 is amended by the addition of the following:

Membrane reinforcement shall be placed over all construction joints in the deck and over the joint between the deck and approach slab at both ends of the structure.

914.07.07 Form and Fill Grooves

Subsection 914.07.07 is amended by the addition of the following:

Form and fill grooves shall be installed above the joint between the deck and approach slab and at both ends of the structural approach slabs as detailed in the Contract Drawings.

Forming and filling of grooves shall be performed within 14 Days of surface course asphalt placement at the location of each groove.

SP34 – BEARINGS

OPSS PROV.922, November 2020, shall govern except as amended or extended herein.

922.01 SCOPE

Section 922.01 of OPSS 922 is amended by the addition of the following:

Work under this item shall include all labour, equipment and material to install the new abutment bearings and plain elastomeric bearing strips below approach slabs as detailed on the Contract Drawings.

922.02 REFERENCE

Section 922.02 of OPSS 922 is amended by the deletion of the following references:

MTO Forms:

PH-CC-701	Request to Proceed
PH-CC-702	Notice to Proceed

922.04 DESIGN AND SUBMISSION REQUIREMENTS

922.04.01 General

Subsection 922.04.01.01.01 of OPSS 922 is amended by the deletion of the first paragraph and replaced with the following:

At least three (3) weeks prior to commencing fabrication of the bearings, the Contractor shall submit to the Engineer for review, six (6) copies of the shop (working) drawings, conforming to the requirements of OPSS.MUNI 922.

A minimum of two (2) weeks prior to installation, the Contractor shall provide, from the bearing Manufacturer, all quality control documentation indicating measurements of the bearing dimensions, as well as documentation for all material tests indicated in Table 1 of the OPSS.MUNI 1202.

922.05 MATERIAL

922.05.01 Bearings

Subsection 922.05.01 of OPSS 922 is amended by the addition of the following:

All laminated elastomeric bearings shall be supplied from a manufacturer listed in the Ministry of Transportation Ontario's (MTO) Designated Sources for Materials (DSM) List # 9.15.25.

Shear Modulus testing shall be performed with the test specimen in an enclosed freezer unit capable of maintaining the specified conditioning temperature. A +/- 25 percent strain cycle shall be applied for a period of 100 seconds. The first three-quarter cycle of strain shall be discarded, and the shear modulus shall be determined by the slope of the force deflection curve for the next half cycle of loading.

922.07 CONSTRUCTION

922.07.01 General

Subsection 922.07.01 of OPSS 922 is amended by the addition of the following:

A Request to Proceed shall be submitted to the Contract Administrator upon completion of the installation of the bearings on the substructure and prior to any loading on the bearings. Any loading on the bearings shall not proceed until a Notice to Proceed has been received from the Contract Administrator. A Request to Proceed shall be submitted to the Contract Administrator after loading of the bearings, prior to opening to traffic.

Opening the bridge to traffic shall not proceed until a Notice to Proceed has been received from the Contract Administrator.

922.08 QUALITY ASSURANCE

Section 922.08 of OPSS 922 is deleted in its entirety and replaced with the following:

922.08.01 Testing

Not required.

The number, type, and size of elastomeric bearing samples to be selected for destructive testing shall be as specified in the Contract Documents.

GEOTECHNICAL REPORT

SECTION 6



GEMTEC

www.gemtec.ca

Geotechnical Investigation
Proposed Hamilton Island Bridge Replacement
Hamilton Island Road
Summerstown, Township of South Glengarry, Ontario

experience • knowledge • integrity



expérience • connaissance • intégrité



GEMTEC

www.gemtec.ca

Submitted to:

Mohawk Council of Akwesasne
101 Tewesateni Road
Akwesasne, Ontario
K6H 0G5

Geotechnical Investigation
Proposed Hamilton Island Bridge Replacement
Hamilton Island Road
Summerstown, Township of South Glengarry, Ontario

April 24, 2026
Project: 100118.005

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	BACKGROUND.....	1
2.1	Project Description.....	1
2.2	Site Geology	2
2.3	Previous Geotechnical Investigation by Others	2
3.0	METHODOLOGY	2
4.0	SUBSURFACE CONDITIONS.....	3
4.1	General.....	3
4.2	Sand	3
4.3	Glacial Till	4
4.4	Refusal	5
4.5	Surface Water Level	5
4.6	Estimated Hydraulic Conductivity.....	5
5.0	RECOMMENDATIONS AND GUIDELINES	6
5.1	General.....	6
5.2	Consequence and Site Understanding Classification	6
5.3	Foundations.....	7
5.3.1	Geotechnical Resistance	7
5.3.2	Resistance to Lateral Loads.....	8
5.3.3	Engineered Fill.....	8
5.3.4	Foundation Backfill	8
5.4	Lateral Earth Pressures for Design	8
5.5	Seismic Design	11
5.5.1	Site Seismicity, Importance Category	11
5.5.2	Liquefaction and Seismic Site Classification	11
5.5.3	Applicable Seismic Site Class	11
5.5.4	Seismic Performance Category	12
5.6	Groundwater and Surface Water Management.....	12
5.7	Foundations Excavations.....	13
5.8	Embankment Fill	13
5.9	Pavement Design and Recommendations	14
5.9.1	Existing and Anticipated Traffic Volumes	14
5.9.2	Design Sections.....	14
5.9.3	Pavement Structural Capacity Required	14
5.9.4	Pavement Design – Bridge Deck	15
5.9.5	Pavement Design – Approach Slabs.....	15

5.9.6	Pavement Design – Roadway Tie-In.....	15
5.9.7	Subgrade Preparation.....	16
5.9.8	Granular Material Compaction	16
5.9.9	Pavement Transitions	16
6.0	ADDITIONAL CONSIDERATIONS.....	17
6.1	Effects of Construction Induced Vibration	17
6.2	Excess Soil Management Plan.....	17
7.0	CLOSURE.....	18

LIST OF TABLES

Table 4.1 – Summary of Grain Size Distribution Tests (Sand).....	3
Table 4.2 – Summary of Grain Size Distribution Tests (Glacial Till).....	4
Table 4.3 – Summary of Groundwater Levels	5
Table 4.4 – Estimated Hydraulic Conductivity	6
Table 5.1 – Coefficients of Static Lateral Earth Pressure	9
Table 5.2 – Coefficients of Seismic Lateral Earth Pressure	10
Table 5.3 – Seismic Hazard Values for Site Class C	12

LIST OF FIGURES

Figure 1 – Site Plan

LIST OF APPENDICES

APPENDIX A	Record of Borehole Sheets
APPENDIX B	Laboratory Test Results
APPENDIX C	Previous Borehole Record
APPENDIX D	Estimated Hydraulic Conductivity
APPENDIX E	Supplemental Geotechnical Investigation Report

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation carried out for the proposed replacement of the bridge on Hamilton Island Road leading from County Road 2 onto Hamilton Island on the St. Lawrence River in Summerstown, Township of South Glengarry, Ontario.

The purpose of the investigation was to identify the general subsurface and groundwater conditions at the site by means of a limited number of boreholes and, based on the factual information obtained, to provide engineering guidelines on the geotechnical design aspects of the project.

Due to design changes for the proposed bridge foundations, a supplemental geotechnical investigation was requested to provide additional geotechnical design information. The results of the supplemental geotechnical investigation are provided in the report titled “Supplemental Geotechnical Investigation, Proposed Hamilton Island Bridge Replacement, Hamilton Island Road, Summerstown, Township of South Glengarry, Ontario”, in Appendix E.

In the event of any discrepancies or conflicts between the findings, interpretations, or recommendations presented in this original geotechnical report and those contained in the supplemental geotechnical investigation, the recommendations provided in the supplemental geotechnical investigation shall govern. The supplemental geotechnical investigation was prepared to reflect the revised foundation design and therefore supersedes the original geotechnical recommendations where differences exist.

This report is subject to the Conditions and Limitations of This Report, which follows the text of the report, and which are considered an integral part of the report.

2.0 BACKGROUND

2.1 Project Description

Plans are being prepared for a proposed replacement of the existing bridge crossing the St. Lawrence River channel on Hamilton Island Road in the Township of South Glengarry, Ontario.

The existing bridge is located just south of County Road 2 and consists of a single lane, single span with a length of about 10 metres. The bridge was constructed in 1930, according to the structural inspection report provided. The existing bridge deck is open steel grate supported by a beam and girder system. The abutments are understood to consist of wood cribs and concrete that have been sheathed in steel to retain the broken concrete. The abutments and approach slabs/roadway are showing visible signs of distress and are distorted and cracked and the steel superstructure is understood to be significantly corroded. The existing bridge has reached the end of its useful life.

A design is being prepared for the new bridge. It is understood that the span of the new bridge will be longer than the existing bridge and will accommodate two lanes of traffic. The configuration and structural details of the new bridge are still to be determined but it is understood the bridge will be located on a new alignment, to the east of the existing bridge, which will require in-water construction for new embankments and abutments.

2.2 Site Geology

A review of surficial geology maps and reported well records by the Ministry of the Environment, Conservation and Parks of Ontario (MECP) in the vicinity of the site indicates that the site is underlain by sandy glacial till. Bedrock geology maps indicate that the bedrock consists of sandstone, limestone, and shale of the Rockcliffe Formation at depths ranging from 5 to 10 metres below ground surface.

2.3 Previous Geotechnical Investigation by Others

A geotechnical investigation was previously carried out at the existing bridge site by St. Lawrence Testing & Inspection Co. Ltd in 2014. The findings of the investigation were presented in a report to the Mohawk Council of Akwesasne (MCA) titled “Geotechnical Subsurface Investigation, Mohawk Council of Akwesasne, Hamilton Island Bridge, Summerstown, ON”, dated August 31, 2014.

Two boreholes were advanced in 2014 at the approximate locations shown on the Site Plan, Figure 1. Descriptions of the subsurface conditions logged in the boreholes are provided on the Office Borehole Record Appendix C. The geotechnical report indicates that the subsurface conditions at the bridge abutments generally consist of 3 to 4 metres of cobble or gravel fill overlying loose to very dense native silt and sand deposits, with gravel. Auger refusal was encountered at a depth of about 11.6 metres below the existing ground surface.

3.0 METHODOLOGY

The fieldwork for the current geotechnical investigation was carried out from October 10 to October 12, 2023. During that time, three boreholes numbered 23-01 to 23-03 inclusive, were advanced to depths ranging from about 1.0 to 3.1 metres below the existing riverbed surface of the St. Lawrence River, at the approximate locations shown on the Site Plan, Figure 1.

The boreholes were advanced using a portable raft drill rig supplied and operated by Ohlmann Geotechnical Services (OGS) Inc. of Mississippi Mills, Ontario.

Casing was advanced in the boreholes within the overburden by the portable raft drill rig. Where obstructions were encountered within the overburden, the boreholes were advanced through the boulders using rotary diamond drilling techniques.

Standard penetration tests (SPT) were carried out in the boreholes, where possible, and samples of the soils encountered were recovered using a 50-millimetre diameter split barrel sampler.

The fieldwork was supervised by a member of our engineering staff who directed the drilling operations, logged the boreholes and samples, and carried out the in-situ testing.

Following the fieldwork, the soil samples were returned to our laboratory for examination by a geotechnical engineer. Selected samples of the soil were tested for water content and grain size distribution, where applicable.

The investigation point locations were selected by GEMTEC personnel and positioned at the site relative to existing site features. The locations and ground surface elevations of the investigation points were surveyed using our Trimble R10 GPS survey instrument. The elevation is referenced to geodetic datum NAD83 (CSRS) Epoch 2010, vertical network CGVD28.

4.0 SUBSURFACE CONDITIONS

4.1 General

Descriptions of the subsurface conditions logged in the boreholes are provided on the Record of Borehole Sheets in Appendix A. The results of the laboratory classification testing are provided on the Record of Borehole Sheets and in Appendix B.

The following sections provide a description of the subsurface conditions encountered in the boreholes advanced as part of this investigation.

4.2 Sand

Native deposits of sand with varying contents of gravel, silt, and clay were encountered at the riverbed surface in boreholes 23-01 and 23-03. The sand also contains wood fragments and organics. The sand sediment extends to depths of about 0.6 and 0.8 metres below the existing riverbed surface.

Standard penetration tests carried out in the sand gave N values of 4 and 5 blows per 0.3 metres of penetration, which indicates a loose relative density.

Grain size distribution tests were carried out on two samples of the sand. The results are provided in Appendix B and are summarized in Table 4.1.

Table 4.1 – Summary of Grain Size Distribution Tests (Sand)

Borehole ID	Sample Number	Sample Depth (metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
23-01	1	0 – 0.6	1	96		3

Borehole ID	Sample Number	Sample Depth (metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
23-03	1	0 – 0.6	12	64	18	6

The measured water contents of two samples of the sand were about 31 and 97 percent. The water content values may be due to the presence of organics in the sand.

4.3 Glacial Till

Native deposits of glacial till were encountered below the sand or at the riverbed surface, where encountered, in all the boreholes.

The glacial till is a heterogeneous mixture of all grain sizes, which at this site can be generally described as sand with varying contents of silt, gravel, and clay. The glacial till also contains cobbles and boulders, and boulders were encountered at depths of 0.6 and 1.5 metres below the existing riverbed surface in borehole 23-03. Standard penetration tests carried out in the glacial till gave N values ranging from 22 to greater than 50 blows per 0.3 metres of penetration, which indicates a compact to very dense relative density.

Grain size distribution tests were carried out on five samples of the glacial till. The results are provided in Appendix B and are summarized in Table 4.2.

Table 4.2 – Summary of Grain Size Distribution Tests (Glacial Till)

Borehole ID	Sample Number	Sample Depth (metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
23-01	2	0.8 – 1.2	3	67	25	5
23-03	3	0.9 – 1.0	10	28	29	33
23-03	3	1.0 – 1.5	45	36		19
23-03	5	1.8 – 2.4	11	44		45
23-03	6	2.4 – 3.1	6	52	29	13

The measured water content of five samples of the glacial till material ranged from about 13 to 25 percent.

4.4 Refusal

Sampler refusal was encountered in boreholes 23-01 and 23-02, at depths of about 1.6 and 1.0 metres below the existing riverbed surface, likely on boulders within the glacial till.

4.5 Surface Water Level

The elevations of surface water level of the St. Lawrence River at the borehole locations were measured upon drilling completion and are summarized in Table 4.3.

Table 4.3 – Summary of Groundwater Levels

Borehole ID	Surface Water Level Elevation (metres)	Date of Measuring
23-01	46.5	October 11, 2023
23-02	46.5	October 11, 2023
23-03	46.5	October 10, 2023

The surface water level may be higher during wet periods of the year such as the early spring or following periods of precipitation.

4.6 Estimated Hydraulic Conductivity

The hydraulic conductivity of the soil material represented by soil samples were estimated based on the grain size distribution results (i.e. hydrometer analysis) using HydrogeoSieve XL spreadsheet toolkit developed by the Department of Geology at the University of Kansas (version 2-3-9, dated April 11, 2023). The toolkit features up to 15 empirical relationships to estimate hydraulic conductivity based on the distribution of grain size analyses. It also compares the grain size distribution to limitations for each empirical relationship and highlights which solutions met suitability criteria and should be used for the hydraulic conductivity estimates. It should be noted that hydraulic conductivity estimates based on grain size should be considered as preliminary estimates and the results used as a tool to assess the variability and uncertainty between the empirical relationships. The summary datasheets from the hydraulic conductivity calculations are provided in Appendix D.

The soil samples, and corresponding relationships that met suitability criteria based on their grain size relationships are summarized in Table 4.4.

Table 4.4 – Estimated Hydraulic Conductivity

Borehole ID	Sample Number	Soil Description	Estimated Hydraulic Conductivity (metres per second)
23-01	2B	Glacial Till	Geomean ¹ : 2E-05 Range: 2E-07 to 1E-04
23-03	1	Sand	Geomean: 3E-05 Range: 4E-07 to 2E-04
23-03	3A	Glacial Till	Geomean: 8E-07 Range: 5E-09 to 3E-05
23-03	6	Glacial Till	Geomean: 7E-06 Range: 1E-07 to 7E-05

Notes:

1. Geomean: Geometric mean.

The estimated hydraulic conductivity for sand and glacial till are generally consistent with literature values, ranging from 10^{-2} to 10^{-6} and 10^{-6} to 10^{-12} metres per second (m/s), respectively (Freeze & Cherry, 1979). The hydraulic conductivity estimates for glacial till span several orders of magnitude, ranging from 10^{-9} to 10^{-4} m/s, highlighting the uncertainty associated with hydraulic conductivity estimates based on grain size distribution. The geometric mean results from the glacial till samples suggest that the estimated hydraulic conductivity is on the higher end of the ranges presented in literature values (i.e., closer to 10^{-6} m/s). In-situ hydraulic testing, e.g., slug tests in monitoring wells completed in the glacial till is recommended to refine the hydraulic conductivity estimates, if required.

5.0 RECOMMENDATIONS AND GUIDELINES

5.1 General

At the time of preparing this report, only limited, conceptual information was available to GEMTEC. The recommendations provided in the following sections may require review as the design of the project progresses and further details are made available to GEMTEC.

5.2 Consequence and Site Understanding Classification

In accordance with Section 6.5 of the 2019 Canadian Highway Bridge Design Code (CHBDC) (CSA S6:19) and its Commentary (CSA S6.1:19), the structure and its foundation system are classified as having a “typical consequence level” associated with exceeding limits states design. In addition, given the level of foundation investigation completed to date at this location in

comparison to the degree of site understanding in Section 6.5 of the 2014 CHBDC, the level of confidence for design is considered to be “typical degree of site and prediction model understanding.” Accordingly, the appropriate corresponding Ultimate Limit State (ULS) and Serviceability Limit State (SLS) consequence factor, ψ , from Table 6.1 and geotechnical resistance factors, ϕ_{gu} and ϕ_{gs} , from Table 6.2 of the CHBDC (2019) have been used for design.

5.3 Foundations

Based on the subsurface conditions encountered in the boreholes, as well as the previous boreholes at the existing bridge abutments in 2014, shallow foundations comprised of spread footings supported on the native soil or on a pad of compacted engineered fill placed on the native soil are recommended for the support of the proposed bridge abutments.

5.3.1 Geotechnical Resistance

Spread footings founded on the native glacial till or on a pad of compacted engineered fill above the native undisturbed soil may be considered for support of the proposed bridge abutments and wing walls.

The native sand is not considered to be suitable for support of the abutment footings and should be removed from within the abutment footprints. The abutments should also be founded below the potential freezing depth, which will depend on the water level at each abutment location but is assumed to be at least 1.5 metres below the river water level.

Foundations supported on the native glacial till or on a pad of engineered fill in this manner may be sized using a geotechnical resistance at SLS of 200 kilopascals and a factored geotechnical resistance at ULS of 400 kilopascals, respectively. The SLS and ULS values could be increased, however, additional subexcavation and replacement may be required depending on the size of foundations proposed.

The geotechnical resistance at ULS provide above is given for loads that will be applied perpendicular to the surface of the footings. Where the load is not applied perpendicular to the footing, inclination of the load should be taken into consideration in accordance with Section 6.10.4 of the 2014 CHBDC.

Provided that the subgrade surface and engineered fill are prepared as described in this report, the post construction total and differential settlement of the footings at SLS should be less than 25 and 15 millimetres, respectively.

Given the level of information on the proposed structures available at this time, the above recommendations should be considered to be preliminary. More detailed assessment of soil bearing capacity and potential foundation settlements can be provided once further details of the foundation design and structural configurations are known.

5.3.2 Resistance to Lateral Loads

Resistance to lateral forces or sliding resistance between the foundations and the subgrade should be calculated in accordance with Section 6.10.5 of the CHBDC (2014). For the interface between cast in place footings and the surface of the native glacial till and compacted engineered fill, unfactored coefficients of friction, $\tan \delta$, of 0.5 and 0.7, respectively, may be used for design.

5.3.3 Engineered Fill

In areas where the underside of footing level is above the level of the native soil or where subexcavation of soil is required, the grade below the proposed structures could be raised with granular material meeting Ontario Provincial Standard Specifications (OPSS) requirements for Granular A or Granular B Type II. The granular material should be compacted in maximum 200 millimetre thick lifts to at least 98 percent of the material's standard Proctor maximum dry density value using suitable vibratory compaction equipment. It should be noted that the specified densities may not be possible to achieve due to dewatering issues under surface water level of the river, as such, relatively well graded rockfill can also be used as engineered fill.

To provide adequate spread of load below the footings, the granular material should extend horizontally at least 0.5 metres beyond the edge of the footings and down and out from the edge of the footings at 1 horizontal to 1 vertical, or flatter. The excavation for the proposed structures should be sized to accommodate the placement of engineered fill. It is suggested that, for environmental reasons, any granular materials used below the founding level be composed of virgin material only (i.e., no crushed glass, ceramic, slag, or recycled asphaltic pavement).

5.3.4 Foundation Backfill

The native soils at this site are frost susceptible and should not be used as backfill against foundations/abutments or wing walls (if applicable).

To avoid frost adhesion and possible heaving, the foundations should be backfilled with imported, free-draining, not-frost susceptible granular material such as that meeting OPSS Granular B Type I or II requirements. Similarly, backfill to abutments or wing walls above ground should consist of OPSS Granular B Type I or II requirements for at least 1.8 metres back from the inside face of the structure. The backfill material should be compacted in maximum 300 millimetre thick lifts to at least 95 percent of the material's standard Proctor maximum dry density value using suitable vibratory compaction equipment.

5.4 Lateral Earth Pressures for Design

The lateral earth pressures acting on the abutment stem walls, and any associated wing walls or retaining walls will depend on the type and method of placement of the backfill material, the nature of the soils behind the backfill, the magnitude of surcharge including construction loadings, the freedom of lateral movement of the structure, and the drainage conditions behind the walls.

The following recommendations are made concerning the design of the abutment walls and associated retaining walls. These design recommendations and parameters assume level backfill and ground surface behind the walls. Where there is sloping ground behind the walls, the coefficient of lateral earth pressure must be adjusted to account for the slope.

- Select, free draining granular fill meeting the specifications of OPSS.MUNI 1010 (Aggregates) Granular A or Granular B Type II, but with less than 5 percent passing the 0.075-millimetre sieve size, should be used as backfill behind the walls;
- Longitudinal drains and weep holes should be installed to provide positive drainage of the granular backfill. Compaction (including type of equipment, target densities, etc.) should be carried out in accordance with OPSS.MUNI 501 (Compacting);
- Other aspects of the granular backfill requirements with respect to sub-drains and frost taper should be in accordance with OPSS 3121.150 (Walls, Retaining, Backfill, Minimum Granular Requirement);
- A minimum compaction surcharge of 12 kilopascal should be included in the lateral earth pressures for the structural design of the wall stem, in accordance with Section 6.12.3 and Figure 6.8 of the 2019 CHBDC. Other surcharge loadings should be accounted for in the design as required; and,
- The lateral earth pressures are based on the proposed embankment fill material and the parameters provided in Table 5.1.

Table 5.1 – Coefficients of Static Lateral Earth Pressure

Fill Type	Unit Weight (kilonewton per cubic metre)	Coefficient	
		At-Rest Earth Pressure Coefficient, K_o	Active Earth Pressure Coefficient, K_a
Granular A	21	0.43	0.27
Granular B Type II	22	0.43	0.27

Where the wall support does not allow lateral yielding, at-rest earth pressures should be assumed for the geotechnical design. Where the wall support allows lateral yielding of the stem, active earth pressures should be used in the geotechnical design of the wall structure(s). The movement required to allow active pressures to develop within the backfill, and thereby assume an unrestrained structure for design, should be calculated in accordance with Section C6.12.1 and Table C6.12 of the 2019 CHBDC.

Seismic (earthquake) loading must be taken into account in the design in accordance with Section 4.6 of the CHBDC. In this regard, the following should be included in the assessment of lateral earth pressures:

Seismic loading will result in increased lateral earth pressures acting on the wall. The wall should be designed to withstand the combined lateral loading for the appropriate static pressure conditions given above, plus the earthquake-induced dynamic earth pressure.

In accordance with Sections 4.6.5 and C.4.6.5 of the CHBDC and its Commentary, for structures which do not allow lateral yielding, the horizontal seismic coefficient (k_h) used in the calculation of the seismic active pressure coefficient is taken as 1.0 times the PGA (see Section 5.5 below). For structures which allow lateral yielding, (k_h) is taken as 0.5 times the PGA.

The following seismic active pressure coefficients in Table 5.2 may be used in design. It should be noted that these seismic earth pressure coefficients assume that the back of the wall is vertical and the ground surface behind the wall is flat. Where sloping backfill is present above the top of the wall, the lateral earth pressures under seismic loading conditions should be calculated by treating the weight of the backfill located above the top of the wall as a surcharge.

Table 5.2 – Coefficients of Seismic Lateral Earth Pressure

Fill Type	Seismic Earth Pressure Coefficient	
	Yielding Wall, K_{AE}	Non-Yielding Wall, K_{AE}
Granular A	0.40	0.57
Granular B Type II	0.35	0.50

The earthquake-induced dynamic pressure distribution, which is to be added to the static earth pressure distribution, is a linear distribution with maximum pressure at the top of the wall and minimum pressure at its toe (i.e., an inverted triangular pressure distribution). The total pressure distribution (static plus seismic) may be obtained as follows:

$$\sigma_h(d) = K_a \gamma d + (K_{AE} - K_a) \gamma (H-d), \text{ yielding walls}$$

$$\sigma_h(d) = K_o \gamma d + (K_{AE} - K_a) \gamma (H-d), \text{ non-yielding walls}$$

Where:

- $\sigma_h(d)$: Lateral earth pressure (static plus seismic) at depth d (kilopascal);
- K_a : Static active earth pressure coefficient;
- K_o : Static at-rest earth pressure coefficient;
- K_{AE} : Seismic active earth pressure coefficient;

- γ : Unit weight of the backfill soil (kilonewton per cubic metre), as given previously;
- d : Depth below the top of the wall (metre); and,
- H : Total height of the wall (metre).

5.5 Seismic Design

5.5.1 Site Seismicity, Importance Category

CHBDC states that the seismic hazard values associated with the design earthquakes should be those established for the National Building Code of Canada (NBCC) by the Geological Survey of Canada (GSC). The GSC has developed a new set of seismic hazard maps (referred to as the 5th generation seismic hazard maps) that were made available for public use in December 2015.

It is understood that the importance category for this bridge shall be “other” in accordance with Section 4.4.2 of the CHBDC.

5.5.2 Liquefaction and Seismic Site Classification

Potentially liquefiable soils, i.e., the loose sand sediment at the existing riverbed surface in boreholes 23-01 and 23-03, were encountered during the investigation.

Under seismic loading in saturated conditions (i.e., below the groundwater level), excess pore water pressures can develop in very loose to loose granular and sandy soils, which if sufficiently large, can bring about a reduction in soil strength and loss of stability, often termed liquefaction. Following liquefaction, the loose granular and sandy soils tend to compress into a denser state resulting in potentially large settlements occurring and soil can be ejected to the ground surface. Large lateral soil movement and embankment instability can also occur.

A simplified assessment of liquefaction risk has been carried out based on the results of the in-situ testing, the measured surface water levels at the borehole locations, and the estimated soil densities from laboratory testing. The assessment assumes that a layer of 2-metre fill material will be placed and compacted over the existing riverbed surface. The soils at this site are considered liquefiable during the 1 in 2,475-year seismic event.

The amount of liquefaction induced settlement is dependant on the groundwater level and the nature of the earthquake event considered. As a preliminary estimate, the amount of liquefaction induced settlement during an earthquake event may be up to 25 millimetres during the 1 in 2,475-year seismic event.

5.5.3 Applicable Seismic Site Class

Based on the 2012 Ontario Building Code (OBC), or the 2015 National Building Code (NBC), sites where liquefiable soils are present are assigned Site Class F. However, assuming the bridge foundations are supported on the native glacial till or on a pad of engineered fill placed on the native glacial till, Site Class C may be assumed for design of the structure.

5.5.4 Seismic Performance Category

In accordance with Section 4.4.3.1. of the CHBDC, the peak ground acceleration (PGA) values and design spectral acceleration values for Site Class C at this site are shown in Table 5.3.

Based on the above values and Table 4.10 of the CHBDC, the seismic performance category for this bridge would be 3 for a bridge with a fundamental period less than 0.5 seconds and 2 for a bridge with a fundamental period greater than 0.5 seconds.

From Table 4.11 in the CHBDC, a regular bridge of type “other” and a seismic performance category of 2 or 3 would require Force Based Design (FBD) as defined in the CHBDC.

Table 5.3 – Seismic Hazard Values for Site Class C

Seismic Hazard Values	2% Exceedance in 50 years (2,475 Return Period)
PGA (g)	0.375
Sa (0.2) (g)	0.589
Sa (0.5) (g)	0.309
Sa (1.0) (g)	0.148
Sa (2.0) (g)	0.068

5.6 Groundwater and Surface Water Management

Excavations for the proposed bridge foundation will likely be through the sand sediment and extend to or into the glacial till and the excavations for the abutments will be carried out below the water level of the St. Lawrence River. Assuming that the foundations are supported on the surface of the native glacial till, excavations to about 1.5 metres below the surface water level will be required based on the measured surface water level elevation of 46.5 metres and the lowest glacial till elevation of about 45.0 metres.

Excavations extending below the river water level will likely be very difficult to dewater since the native soils (i.e., the sand) below the surface water level are relatively permeable. A sheet pile cofferdam, or similar cut-offs will be required for construction below the river water level, or the construction will need to be carried out in the wet.

Construction dewatering requires permitting depending on the groundwater and surface water volumes pumped, with a Ministry of the Environment, Conservation and Parks (MECP) Environmental Activity and Sector (EASR) for groundwater pumping between 50,000 to 400,000 litres per day or a Category 3 Permit to Take Water (PTTW) for groundwater pumping over 400,000 litres per day. Ontario Regulation 387/04 states that construction related activities,

including bridge construction, repair, alteration, extension or replacement that involve the passive or active diversion of water within a watercourse to accommodate in-water construction activity are exempt from registration, provided they meet certain criteria. Additional comments can be provided as the plans for the bridge replacement are developed.

It is suggested that an excavation and surface water or groundwater management plan be submitted for review and approval as part of the contract.

5.7 Foundations Excavations

As indicated in the section above, dewatering of the sands to excavate to the founding level will be difficult and likely not practical. Excavations will therefore likely require some form of cut-off wall, extending through the sand layer, and/or the excavations will need to be carried out in the wet.

The existing embankment (indicated to be potentially constructed with gravel and cobbles and boulders) also extends along and near the foundation excavations and that embankment must remain in service during construction of the new bridge. The existing embankment is likely relatively permeable and will allow relatively high water flows. Dewatering to or below the surface of the sand level in the river using cofferdams placed on the river bottom, may also result in loss of support for the existing embankment due to piping and loss of sand.

In addition to the above, if the sand is excavated in the wet (i.e., without providing support and dewatering) side slopes of at least 3 horizontal to 1 vertical, or flatter, may be required. This also assumes that the excavation area is protected from currents (which would require cofferdams or similar).

Based on the above, it is therefore considered that for construction excavations for the abutment foundations, the most practical option may be short sections of sheet piling or similar steel plating that would extend to the surface of the glacial till. Conceptually, these could be driven in advance of excavation or placed prior to excavation, if suitably supported, and then advanced with the excavation. Concrete would be placed using tremie methods.

5.8 Embankment Fill

It is assumed that rockfill will be used for embankment construction. The post-construction embankment settlement should be less than 25 millimetres.

In order to reduce the loss of fines into the rockfill from the pavement structure, a 450-millimetre intermediate layer composed of 4 inch minus crushed rock is suggested to be placed between the rockfill and the pavement structure.

Due to the loose condition of the native sand, embankment side slopes of 2 horizontal to 1 vertical should be provided. Rockfill embankments with these side slopes will have factors of safety

against static and seismic (i.e., under the design earthquake loading) instability of greater than 1.5 and 1.1, respectively.

As previously noted, the relatively thin sand layer below the embankment may liquefy during the design earthquake and post-seismic event embankment settlements of up to 25 millimetres may occur.

5.9 Pavement Design and Recommendations

The following section discusses considerations for the pavement design of the Hamilton Island Bridge replacement.

5.9.1 Existing and Anticipated Traffic Volumes

Traffic information was not available at the time of this report. However, it is understood that there are 79 cottages on Hamilton Island and only 16 are used for the entire year. Furthermore, a school bus, supply trucks and snowplows will use the bridge routinely.

Using an average Truck Factor of 2.0 Equivalent Single Axle Loads (ESALs) per truck and estimating an average of five trucks per day, the anticipated 20-year ESAL count is approximately 110,000 when using 2 percent annual growth.

5.9.2 Design Sections

It is understood that as part of the bridge replacement, the roadway approaches will be paved 38 meters to the south and 80 meters to the north. A concrete approach slab will be installed on either side of the bridge.

Separate pavement designs are provided for the bridge deck, the approach slab, and the roadway tie-ins. If the bridge surface is proposed as exposed concrete, an alternative pavement design is presented for the approach slab. The surface material/type for the bridge deck is at the discretion of the structural engineer.

5.9.3 Pavement Structural Capacity Required

According to Tables 8-4 and 8-5 of MTO report MI-183, Hamilton Island Road may be considered a Local Road. The following AASHTO 93 design inputs were used to evaluate the required pavement structural capacity:

- Initial Serviceability, PSI = 4.2;
- Terminal Serviceability, PSI = 2.0;
- Overall Standard Deviation = 0.49;
- Design Reliability = 90 percent;
- Design Subgrade Modulus = 50 MPa (Silt, silty sand); and,
- 20-year Design ESALs = 110,000.

The required Structural Number (SN_{req}) to resist the anticipated vehicle loading was calculated to be 62 millimetres.

5.9.4 Pavement Design – Bridge Deck

If the bridge deck be surfaced with Hot Mix Asphalt (HMA), the following pavement structure should be placed upon the concrete deck:

- Two (2) lifts of 40 millimeters of Superpave 12.5 Traffic Category B with PG 58-34; over
- 10 millimeters of waterproofing membrane.

5.9.5 Pavement Design – Approach Slabs

The concrete approach slabs will extend from the expansion joint on either side of the bridge, as per the designs of the structural engineer.

To avoid a severe crack developing where the road pavement structure abuts the concrete approach slab, the pavement structure on the approach slab should be extended between three (3) to five (5) meters into the roadway.

5.9.5.1 Approach Slab with Hot Mix Asphalt Surfaced Bridge Deck

If the bridge deck is surfaced with HMA, the pavement thickness on the bridge deck should be continued on to the approach slab, omitting the waterproofing membrane. The concrete approach slab should be paved with the following HMA thicknesses:

- 40 millimeters of Superpave 12.5 Traffic Category B with PG 58-34; over
- 50 millimeters of Superpave 12.5 Traffic Category B with PG 58-34.

5.9.5.2 Approach Slabs with Exposed Concrete Bridge Deck

If the bridge deck is to remain exposed concrete, the approach slabs may receive the following HMA thickness:

- 50 millimeters of Superpave 12.5 Traffic Category B with PG 58-34.

5.9.6 Pavement Design – Roadway Tie-In

The roadway leading up to the approach slabs on either side of the bridge should receive the following pavement structure after reconstruction:

- 50 millimeters of Superpave 12.5 Traffic Category B with PG 58-34; over
- 150 millimeters of OPSS Granular A; over
- 300 millimeters of OPSS Granular B, Type II.

The resulting Structural Number (SN) of the design is 70 millimeters, which satisfies the SN required.

5.9.7 Subgrade Preparation

In preparation for reinstatement of portions of the roadway any soft, wet, deleterious material, or organic soil should be removed to the design subgrade elevation or a competent bearing surface, as required.

New or replacement subgrade materials may consist of suitable, compacted earth borrow that is similar to that exposed in adjacent subgrade areas, as directed by the geotechnical engineer, or material meeting the requirements of OPSS specifications for Granular B Type I or Granular B Type II and / or reuse of existing fill material which meets OPSS Granular B Type I (provided it is deemed acceptable for re-use from an environmental perspective).

In areas where abrupt changes in the frost susceptibility of the subgrade materials are encountered, frost tapers and / or some sub-excavation of materials may be required to avoid future localized differential frost heaving of the pavement structure. The frost taper and sub-excavation requirements should be assessed at the time of construction by geotechnical personnel.

The roadway subgrade surface should be made smooth and crowned or sloped prior to placing the granular materials to promote drainage of the roadway base and subbase materials.

Prior to placing granular material, the subgrade surface should be proof rolled with a large steel drum roller (i.e., 10 tonne or larger) under dry conditions, in the presence of the geotechnical engineer. Any soft areas should be sub-excavated and replaced with suitable materials described above.

5.9.8 Granular Material Compaction

All imported granular materials should be placed in maximum 150-millimetre-thick lifts and should be compacted to at least 99 percent of the Standard Proctor dry density value using suitable vibratory compaction equipment.

5.9.9 Pavement Transitions

As part of the roadway construction, it is anticipated that new pavement will abut the existing pavement at various locations. The following is suggested to improve the performance of the joint between the new and the existing pavements:

- Neatly saw cut the existing asphaltic concrete;
- Remove the asphaltic concrete and slope the bottom of the excavation within the existing granular base and subbase at 1 horizontal to 1 vertical (1H:1V), or flatter, to avoid undermining the existing asphaltic concrete;

- To avoid cracking of the asphaltic concrete due to an abrupt change in the thickness of the roadway granular materials where new pavement areas join with the existing pavements, the granular depths should taper up or down at 5 horizontal to 1 vertical (5H:1V), or flatter, to match the existing pavement structure; and,
- If the existing asphalt at the tie-in is greater than 80 mm thickness, remove (mill off) the existing asphaltic concrete to a depth matching the thickness of the new surface course recommended in this report (50 millimetres) to a distance of 300 millimetres at the joint and tack coat the asphaltic concrete at the joint in accordance with the requirements in OPSS 310. If the existing asphalt at the tie-in is less than 80 mm, a butt joint can be constructed.

6.0 ADDITIONAL CONSIDERATIONS

6.1 Effects of Construction Induced Vibration

Some of the construction operations (such as granular material compaction, excavation, etc.) will cause ground vibration on and off the site. The vibrations will attenuate with distance from the source but may be felt at nearby structures. Assuming that any excavating is carried out in accordance with the guidelines in this report, the magnitude of the vibrations will be much less than that required to cause damage to the nearby structures or services in good condition. Precondition surveys of the adjacent structures should be considered.

6.2 Excess Soil Management Plan

This report does not constitute an excess soil management plan. The disposal requirements for excess soil from the site have not been assessed. Consultation on this matter can be provided upon request.

7.0 CLOSURE

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.



Feitao Zeng, Ph.D., CEP
Geotechnical Analyst



William (Bill) Cavers, P.Eng.
Principal Geotechnical Engineer



FZ/AP/AB/JH/BC

Enclosures

N:\Projects\100100\100118.005\Technical Work\Reports\Geotechnical Report\100118.005_RPT_Geotechnical_2026-04-24_Rev2.docx

CONDITIONS AND LIMITATIONS OF THIS REPORT

1. **Standard of Care:** GEMTEC has prepared this report in a manner consistent with generally accepted engineering or environmental consulting practice in the jurisdiction in which the services are provided at the time of the report. No other warranty, expressed or implied is made.
2. **Copyright:** The contents of this report are subject to copyright owned by GEMTEC, save to the extent that copyright has been legally assigned by us to another party or is used by GEMTEC under license. To the extent that GEMTEC owns the copyright in this report, it may not be copied without our prior written agreement for any purpose other than the purpose indicated in this report. The methodology (if any) contained in this report is provided to the Client in confidence and must not be disclosed or copied to third parties without the prior written agreement of GEMTEC. Disclosure of that information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests.
3. **Complete Report:** This report is of a summary nature and is not intended to stand alone without reference to the instructions given to GEMTEC by the Client, communications between GEMTEC and the Client and to any other reports prepared by GEMTEC for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. GEMTEC cannot be responsible for use of portions of the report without reference to the entire report.
4. **Basis of Report:** This Report has been prepared for the specific site, development, design objectives and purposes that were described to GEMTEC by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this report expressly addresses the proposed development, design objectives and purposes. Any change of site conditions, purpose or development plans may alter the validity of the report and GEMTEC cannot be responsible for use of this report, or portions thereof, unless GEMTEC is requested to review any changes and, if necessary, revise the report.
5. **Time Dependence:** If the proposed project is not undertaken by the Client within 18 months following the issuance of this report, or within the timeframe understood by GEMTEC to be contemplated by the Client, the guidance and recommendations within the report should not be considered valid unless reviewed and amended or validated by GEMTEC in writing.
6. **Use of This Report:** The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without GEMTEC's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, GEMTEC may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process.

Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.
7. **No Legal Representations:** GEMTEC makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.
8. **Decrease in Property Value:** GEMTEC shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **Reliance on Provided Information:** The evaluation and conclusions contained in this report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of misstatements, omissions,

misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

10. **Investigation Limitations:** Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions but even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions.

The data derived from the site investigation program and subsequent laboratory testing are interpreted by trained personnel and extrapolated across the site to form an inferred geological representation and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Conditions between and beyond the borehole/test hole locations may differ from those encountered at the borehole/test hole locations and the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. Accordingly, GEMTEC does not warrant or guarantee the exactness of the subsurface descriptions.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

In addition, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

11. **Sample Disposal:** GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fill materials or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.
12. **Follow-Up and Construction Services:** All details of the design were not known at the time of submission of GEMTEC's report. GEMTEC should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of GEMTEC's report.
During construction, GEMTEC should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of GEMTEC's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in GEMTEC's report. Adequate field review, observation and testing during construction are necessary for GEMTEC to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, GEMTEC's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.
13. **Changed Conditions:** Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEMTEC be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that GEMTEC be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.
14. **Drainage:** Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. GEMTEC takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

N:\PROJECTS\100100118.005\DRAWING\1. DRAWINGS\SP R0100118.005_SP_R0_2023-10.DWG



KEY PLAN
1 : 75,000

LEGEND

BH #
XX.XX

BOREHOLE ID
RIVERBED SURFACE ELEVATION, IN METRES
GEODETIC DATUM

BOREHOLE LOCATION
(current investigation by GEMTEC)

APPROXIMATE BOREHOLE LOCATION
(previous investigation by St. Lawrence Testing & Inspection Co. Ltd., 2014)

GENERAL NOTE(S)

1. Coordinate system: NAD83, UTM ZONE 18
2. Distances, elevations, and coordinates are shown in metres unless denoted otherwise
3. All boundaries and dimensions are approximate
4. Contains information licensed under the Open Government Licence – Ontario
5. Maps Data: Google, @2023 CNES / Airbus, First Base Solutions, Maxar Technologies
6. Geographic dataset source: Ontario GeoHub

SCALE

1:1,000

DRAWING

SITE PLAN

CLIENT

MOHAWK COUNCIL OF AKWESASNE

PROJECT

GEOTECHNICAL INVESTIGATION
PROPOSED HAMILTON ISLAND BRIDGE REPLACEMENT
SUMMERTOWN, TOWNSHIP OF SOUTH GLENGARRY, ONTARIO

DRAWN BY
S.L.

CHECKED BY
F.Z.

PROJECT NO.
100118.005

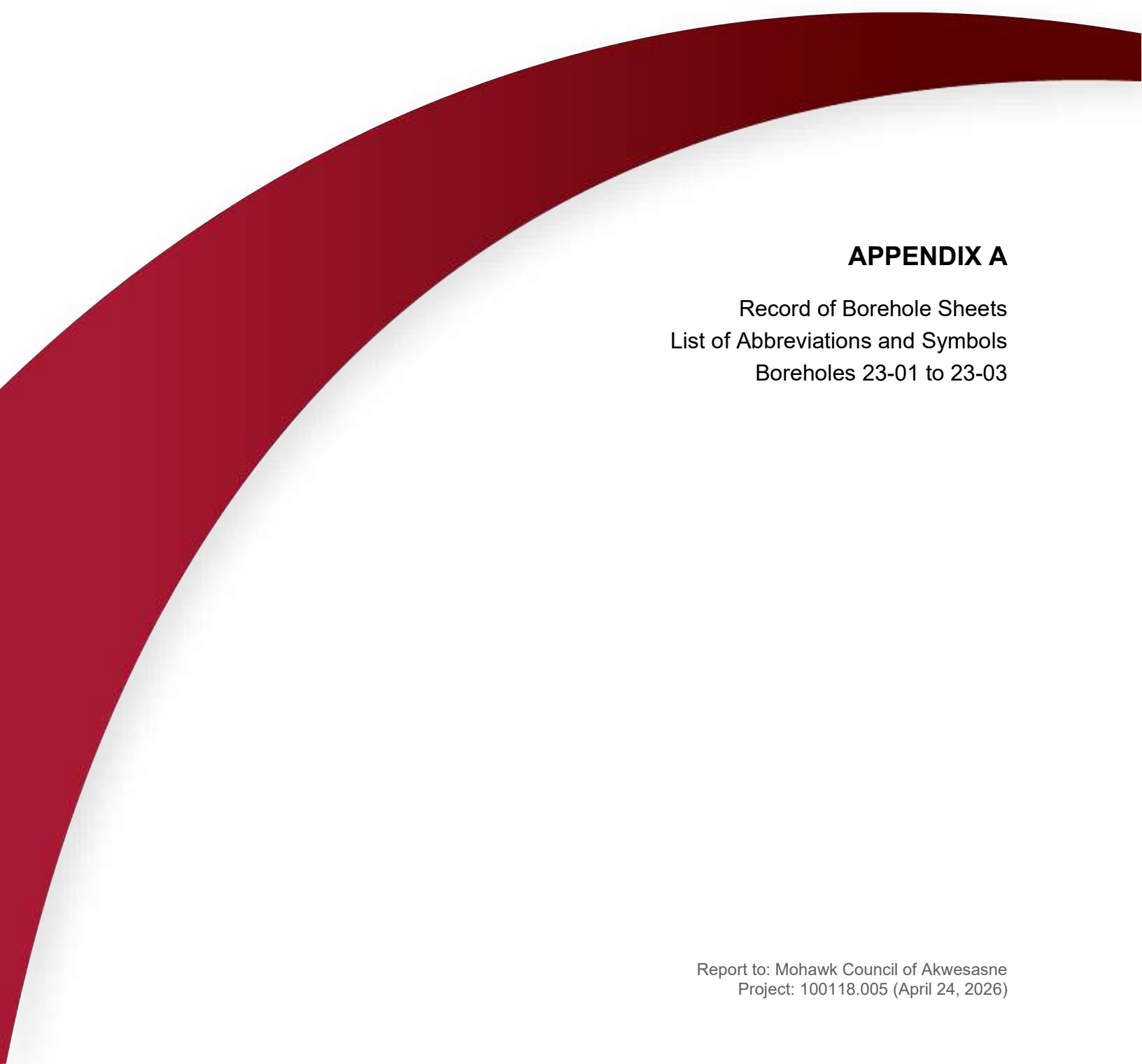
REVISION NO.
0

DATE
DECEMBER 2023

FIGURE NO.
FIGURE 1

GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS

32 Steacie Drive
Ottawa, ON, K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca



APPENDIX A

Record of Borehole Sheets
List of Abbreviations and Symbols
Boreholes 23-01 to 23-03

RECORD OF BOREHOLE 23-01

CLIENT: Mohawk Council of Akwesasne
 PROJECT: Geotechnical Investigation, Proposed Hamilton Island Bridge Replacement, Summerstown, Township of South Glengarry, Ontario
 JOB#: 100118.005
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Oct 11 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED WATER CONTENT, % W _p — W — W _L										ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m													
0	Casing Advance Casing (155mm OD)	Ground Surface		46.05																	
		Loose, dark grey to black SAND, trace gravel, trace silt, with organics			1	SS	180	4	●											M	
1		Very dense, grey brown SILTY SAND, trace gravel, trace clay, with cobbles and boulders (GLACIAL TILL)		45.29 0.76	2	SS	380	18	●											MH	
					3	SS	150	>50													
		End of Borehole Sampler Refusal		44.45 1.60																	
2																					
3																					
4																					
5																					

RECORD OF BOREHOLE 23-02

CLIENT: Mohawk Council of Akwesasne
 PROJECT: Geotechnical Investigation, Proposed Hamilton Island Bridge Replacement, Summerstown, Township of South Glengarry, Ontario
 JOB#: 100118.005
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Oct 11 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m										SHEAR STRENGTH (Cu), kPA										ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m										WATER CONTENT, %											
									10 20 30 40 50 60 70 80 90										Wp — W — Wl											
0	Casing Advance Casing (155mm OD)	Ground Surface		45.02																										
		Compact to very dense, grey brown SILTY SAND, some gravel, trace clay, with cobbles and boulders (GLACIAL TILL)			1	SS	150	29																						
					2	SS	50	>50																						
1		End of Borehole Sampler Refusal		44.05 0.97																										
2																														
3																														
4																														
5																														

RECORD OF BOREHOLE 23-03

CLIENT: Mohawk Council of Akwesasne
 PROJECT: Geotechnical Investigation, Proposed Hamilton Island Bridge Replacement, Summerstown, Township of South Glengarry, Ontario
 JOB#: 100118.005
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Oct 10 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED WATER CONTENT, % W_p — W — W_L										ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m													
0	Casing Advance Casing (155mm OD)	Ground Surface		45.60																	
		Loose, brown to black SAND, some gravel, some silt, trace clay, with wood fragments and organics			1	SS	150	5	●												MH
		Grey brown CLAYEY SAND and SILT, some gravel, with cobbles and boulders (GLACIAL TILL)		44.99 0.61	2	RC	150														MH
1		Grey brown GRAVEL and SAND, some silt, with cobbles and boulders (GLACIAL TILL)		44.58 1.02	3	SS	205	47			○										M
					4	RC	255														
2		Very dense, grey brown SILT and SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		43.77 1.83	5	SS	305	63			○										M
		Compact, grey brown SILTY SAND, some clay, trace gravel, with cobbles and boulders (GLACIAL TILL)		43.16 2.44	6	SS	150	22	○	●											MH
3		End of Borehole		42.55 3.05																	
4																					
5																					

GEO - BOREHOLE LOG_100118.005_GINT_BOREHOLE LOGS.GPJ GEMTEC 2018.GDT_2/11/23

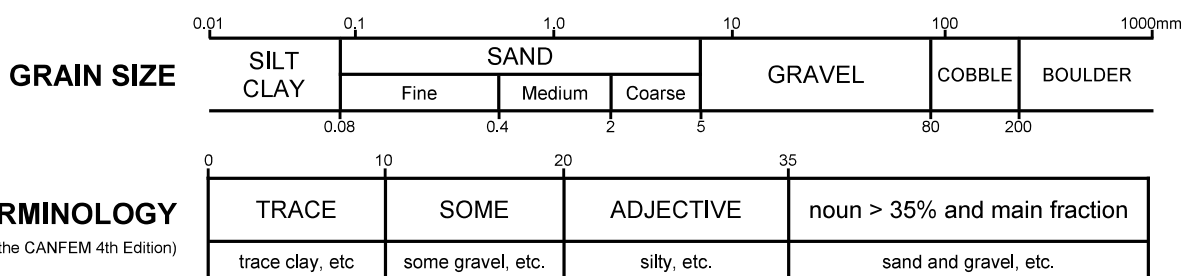
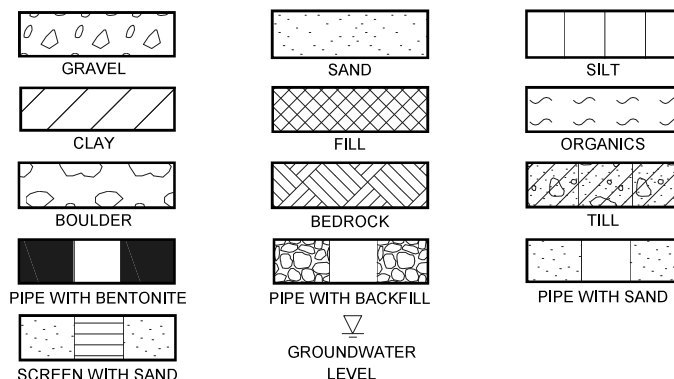
ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w_p	Plastic limit
LL, w_L	Liquid limit
C	Consolidation (oedometer) test
D_R	Relative density
DS	Direct shear test
G_s	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

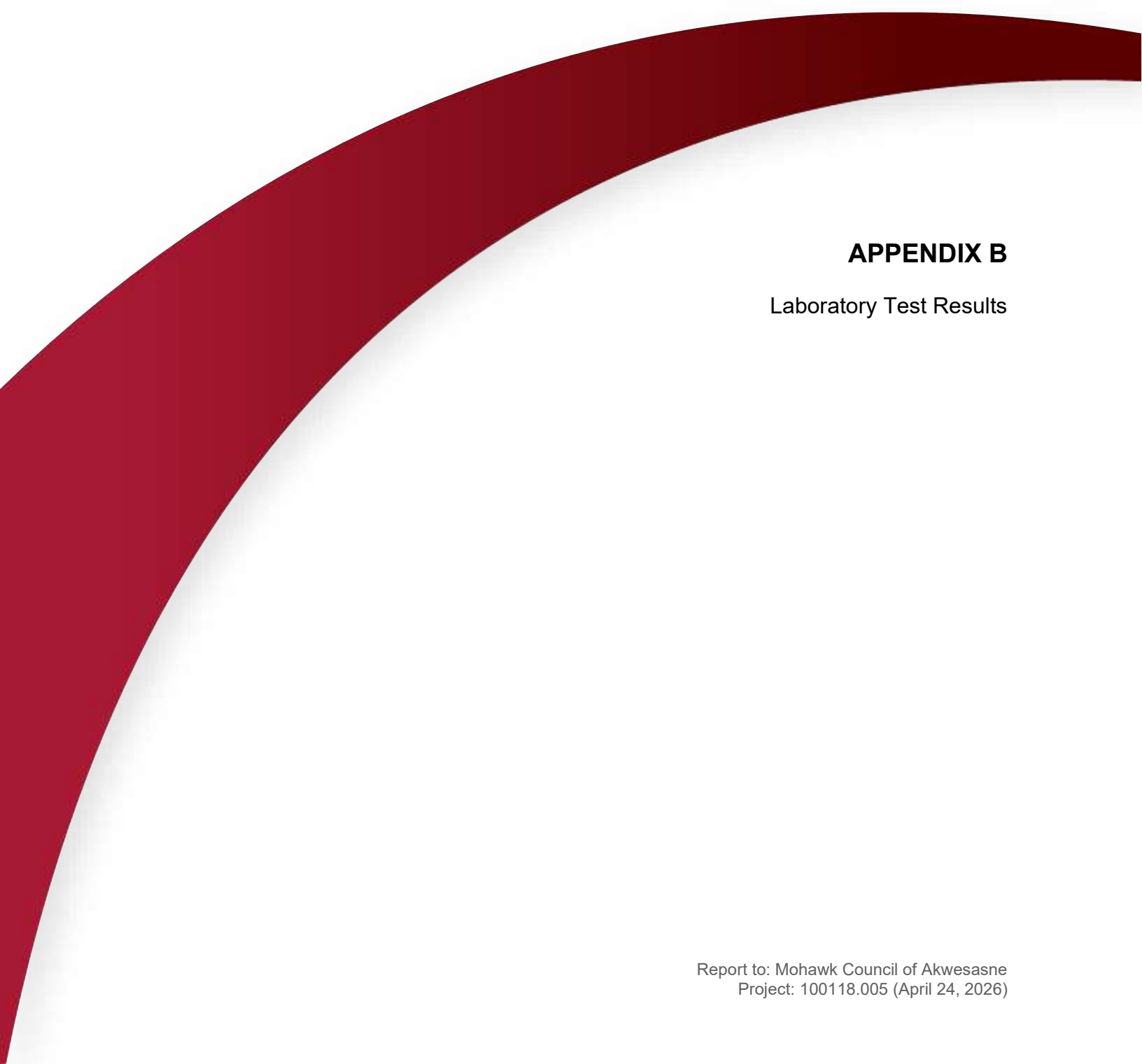
PENETRATION RESISTANCE	
Standard Penetration Resistance, N The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.	
Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).	
WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	Description	C_u , kPa	Description
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard



DESCRIPTIVE TERMINOLOGY

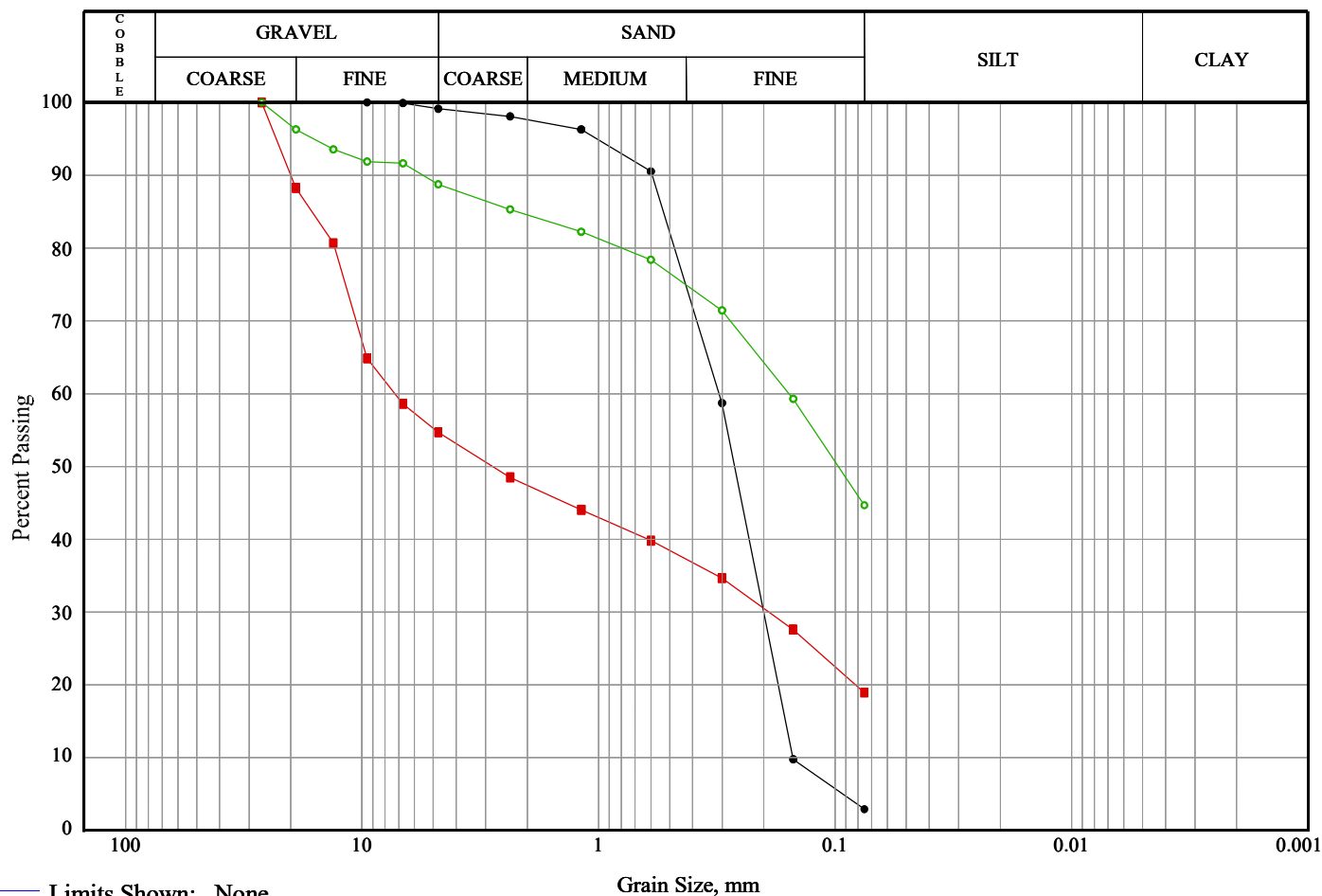
(Based on the CANFEM 4th Edition)



APPENDIX B

Laboratory Test Results

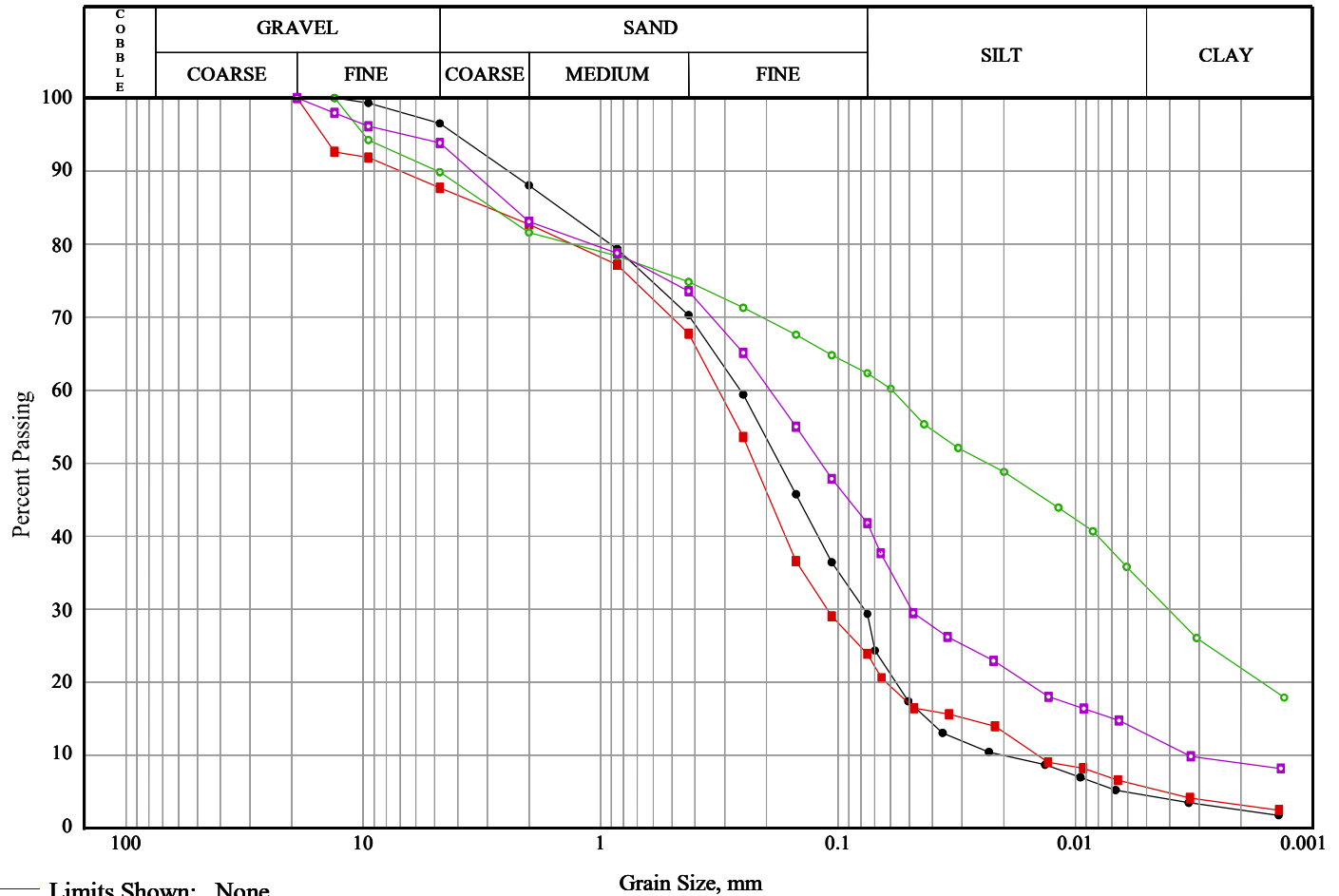
 GEMTEC CONSULTING ENGINEERS AND SCIENTISTS	Client: Mohawk Council of Akwesasne	Soils Grading Chart
	Project: Geotechnical Investigation, Hamilton Island Bridge, Sum	
	Project #: 100118005	



Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
—●—	SAND	23-01	01	0.0-0.61	0.9	96.2	2.9	
—■—	GLACIAL TILL	23-03	03B	1.02-1.52	45.3	35.8	18.9	
—○—	GLACIAL TILL	23-03	05	1.83-2.44	11.3	44.1	44.6	

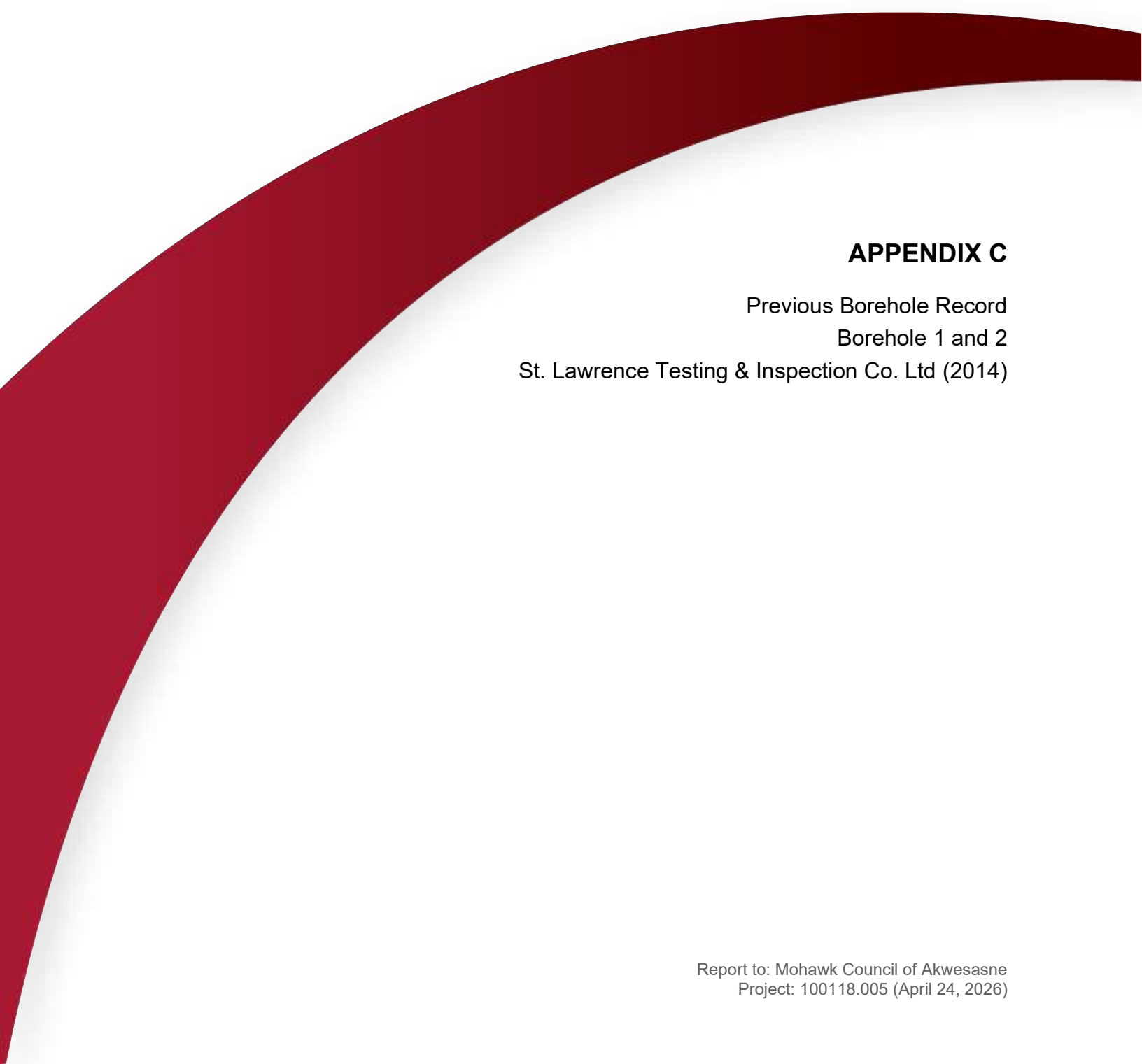
Line Symbol	CanFEM Classification	USCS Symbol	D ₁₀	D ₁₅	D ₃₀	D ₅₀	D ₆₀	D ₈₅	% 5-75µm
—●—	Sand , trace gravel, trace silt	SP	0.15	0.16	0.20	0.27	0.31	0.53	---
—■—	Gravel and sand , some silt	N/A	---	---	0.19	2.80	7.25	16.26	---
—○—	Silt and sand , some gravel	N/A	---	---	---	0.10	0.16	2.21	---

 GEMTEC CONSULTING ENGINEERS AND SCIENTISTS	Client: Mohawk Council of Akwesasne	Soils Grading Chart (LS-702/ ASTM D-422)
	Project: Geotechnical Investigation, Hamilton Island Bridge, Sum	
	Project #: 100118005	



Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
—●—	GLACIAL TILL	23-01	02B	0.76-1.22	3.5	67.2	24.9	4.5
—■—	SAND	23-03	01	0.0-0.61	12.3	63.8	18.3	5.6
—○—	GLACIAL TILL	23-03	03A	0.91-1.02	10.1	27.6	29.3	33.0
—□—	GLACIAL TILL	23-03	06	2.44-3.05	6.2	52.1	28.9	12.9

Line Symbol	CanFEM Classification	USCS Symbol	D ₁₀	D ₁₅	D ₃₀	D ₅₀	D ₆₀	D ₈₅	% 5-75µm
—●—	Silty sand , trace gravel, trace clay	N/A	0.02	0.04	0.08	0.18	0.26	1.48	24.9
—■—	Sand , some gravel, some silt , trace clay	N/A	0.01	0.03	0.11	0.22	0.32	2.99	18.3
—○—	Clayey sand and silt , some gravel	N/A	---	---	0.00	0.02	0.06	2.86	29.3
—□—	Silty sand , some clay , trace gravel	N/A	0.00	0.01	0.05	0.12	0.19	2.34	28.9



APPENDIX C

Previous Borehole Record
Borehole 1 and 2
St. Lawrence Testing & Inspection Co. Ltd (2014)



**St. Lawrence Testing
& Inspection Co. Ltd.**

OFFICE BOREHOLE RECORD

CLIENT Mohawk Council of Akwesasne

REPORT NO. 14C131

LOCATION Hamilton Island Bridge, Summerstown, ON

BOREHOLE NO. 1

DATE OF BORING July 29, 2014

DATE OF WL READING _____

CASING HF Auger

DATUM _____

SOIL PROFILE				SAMPLES				LABORATORY TESTS PERFORMED	LAB	TEST	RESULTS			
DEPTH	ELEVATION	DEPTH	SOIL DESCRIPTION	STRAT. PLT	WATER CONDITIONS	CONDITION	TYPE					NUMBER	RECOVERY	N - VALUE
0			50 mm. Asphalt Gravel Fill											
.51			Cobble Fill Brown, moist, compact with sand and gravel becoming wet below 2.1 m.											
2							SS	1	10	13				
3							SS	2	15	22				
4							SS	3	30	14				
5							SS	4	30	13				
6							SS	5	80	13				
7														
8							SS	6	25	17				
10							SS	7	40	29				
11							SS	8	60	20				
12							SS	9	70	61				
13							C			50 +				
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														
30														
31														
32														
33														
34														
35														
36														
37														
38														
39														
40														
41														
42														
43														
44														
45														
46														
47														
48														
49														
50														
51														
52														
53														
54														
55														
56														
57														
58														
59														
60														
61														
62														
63														
64														
65														
66														
67														
68														
69														
70														
71														
72														
73														
74														
75														
76														
77														
78														
79														
80														
81														
82														
83														
84														
85														
86														
87														
88														
89														
90														
91														
92														
93														
94														
95														
96														
97														
98														
99														
100														

APPENDIX

CLIENT Mohawk Council of Akwesasne

REPORT NO. 14C131

BOREHOLE NO. 2

LOCATION Hamilton Island Bridge, Summerstown, ON

CASING HF Auger

DATE OF BORING July 29, 2014

DATE OF WL READING

DATUM

[illegible]



APPENDIX D

Estimated Hydraulic Conductivity
HydrogeoSieve XL Spreadsheet Toolkit
Boreholes 23-01 and 23-03



K from Grain Size Analysis Report

Date: 25-Jan-24

Report Rub By:

Andrius Paznekas, GEMTEC

Sample Name:

BH23-01 SA02B

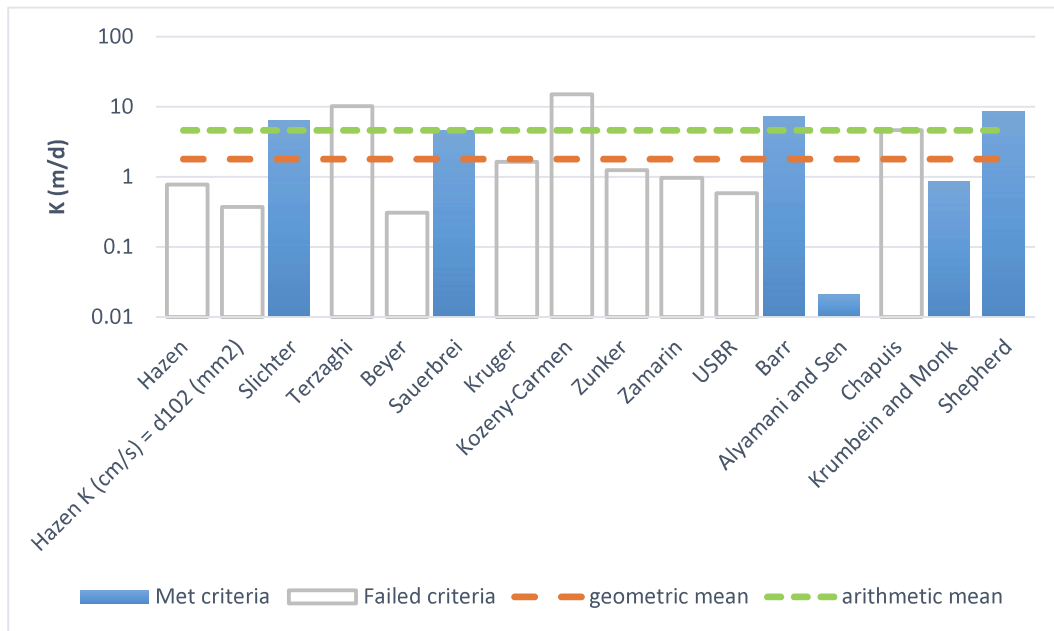
Mass Sample (g):

100

T (oC)

20

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen				
Hazen K (cm/s) = d ₁₀ (mm)				
Slichter	7E-03	7E-05	6E+00	
Terzaghi				
Beyer				
Sauerbrei	5E-03	5E-05	4E+00	
Kruger				
Kozeny-Carmen				
Zunker				
Zamarin				
USBR				
Barr	8E-03	8E-05	7E+00	
Alyamani and Sen	2E-05	2E-07	2E-02	
Chapuis				
Krumbein and Monk	1E-03	1E-05	9E-01	
Shepherd	1E-02	1E-04	9E+00	
geometric mean	2E-03	2E-05	2E+00	
arithmetic mean	5E-03	5E-05	5E+00	



K from Grain Size Analysis Report

Date: 25-Jan-24

Report Run By:

Andrius Paznekas, GEMTEC

Sample Name:

BH23-03 SA01

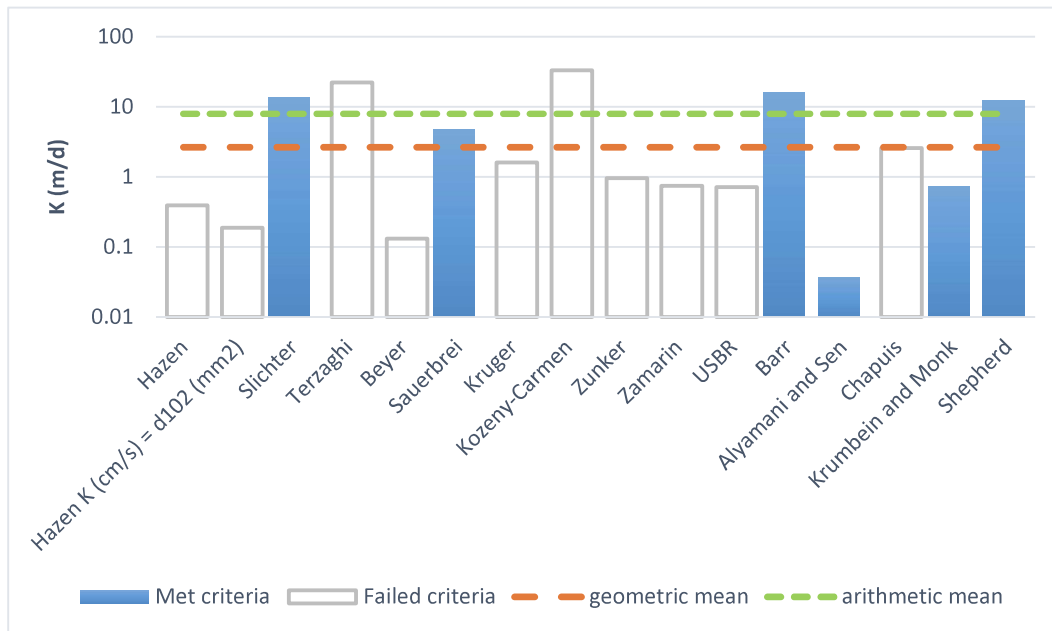
Mass Sample (g):

100

T (oC)

20

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen				
Hazen K (cm/s) = d ₁₀ (mm)				
Slichter	2E-02	2E-04	1E+01	
Terzaghi				
Beyer				
Sauerbrei	5E-03	5E-05	5E+00	
Kruger				
Kozeny-Carmen				
Zunker				
Zamarin				
USBR				
Barr	2E-02	2E-04	2E+01	
Alyamani and Sen	4E-05	4E-07	4E-02	
Chapuis				
Krumbein and Monk	8E-04	8E-06	7E-01	
Shepherd	1E-02	1E-04	1E+01	
geometric mean	3E-03	3E-05	3E+00	
arithmetic mean	9E-03	9E-05	8E+00	



K from Grain Size Analysis Report

Date: 25-Jan-24

Report Run By:

Andrius Paznekas, GEMTEC

Sample Name:

BH23-03 SA03A

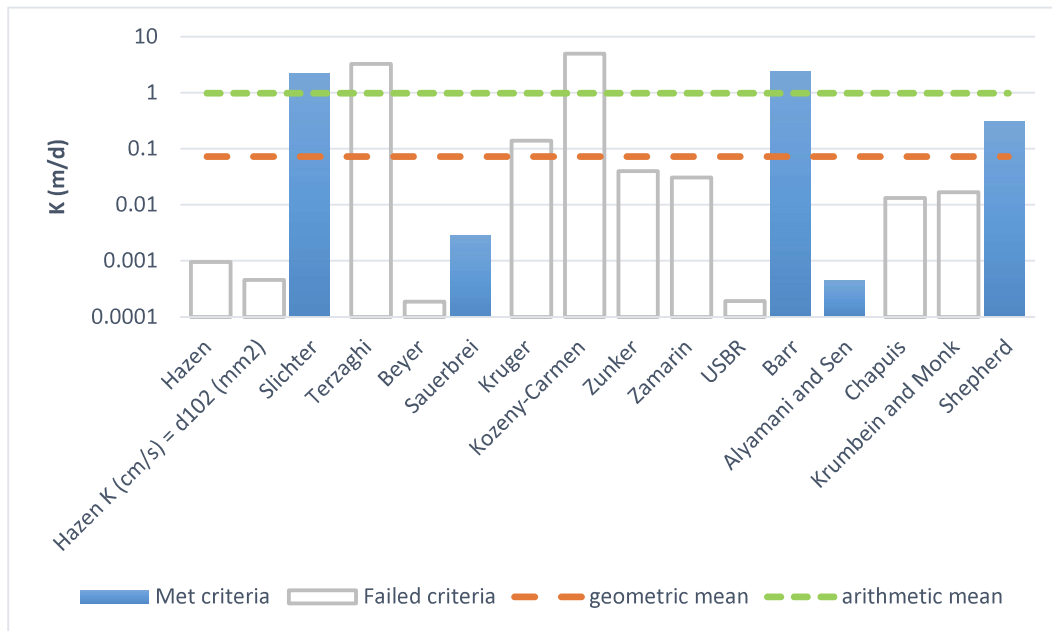
Mass Sample (g):

100

T (oC)

20

Poorly sorted sandy gravelly silt with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen				
Hazen K (cm/s) = d ₁₀ (mm)				
Slichter	3E-03	3E-05	2E+00	
Terzaghi				
Beyer				
Sauerbrei	3E-06	3E-08	3E-03	
Kruger				
Kozeny-Carmen				
Zunker				
Zamarin				
USBR				
Barr	3E-03	3E-05	2E+00	
Alyamani and Sen	5E-07	5E-09	4E-04	
Chapuis				
Krumbein and Monk				
Shepherd	4E-04	4E-06	3E-01	
geometric mean	8E-05	8E-07	7E-02	
arithmetic mean	1E-03	1E-05	1E+00	



K from Grain Size Analysis Report

Date: 25-Jan-24

Report Run By:

Andrius Paznekas, GEMTEC

Sample Name:

BH23-03 SA6

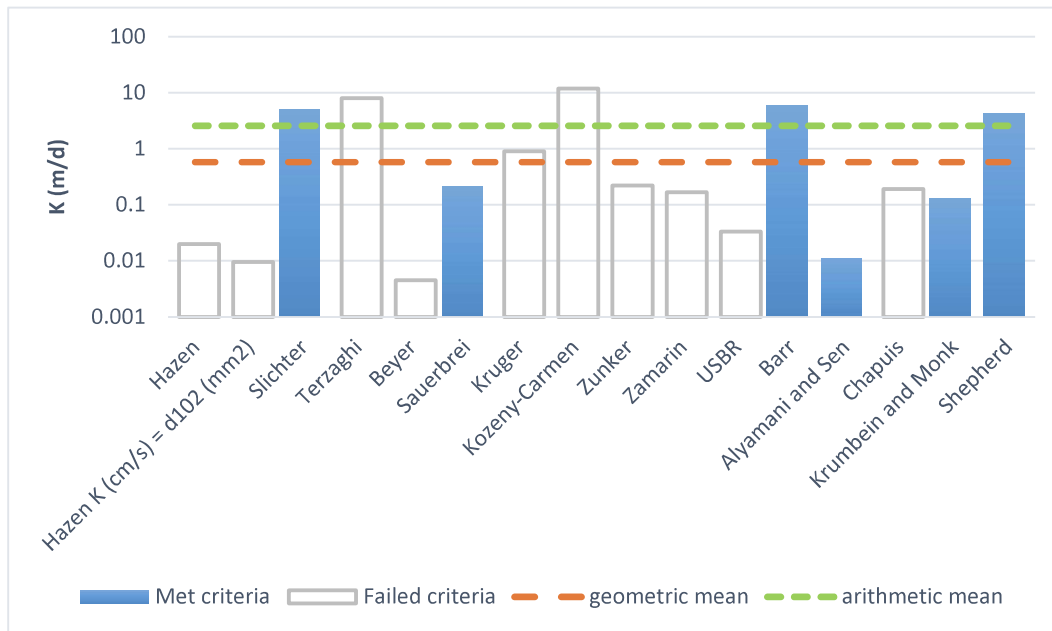
Mass Sample (g):

100

T (oC)

20

Poorly sorted gravelly sand low in fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen				
Hazen K (cm/s) = d ₁₀ (mm)				
Slichter	6E-03	6E-05	5E+00	
Terzaghi				
Beyer				
Sauerbrei	2E-04	2E-06	2E-01	
Kruger				
Kozeny-Carmen				
Zunker				
Zamarin				
USBR				
Barr	7E-03	7E-05	6E+00	
Alyamani and Sen	1E-05	1E-07	1E-02	
Chapuis				
Krumbein and Monk	1E-04	1E-06	1E-01	
Shepherd	5E-03	5E-05	4E+00	
geometric mean	7E-04	7E-06	6E-01	
arithmetic mean	3E-03	3E-05	3E+00	



APPENDIX E

Supplemental Geotechnical Investigation Report



GEMTEC

www.gemtec.ca

**Supplemental Geotechnical Investigation
Proposed Hamilton Island Bridge Replacement
Hamilton Island Road
Summerstown, Township of South Glengarry, Ontario**

experience • knowledge • integrity



expérience • connaissance • intégrité



GEMTEC

www.gemtec.ca

Submitted to:

Mohawk Council of Akwesasne
101 Tewesateni Road
Akwesasne, Ontario
K6H 0G5

**Supplemental Geotechnical Investigation
Proposed Hamilton Island Bridge Replacement
Hamilton Island Road**
Summerstown, Township of South Glengarry, Ontario

April 24, 2026
Project: 100118.005

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	BACKGROUND.....	1
2.1	Project Description.....	1
2.2	Original Geotechnical Investigation by GEMTEC (2023).....	1
2.3	Previous Geotechnical Investigation by Others (2014).....	1
3.0	METHODOLOGY	2
4.0	SUBSURFACE CONDITIONS.....	2
4.1	General.....	2
4.2	Existing Pavement Structure.....	3
4.3	Fill.....	3
4.4	Glacial Till	3
4.5	Bedrock	4
5.0	RECOMMENDATIONS AND GUIDELINES	5
5.1	General.....	5
5.2	Deep Foundations.....	5
5.2.1	General.....	5
5.2.2	Geotechnical Capacity	5
5.3	Embankment Construction.....	6
6.0	CLOSURE.....	8

LIST OF TABLES

Table 4.1 – Summary of Grain Size Distribution Test, Base/Subbase 3

Table 4.2 – Summary of Grain Size Distribution Test, Glacial Till.....4

Table 4.3 – Summary of Bedrock Depth and Elevation 4

Table 4.4 – Results of Compressive Strength Testing of Rock Core 4

LIST OF FIGURES

Figure 1 – Site Plan

LIST OF APPENDICES

Appendix A	Record of Borehole Sheets
Appendix B	Laboratory Test Results
Appendix C	Rock Core Compressive Strength Testing Results

1.0 INTRODUCTION

This report presents the results of a supplemental geotechnical investigation carried out for the proposed replacement of the bridge on Hamilton Island Road leading from County Road 2 onto Hamilton Island on the St. Lawrence River in Summerstown, Township of South Glengarry, Ontario.

The purpose of the investigation was to obtain additional subsurface conditions at the site by means of a borehole and, based on the factual information obtained, to provide additional engineering guidelines on the geotechnical design aspects of the project.

This report is subject to the Conditions and Limitations of This Report, which follows the text of the report, and which are considered an integral part of the report.

2.0 BACKGROUND

2.1 Project Description

Plans are being prepared for a proposed replacement of the existing bridge crossing the St. Lawrence River channel on Hamilton Island Road in the Township of South Glengarry, Ontario.

An original geotechnical investigation has been completed for the proposed bridge replacement by GEMTEC. However, due to the design changes for the proposed bridge foundations, a supplemental geotechnical investigation was required to provide additional geotechnical design information.

2.2 Original Geotechnical Investigation by GEMTEC (2023)

The original geotechnical investigation was previously carried out north of the existing bridge in 2023. Three boreholes were advanced in 2023 at the locations shown on the Site Plan, Figure 1. The geotechnical report indicates that the subsurface conditions on the north side of the existing bridge in the St. Lawrence River generally consist of 0.6 to 0.8 metres of loose sand overlying compact to very dense glacial till below the existing riverbed surface. Sampler refusal was encountered at depths of about 1.6 and 1.0 metres below the existing riverbed surface, likely on boulders within the glacial till.

2.3 Previous Geotechnical Investigation by Others (2014)

A geotechnical investigation was previously carried out at the existing bridge site by St. Lawrence Testing & Inspection Co. Ltd in 2014. The findings of the investigation were presented in a report to the Mohawk Council of Akwesasne (MCA) titled “Geotechnical Subsurface Investigation, Mohawk Council of Akwesasne, Hamilton Island Bridge, Summerstown, ON”, dated August 31, 2014.

Two boreholes were advanced in 2014 at the approximate locations shown on the Site Plan, Figure 1. The geotechnical report indicates that the subsurface conditions at the bridge abutments generally consist of 3 to 4 metres of cobble or gravel fill overlying loose to very dense native silt and sand deposits, with gravel. Auger refusal was encountered at a depth of about 11.6 metres below the existing ground surface.

3.0 METHODOLOGY

The fieldwork for the supplemental geotechnical investigation was carried out on February 20, 2026. One that day, one (1) borehole, numbered 26-01, was advanced at the location shown on the Site Plan, Figure 1.

The borehole was advanced using a truck mounted hollow stem auger drill rig supplied and operated by George Downing Estate Drilling Ltd. of Grenville-Sur-La-Rouge, Quebec.

The fieldwork was supervised by a member of our engineering staff who directed the drilling operations, logged the boreholes and samples, and carried out the in-situ testing. Standard penetration tests (SPT) were carried out in the borehole and samples of the soils encountered were recovered using a 50-millimetre diameter split barrel sampler. NQ sized rotary diamond drilling equipment was used to advance the borehole into the bedrock.

Following the fieldwork, the soil samples were returned to our laboratory for examination by a geotechnical engineer. Selected samples of the soil were tested for water content and grain size distribution. Selected samples of the bedrock cores were tested for unconfined compressive strength.

The borehole location was selected by GEMTEC personnel and positioned at the site relative to existing site features. The location and ground surface elevation of the borehole were surveyed using our Trimble R10 GPS survey instrument. The elevation is referenced to geodetic datum NAD83 (CSRS) Epoch 2010, vertical network CGVD2013.

4.0 SUBSURFACE CONDITIONS

4.1 General

Descriptions of the subsurface conditions logged in the borehole are provided on the Record of Borehole Sheets in Appendix A. The results of the laboratory classification testing are provided on the Record of Borehole Sheets and in Appendix B. The results of the rock core compressive strength testing are provided in Appendix C.

The following sections provide a description of the subsurface conditions encountered in the borehole advanced as part of this supplemental investigation.

4.2 Existing Pavement Structure

The existing pavement structure at borehole 26-01 consists of asphaltic concrete underlain by base/subbase.

The asphaltic concrete has a thickness of about 80 millimetres. The base/subbase is composed of gravelly silty sand. The base/subbase layer has a thickness of about 280 millimetres.

A grain size distribution test was carried out on one sample of the base/subbase. The results are provided in Appendix B and are summarized in Table 4.1. The measured water content of one sample of the base/subbase was about 8 percent.

Table 4.1 – Summary of Grain Size Distribution Test, Base/Subbase

Borehole ID	Sample Number	Sample Depth (metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
26-01	GS1	0.1 – 0.4	13	59		29

4.3 Fill

Fill was encountered below the existing pavement structure at borehole 26-01. The fill extends to a depth of about 4.6 metres below the existing ground surface.

The fill consists of silty sand and gravel, with cobbles and boulders. Standard penetration tests carried out in the fill gave N values greater than 50 blows per 0.3 metres of penetration, which is likely due to the presence of cobbles and boulders in the fill.

4.4 Glacial Till

Native deposits of glacial till were encountered below the fill at borehole 26-01. The glacial till consists of gravelly silty sand. The glacial till also contains cobbles and boulders. The glacial till extends to a depth of about 13.0 metres below the existing ground surface.

Standard penetration tests carried out in the glacial till gave N values ranging from 27 to 59 blows or greater than 50 blows per 0.3 metres of penetration which indicates a compact to very dense relative density. The SPT-N values greater than 50 may be due to the presence of cobbles and boulders in the glacial till.

A grain size distribution test was carried out on one sample of the glacial till. The results are provided in Appendix B and are summarized in Table 4.2. The measured water content of one sample of the glacial till was about 9 percent.

Table 4.2 – Summary of Grain Size Distribution Test, Glacial Till

Borehole ID	Sample Number	Sample Depth (metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
26-01	7	9.1 – 9.8	13	39		48

4.5 Bedrock

Bedrock was encountered at a depth of about 13.0 metres below the existing ground surface at borehole 26-01. The bedrock can be described as slightly weathered to fresh, thinly bedded to medium bedded, grey limestone. Shale interbeds were also found in the bedrock. A summary of the bedrock depth is provided in Table 4.3.

Table 4.3 – Summary of Bedrock Depth and Elevation

Borehole ID	Depth of Bedrock Surface (metres)	Elevation of Bedrock Surface (metres)
26-01	13.0	36.0

The recovered bedrock core samples had rock quality designation (RQD) values of 55 and 76 percent indicating fair to good quality rock.

The results of compressive strength testing carried out on two bedrock core samples indicate an unconfined compressive strength of 255 and 294 megapascals, which reflects a very strong rock. The results are provided in Appendix C and are summarized in Table 4.4.

Table 4.4 – Results of Compressive Strength Testing of Rock Core

Borehole ID	Sample Number	Depth (metres)	Length:Diameter Ratio (L/D) ¹	Unconfined Compressive Strength (MPa)	Strength Classification ²
26-01	RC8	13.6 – 13.8	1.97	294	Very Strong
26-01	RC9	15.3 – 15.4	1.96	255	Very Strong

Notes:

1. The values provided are corrected for non-standard L/D as appropriate.
2. The rock strength classification is based on Table 4.21 Canadian Foundation Engineering Manual 5th Edition, 2023.

A photograph of the bedrock core is presented in Figure C1 in Appendix C.

5.0 RECOMMENDATIONS AND GUIDELINES

5.1 General

At the time of preparing this report, only limited, conceptual information was available to GEMTEC. The recommendations provided in the following sections may require review as the design of the project progresses and further details are made available to GEMTEC.

5.2 Deep Foundations

5.2.1 General

The new bridge abutment could be supported on small diameter pile foundations, micropiles, socketed into bedrock. The following guidance for design of micropiles at this site may be considered:

- Piles should be drilled and socketed into bedrock. The bedrock surface was confirmed at an elevation of about 36.0 metres at borehole 26-01;
- Cobbles and boulders should be anticipated within the glacial till deposits. As such, difficult pile drilling conditions should be anticipated;
- Pile capacities at this site will depend on pile type, pile dimensions, and pile material;
- Pile load testing should be carried out to verify the pile geotechnical capacity such as to not cause structural damage to the piles (unless sacrificial piles are included);
- Provided the piles are on or within bedrock, ULS resistance will govern the design since the stresses required to induce Serviceability Limit State (SLS) criteria for piles terminated within bedrock will exceed those at ULS;
- Full time inspection of pile drilling and installation by qualified geotechnical personnel is recommended; and,
- The actual resistance that can be generated by the pile may be limited by other factors not considered in the assessment of the geotechnical resistance value.

5.2.2 Geotechnical Capacity

The maximum compression and tension loads applied at the top of the micropile must be resisted through grout to ground bond over a specific length of the micropile. This length is referred to as the bond zone or bond length. This length can be formed in most soil and rock strata with the major differences being in the grout to ground bond strength that can be developed in a given ground type. The objective for design is to evaluate the length of this bond zone required to resist the applied tension and compression loads with a prescribed factor of safety.

For preliminary design purposes, the allowable geotechnical bond capacity can be calculated using the following formula:

$$P_{bond} = \alpha_{bond} \times \phi \times \pi \times D_b \times L_b$$

where,

- α_{bond} = Grout to ground ultimate bond strength;
- ϕ = Resistance factor applied to the ultimate bond strength = 0.4;
- π = 3.14;
- D_b = Diameter of the drill hole; and,
- L_b = Bond length.

The allowable geotechnical bond capacity is equal to the maximum compression or tension load for design. It should be assumed that a Type A (gravity grout only) micropile will be constructed for micropile bond zones in bedrock.

Based on the bedrock condition obtained at borehole 26-01, a factored grout to ground ultimate bond strength of **1000 kilopascals (kPa)** can be used to calculate the estimated bond length in design.

5.3 Embankment Construction

Due to the subsurface conditions at the site, dewatering may be challenging and embankment construction is likely to be carried out in the wet.

Rockfill may be used for embankment construction. GEMTEC suggests using rockfill with a maximum particle size of 500 millimetres and with no more than 30% by weight passing the 0.425-millimetre sieve. The rockfill should be placed in accordance with the requirements in OPSS.PROV 206 and the maximum particle size adjacent to structures should be 250 millimetres as noted in the standard.

In order to reduce the loss of fines into the rockfill from the pavement structure, a 450-millimetre intermediate layer composed of 4 inch minus crushed rock is suggested to be placed between the rockfill and the pavement structure.

Armour rock (rock protection) is required for the embankment. However, the sizing and stability of the side slope armour rock will depend on flow velocity, ice impact forces, and the riprap slope angle to prevent stones from being washed away. The design calculations should be reviewed to confirm that the erosion and slope stability criteria are satisfied. The construction of rock protection can follow the completion of the rockfill core of the embankment.

Geotextile is not required during embankment construction to prevent the native sand at the bottom of the rockfill being washed away. However, to provide toe protection and prevent potential scour erosion of the riverbed, rap should be placed at the toe of the embankment. The rock size can be determined based on flow velocity and ice thickness. Due to limited information available to GEMTEC at the time of preparing this report, R200 rock material (with $W_{50} = 200$ kg) is recommended for this purpose. The construction of toe protection should be carried out after the completion of embankment.

The post-construction embankment settlement should be less than 25 millimetres.

Embankment side slopes of 1.5 horizontal to 1 vertical should be provided both below and above water level. Rockfill embankments with these side slopes will have factors of safety against static and seismic (i.e., under the design earthquake loading) instability of greater than 1.5 and 1.1, respectively.

Considering the water flow in the river, GEMTEC suggests that the construction be carried out during a period of low water levels and flow velocity in the river. Appropriate silt mitigation and protection measures will need to be provided during the embankment construction.

6.0 CLOSURE

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.



Feitao Zeng, Ph.D., CEP
Geotechnical Analyst



William (Bill) Cavers, P.Eng.
Principal Geotechnical Engineer



FZ/BC

Enclosures

N:\Projects\100100\100118.005\Technical Work\Reports\Supplemental Geotechnical Report\100118.005_RPT_Supplemental Geotechnical_2026-04-24_Rev1.docx

CONDITIONS AND LIMITATIONS OF THIS REPORT

1. **Standard of Care:** GEMTEC has prepared this report in a manner consistent with generally accepted engineering or environmental consulting practice in the jurisdiction in which the services are provided at the time of the report. No other warranty expressed or implied is made.
2. **Copyright:** The contents of this report are subject to copyright owned by GEMTEC, save to the extent that copyright has been legally assigned by us to another party or is used by GEMTEC under license. To the extent that GEMTEC owns the copyright in this report, it may not be copied without our prior written agreement for any purpose other than the purpose indicated in this report. The methodology (if any) contained in this report is provided to the Client in confidence and must not be disclosed or copied to third parties without the prior written agreement of GEMTEC. Disclosure of that information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests.
3. **Complete Report:** This report is of a summary nature and is not intended to stand alone without reference to the instructions given to GEMTEC by the Client, communications between GEMTEC and the Client and to any other reports prepared by GEMTEC for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. GEMTEC cannot be responsible for use of portions of the report without reference to the entire report.
4. **Basis of Report:** This Report has been prepared for the specific site, development, design objectives and purposes that were described to GEMTEC by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this report expressly addresses the proposed development, design objectives and purposes. Any change of site conditions, purpose or development plans may alter the validity of the report and GEMTEC cannot be responsible for use of this report, or portions thereof, unless GEMTEC is requested to review any changes and, if necessary, revise the report.
5. **Time Dependence:** If the proposed project is not undertaken by the Client within 18 months following the issuance of this report, or within the timeframe understood by GEMTEC to be contemplated by the Client, the guidance and recommendations within the report should not be considered valid unless reviewed and amended or validated by GEMTEC in writing.
6. **Use of This Report:** The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without GEMTEC's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, GEMTEC may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process.

Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety, and equipment capabilities.

7. **No Legal Representations:** GEMTEC makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.
8. **Decrease in Property Value:** GEMTEC shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **Reliance on Provided Information:** The evaluation and conclusions contained in this report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information

and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

10. **Investigation Limitations:** Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions but even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions.

The data derived from the site investigation program and subsequent laboratory testing are interpreted by trained personnel and extrapolated across the site to form an inferred geological representation and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Conditions between and beyond the borehole/test hole locations may differ from those encountered at the borehole/test hole locations and the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. Accordingly, GEMTEC does not warrant or guarantee the exactness of the subsurface descriptions.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

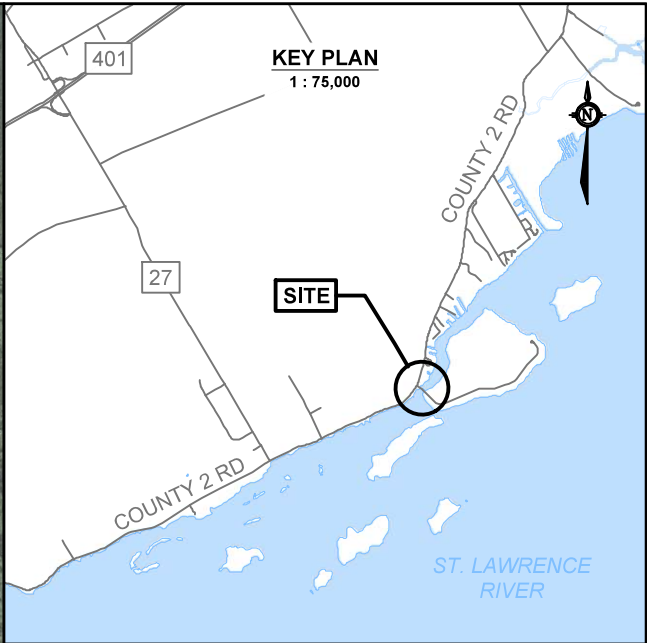
In addition, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

11. **Sample Disposal:** GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fill materials or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.
12. **Follow-Up and Construction Services:** All details of the design were not known at the time of submission of GEMTEC's report. GEMTEC should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of GEMTEC's report.

During construction, GEMTEC should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of GEMTEC's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in GEMTEC's report. Adequate field review, observation and testing during construction are necessary for GEMTEC to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, GEMTEC's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

13. **Changed Conditions:** Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEMTEC be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that GEMTEC be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.
14. **Drainage:** Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. GEMTEC takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

N:\PROJECTS\1001100118\005\DRAWING\1. DRAWINGS\SSP R0\100118.005_SSP_R0_2026_02.DWG

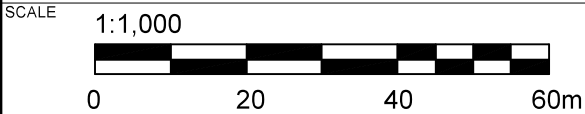


LEGEND

- BH #** — BOREHOLE ID
XX.XX — RIVERBED OR GROUND SURFACE ELEVATION, IN METRES GEODETIC DATUM
- BOREHOLE LOCATION**
(current investigation by GEMTEC)
- BOREHOLE LOCATION**
(previous investigation by GEMTEC, 2023)
- APPROXIMATE BOREHOLE LOCATION**
(previous investigation by St. Lawrence Testing & Inspection Co. Ltd., 2014)

GENERAL NOTE(S)

1. Coordinate system: NAD83, UTM ZONE 18
2. Distances, elevations, and coordinates are shown in metres unless denoted otherwise
3. All boundaries and dimensions are approximate
4. Contains information licensed under the Open Government Licence – Ontario
5. Maps Data: Google, @2023 CNES / Airbus, First Base Solutions, Maxar Technologies
6. Geographic dataset source: Ontario GeoHub



DRAWING

SITE PLAN

CLIENT

MOHAWK COUNCIL OF AKWESASNE

PROJECT

**SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
PROPOSED HAMILTON ISLAND BRIDGE REPLACEMENT
SUMMERSTOWN, TOWNSHIP OF SOUTH GLENGARRY, ONTARIO**

DRAWN BY	S.L.	CHECKED BY	F.Z.
PROJECT NO.	100118.005	REVISION NO.	0
DATE	MARCH 2026	FIGURE NO.	FIGURE 1



APPENDIX A

Record of Borehole Sheets
GEMTEC's Method of Soil Classification
List of Abbreviations and Symbols
Borehole 26-01

RECORD OF BOREHOLE 26-01

CLIENT: Mohawk Council of Akwesasne
 PROJECT: Supplemental Geotechnical Investigation, Proposed Hamilton Island Bridge Replacement, Summerstown, Ontario
 JOB#: 100118.005
 LOCATION: See Site Plan, Figure 1

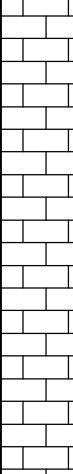
SHEET: 1 OF 2
 DATUM: CGVD2013
 BORING DATE: Feb 20 2026

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED		WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m						
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		49.05									M	Asphalt cold patch
		ASPHALTIC CONCRETE		0.08	1	GS			○					
		BASE/SUBBASE - (SM) gravelly silty sand; dark brown; non-cohesive, moist		48.69										
		FILL - (SM) silty sand and gravel; with cobbles and boulders; brown; non-cohesive, moist		0.36										
1														
2					2	SS	125	>50						
3					3	SS	75	>50						
4														
5		(SM) gravelly SILTY SAND; with cobbles and boulders; grey (GLACIAL TILL); non-cohesive, moist to wet, compact to very dense		44.48	4	SS	0	>50						
				4.57										
6					5	SS	50	>50					M	Native backfill
7														
8					6	SS	380	27	●					
9														
10					7	SS	380	59	○	●				
				39.05										

RECORD OF BOREHOLE 26-01

CLIENT: Mohawk Council of Akwesasne
 PROJECT: Supplemental Geotechnical Investigation, Proposed Hamilton Island Bridge Replacement, Summerstown, Ontario
 JOB#: 100118.005
 LOCATION: See Site Plan, Figure 1

SHEET: 2 OF 2
 DATUM: CGVD2013
 BORING DATE: Feb 20 2026

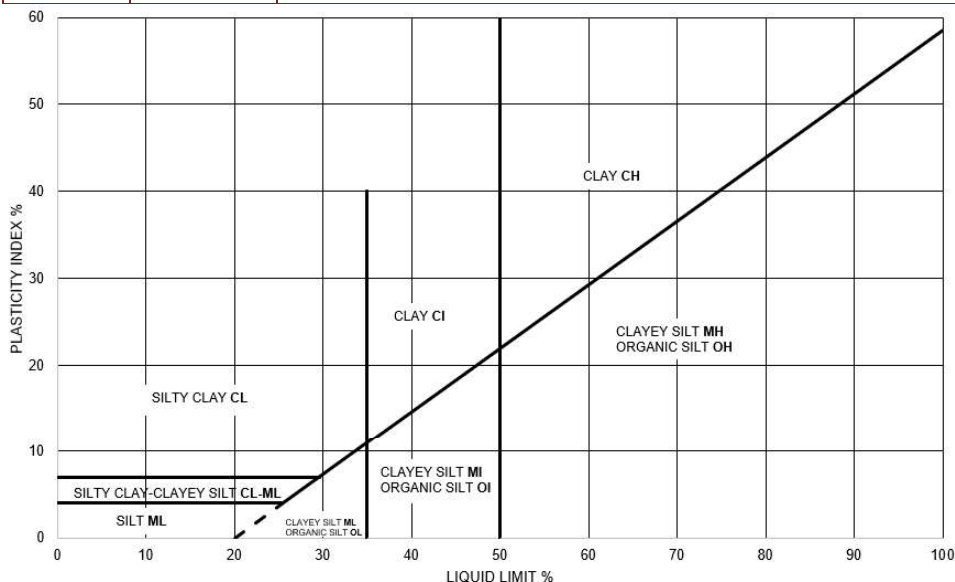
DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPA		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	● PENETRATION RESISTANCE (N), BLOWS/0.3m	▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	+ NATURAL ⊕ REMOULDED				
											WATER CONTENT, %				
10	Power Auger Hollow Stem Auger (210mm OD)	(SM) gravelly SILTY SAND; with cobbles and boulders; grey (GLACIAL TILL); non-cohesive, moist to wet, compact to very dense		10.00											
11															
12															
13	Diamond Rotary Core NQ (70mm OD)	Slightly weathered to fresh, grey LIMESTONE, with shale interbeds, thinly bedded to medium bedded, very strong BEDROCK - Sub-vertical discontinuity from 14.1 m to 14.2 m depth		36.04 13.01											
14				8	RC		TCR = 97%; SCR = 72%; RQD = 76%								
15															
16															
17		End of Borehole		32.82 16.23											
18															
19															
20															

GEO - BOREHOLE LOG 100118.005 GINT - BOREHOLE LOGS 2026.GPJ GEMTEC 2018.GDT 13/3/26

Method of Soil Classification

GEMTEC's Soil Classification is based on the MTC Soil Classification Manual (January 1980)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	USCS Group Symbol	Group Name		
Inorganic (Organic Content less than 30%)	Coarse Grained Soils (>50% is larger than 0.075 mm)	Gravel (>50% of coarse fraction is > 4.75 mm)	Gravel with ≤12% fines	Poorly Graded	<4	≤1 or ≥3	GP	Gravel		
				Well Graded	≥4	1 to 3	GW	Gravel		
			Gravel with >12% fines	Below A Line	N/A		GM	Silty Gravel		
				Above A Line	N/A		GC	Clayey Gravel		
		Sand (≥50% coarse fraction is > 4.75 mm)	Sand with ≤12% fines	Poorly Graded	<6	≤1 or ≥3	SP	Sand		
				Well Graded	≥6	1 to 3	SW	Sand		
			Sand with >12% fines	Below A Line	N/A		SM	Silty Sand		
				Above A Line	N/A		SC	Clayey Sand		
			Soil Group	Type of Soil	Liquid Limit	Field Tests			USCS Group Symbol	Group Name
						Dilatancy	Thread Diameter	Toughness		
	Fine Grained Soils (≥50% is smaller than 0.075 mm)	Silts (Non-Plastic or PI and LL plot below A- Line)	<50	Rapid	>6 mm	N/A	ML	Silt		
				Slow	3 to 6 mm	None to low	ML	Clayey Silt		
				Slow to V. Slow	3 to 6 mm	Low	OL	Organic Silt		
			≥50	Slow to V. Slow	3 to 6 mm	Low to Medium	MH	Clayey Silt		
				None	1 to 3 mm	Medium to High	OH	Organic Silt		
			Clays (PI and LL plot above A-Line)	Liquid Limit <35	None	~3 mm	Low to Medium	CL	Silty Clay	
		Liquid Limit 35 to 50		None	1 to 3 mm	Medium	CI	Silty Clay		
		Liquid Limit >50		None	<1 mm	High	CH	Clay		
		Highly Organic (> 30%)	Peat (Amorphous or Fibrous)						PT	Peat



Dual Symbol – Is used to indicate when soils are transitional. For coarse grained soils, it is used when the soil has between 5 and 12% fines (e.g., SP-SC, Sand to Silty Sand). For fine-grained soils it is used when the plasticity index and liquid limit values plot in the area shown in the plasticity chart on this page.

Borderline Symbol – Is used to indicate soils that are not clearly in one soil type but have similar behaviour and properties as similar materials (e.g., CL/CI or GM/SM).

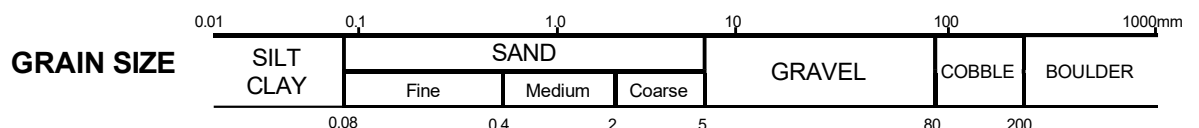
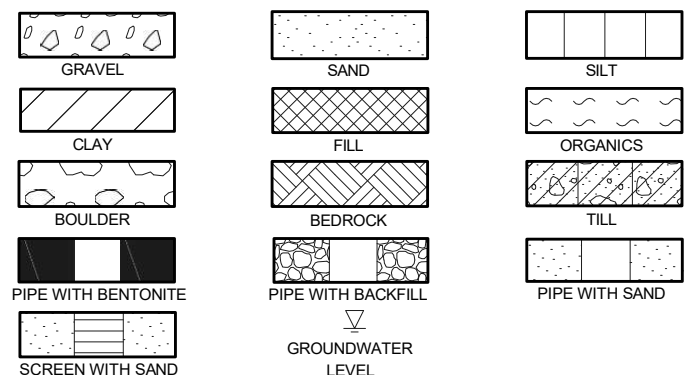
ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w _p	Plastic limit
LL, w _L	Liquid limit
C	Consolidation (oedometer) test
D _R	Relative density
D _S	Direct shear test
G _s	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

PENETRATION RESISTANCE	
Standard Penetration Resistance, N The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.	
Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).	
WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	Description	Cu, kPa	Description
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard



DESCRIPTIVE TERMINOLOGY

TRACE	SOME	ADJECTIVE	noun > 30% and main fraction
trace clay, etc	some gravel, etc.	silty, etc.	sand and gravel, etc.

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERING STATE	
Fresh	No visible sign of rock material weathering
Faintly weathered	Weathering limited to the surface of major discontinuities
Slightly weathered	Penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material
Moderately weathered	Weathering extends throughout the rock mass but the rock material is not friable
Completely weathered	Rock is wholly decomposed and in a friable condition but the rock and structure are preserved

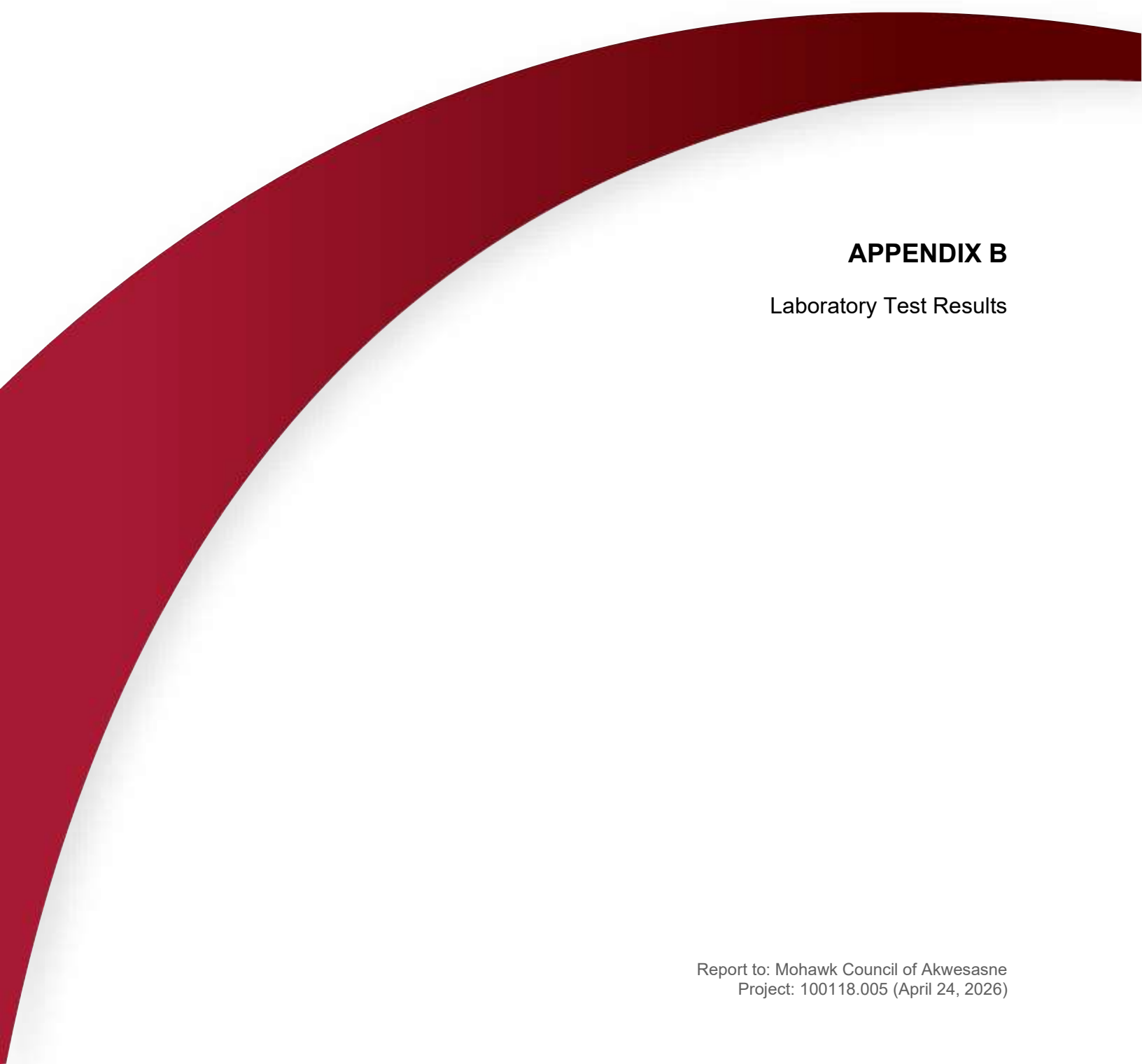
CORE CONDITION
Total Core Recovery (TCR) The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run
Solid Core Recovery (SCR) The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.
Rock Quality Designation (RQD) The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completed broken core to 100% for core in solid segments.

BEDDING THICKNESS	
Description	Thickness
Thinly laminated	< 6 mm
Laminated	6 - 20 mm
Very thinly bedded	20 - 60 mm
Thinly bedded	60 - 200 mm
Medium bedded	200 - 600 mm
Thickly bedded	600 - 2000 mm
Very thickly bedded	2000 - 6000 mm

DISCONTINUITY SPACING	
Description	Spacing
Very close	20 - 60 mm
Close	60 - 200 mm
Moderate	200 - 600 mm
Wide	600 - 2000 mm
Very wide	2000 - 6000 mm

ROCK QUALITY	
RQD	Overall Quality
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

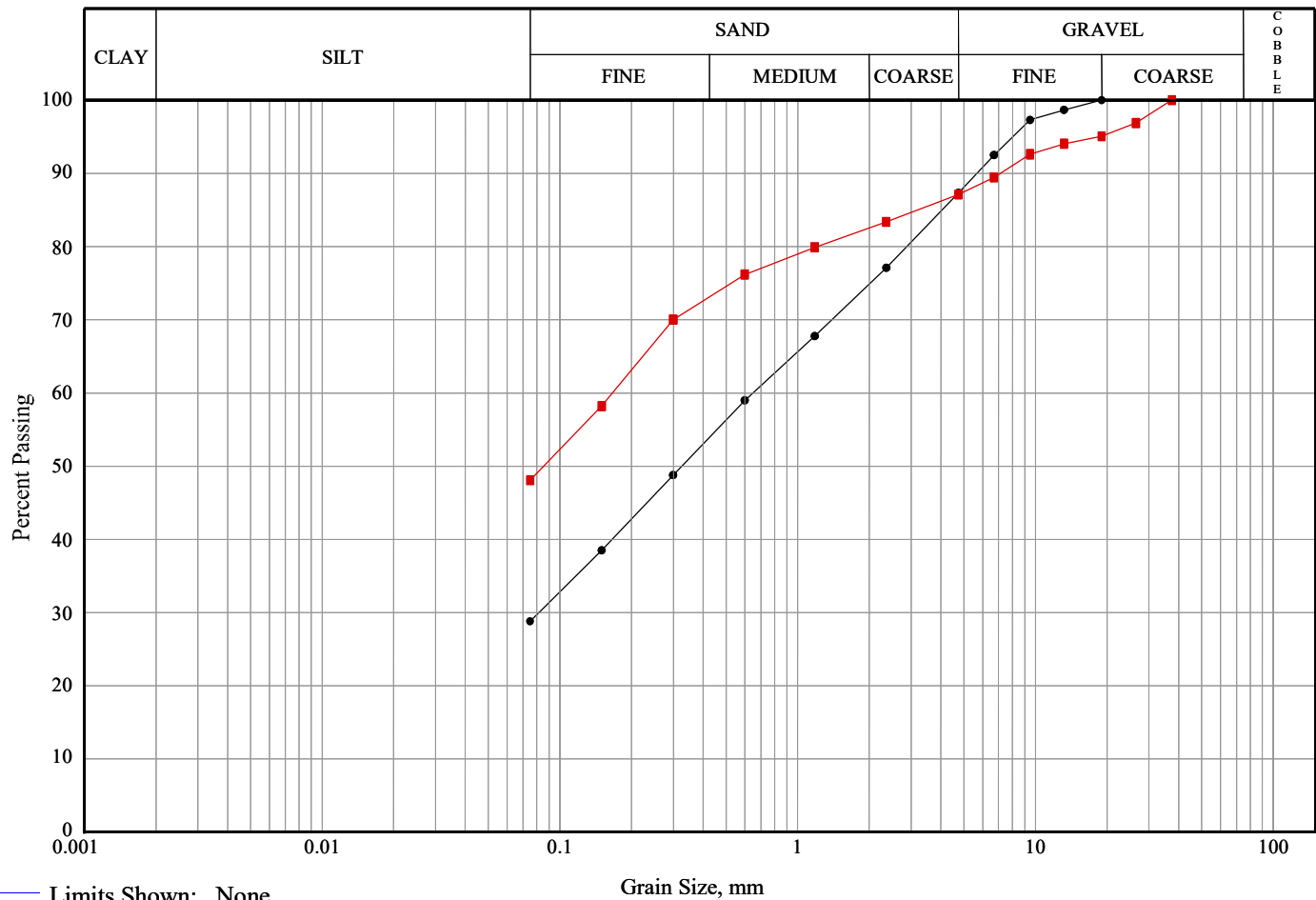
ROCK COMPRESSIVE STRENGTH	
Comp. Strength, MPa	Description
1 - 5	Very weak
5 - 25	Weak
25 - 50	Moderate
50 - 100	Strong
100 - 250	Very strong



APPENDIX B

Laboratory Test Results

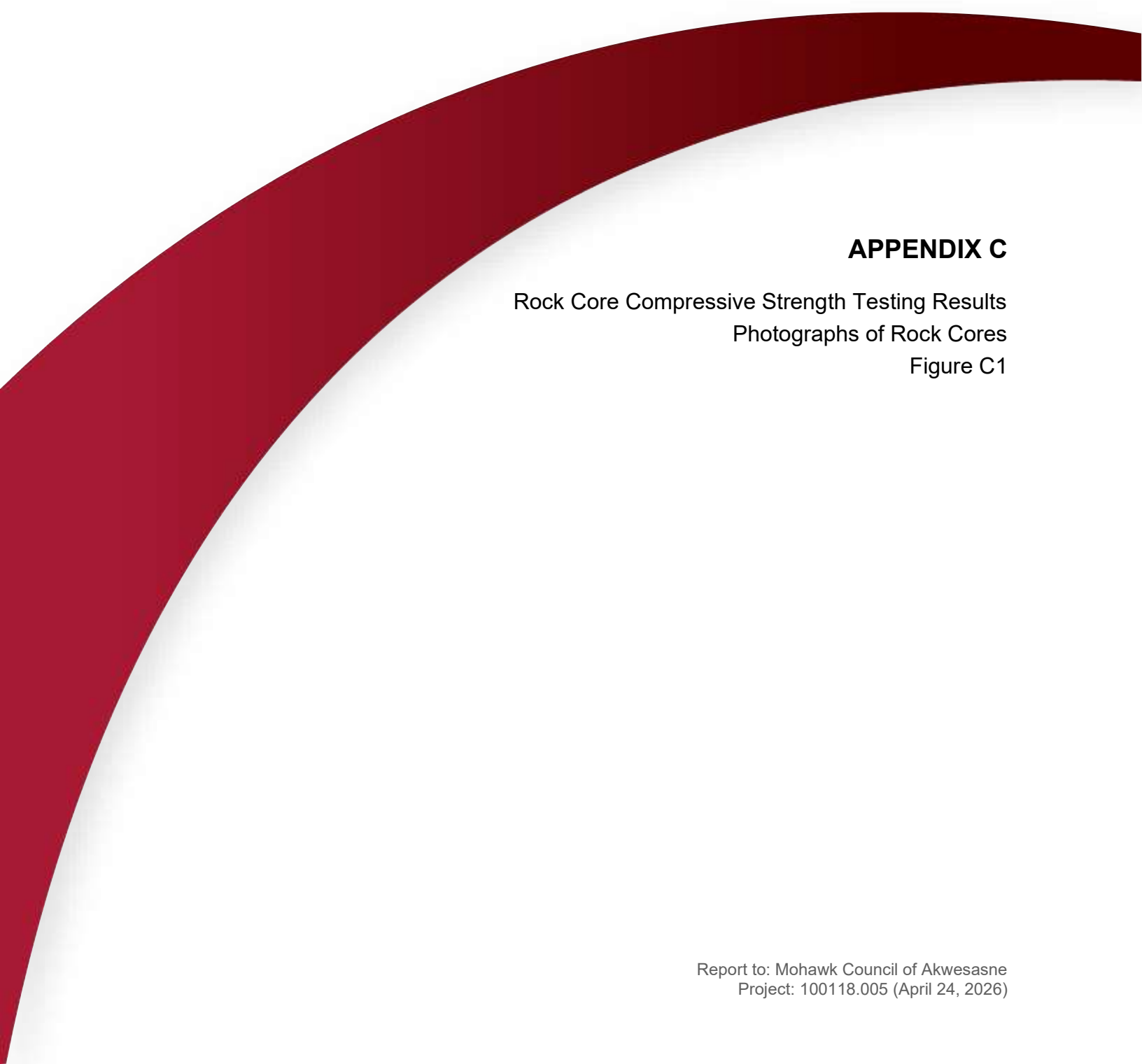
 GEMTEC CONSULTING ENGINEERS AND SCIENTISTS	Client: Jacobs	Soils Grading Chart
	Project: MCA/Hamilton Island Bridge	
	Project #: 100118005	



Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
—●—		BH 26-01	GS 1	0.07-0.35	12.7	58.5	28.8	
—■—		BH 26-01	SA 7	9.14-9.75	12.9	39.1	48.0	

Line Symbol	USCS Classification	USCS Symbol	D ₁₀	D ₁₅	D ₃₀	D ₅₀	D ₆₀	D ₈₅	% 5-75µm
—●—		N/A	---	---	0.08	0.33	0.65	4.05	---
—■—		N/A	---	---	---	0.09	0.17	3.21	---

Note: More information available upon request



APPENDIX C

Rock Core Compressive Strength Testing Results
Photographs of Rock Cores
Figure C1

	Client: Jacobs	Rock Core Compressive Strength
	Project: MCA/Hamilton Island Bridge	
	Project #: 100118005	

Date/Time Sampled: 26/02/26 3:18:00 PM	Date/Time Tested: 26/02/26 3:19:44 PM
--	---------------------------------------

BH	Sample No	Depth	Description	Diameter, mm	Area, mm ²	Length After Capping, mm	L/D	Load, kN	Comp. Str., MPa
BH 26-01	RC8	13.64-13.76		47.2	1750	93	1.97	515.200	294.1
BH 26-01	RC9	15.26-15.42		47.2	1750	93	1.96	447.420	255.1

BOREHOLE: 26-01
BORING DATE: FEBRUARY 20, 2026
DEPTH: 13.01 TO 16.23 METRES BELOW GROUND SURFACE



GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS

32 Steacie Drive, Ottawa, ON K2K 2A9
T: (613) 836-1422 | www.gemtec.ca | ottawa@gemtec.ca

Project

MOHAWK COUNCIL OF AKWESASNE
SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
PROPOSED HAMILTON ISLAND BRIDGE REPLACEMENT
SUMMERSTOWN, TOWNSHIP OF SOUTH GLENGARRY, ONTARIO

Drawing

ROCKCORE PHOTOGRAPH
BOREHOLE 26-01

FIGURE C1

Project No.

100118.005

Drwn By

SL

Chkd By

FZ

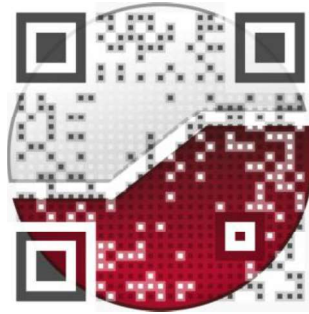
Rev No.

0

Date

MARCH 2026

experience • knowledge • integrity



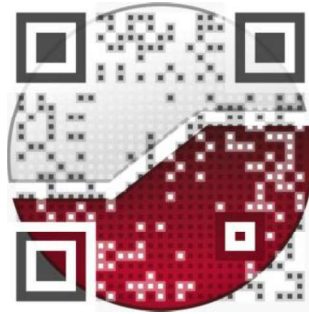
civil
geotechnical
environmental
field services
materials testing

civil
géotechnique
environnementale
surveillance de chantier
service de laboratoire des matériaux

expérience • connaissance • intégrité



experience • knowledge • integrity



civil
geotechnical
environmental
field services
materials testing

civil
géotechnique
environnementale
surveillance de chantier
service de laboratoire des matériaux

expérience • connaissance • intégrité

