



art engineering inc.

115-1350 Fisher Street • North Bay • Ontario • P1B 2H1 • Canada
(705) 737-2500 • Fax: (613) 836-1226
www.artengineering.ca

Project No. 8611

Addendum No. 001

DATE: August 14, 2026
CLIENT: Municipality of West Nipissing
PROJECT: Retaining Wall Replacement, 101-225 Holditch St. Sturgeon Falls, ON

The following items are now part of the Contract Documents and are to be included in the Base Bid.

The Bid Documents are revised as follows.

Item No.	Dwg. Ref.	Spec. Ref.	Revisions/Clarifications/Additional Information/Remarks
1	S05	-	Revise: Drawing S05 has been revised and attached with changes marked "1".
2	S08	-	New: Drawing S08 added to contract drawings with additional miscellaneous details
3	S03	-	Question: Limit of influence of existing footing is shown at 10H:7V but is identified as 7H:10V in the call-up, please clarify. Response: Limit of influence of existing footing is shown correctly at 10H:7V.
4		00 42 13	Revise: Specification Section 00 42 13 has been revised to reflect correct dates, and an updated Bid Price Breakdown table to reflect new details included in DWG S08.
5	-	00 42 13 01 21 00	Question: Section 00 42 13 – Proposal Form, Bid Price Breakdown, Item 18 identifies the Contingency Allowance as \$20,000.00. Section 01 21 00 – Allowances, Article 1.2.2 states that the Contract Price is to include a Contingency Allowance of \$50,000.00. Please confirm the correct Contingency Allowance amount to be included in the stipulated bid price. Response: A \$20,000.00 Contingency Allowance shall be carried in the Stipulated Bid Price for this contract.
6	-	00 42 13 01 21 13 01 32 16.19	Question: Section 00 42 13 – Proposal Form states that the Contractor is to attain Substantial Performance of the Work by August 20, 2026. However, Section 00 21 13 – Instructions to Bidders, Article 1.9.6 requires the construction schedule to demonstrate Substantial Performance no later than November 13, 2026. Additionally, Section 01 32 16.19 – Construction Progress Schedule, Article 1.3.5 identifies the Interim Certificate / Substantial Completion milestone as within 55 working days of the Award of Contract. Please confirm the governing Substantial Performance requirement and completion date that bidders are to carry in their tender. Response: Date Clarification (in local time): Bid Submissions: August 20, 2026 by 4:00:00P.M. Project Award: September 1, 2026 Substantial Completion: November 13, 2026



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7	-	01 45 00 05 50 00	Question: Sections 01 45 00 – Quality Control and 05 50 00 – Metal Fabrications reference liquidated damages; however, we have not identified a liquidated damages amount or daily rate within the Tender Documents. Please confirm whether liquidated damages apply to this Contract. Response: Liquidated damages are not applicable to this contract.
8	-	00 21 13	Question: Section 00 21 13 Part 1.9 – Bid Enclosure/Requirements identifies a Bid Bond Item but does not specify an amount, please clarify. Response: A Bid Bond is not required to be submitted with the Stipulated Bid Price.
9	S03	-	Question: RFI-05 – Rigid Insulation Thickness The reconstruction detail on Drawing S03 appears to indicate 5-inch rigid insulation, while Section 07 21 13 specifies 38 mm (1.5-inch) DuPont Styrofoam Highload 40 XPS or approved equivalent. Please confirm the required XPS insulation thickness to be supplied and installed beneath the retaining wall construction. Response: 5-inch rigid insulation as shown on DWG S03
10	S02	01 31 19 01 45 00	Question: The Contract Documents appear to contain conflicting requirements regarding responsibility for the existing generator and propane tank. Drawing S02 indicates that relocation and associated work is to be performed by the Owner, while Sections 01 31 19 and 01 45 00 include Contractor requirements relating to temporary relocation, electrical/mechanical connections, propane connections, testing, commissioning, reinstatement, and maintenance of continuous service. Please confirm which party is responsible for. Response: The Contractor is responsible to provide new equipment pads per S08. Contractor is responsible to protect generator, propane tank, and associated existing and temporary electrical and gas lines during construction. The Owner is responsible for relocating and commissioning the generator and propane tank.
11	S00	31 00 99	Question: The earthwork notes on Drawing S00 appear to specify Granular B Type II, while Section 31 00 99 specifies Granular B Type I for retaining wall backfill. Please confirm the required Granular B material type. Response: Granular B Type II shall be used for retaining wall backfill.
12	S00	31 00 99	Question: The earthwork notes on Drawing S00 appear to indicate that excavated material is unsuitable for reuse, while Section 31 00 99 appears to permit reuse of suitable site-excavated material in certain areas. Please confirm whether excavated material may be reused on site and, if so, identify the acceptable locations and material requirements.



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			Response: As per Drawing S00, excavated material is unsuitable for reuse and shall be removed as instructed.
13	-	00 21 13	Question: Section 00 21 13 indicates that an electronic copy of the soils investigation report is available upon request. Please provide the geotechnical/soils investigation report applicable to this project for review prior to tender close. Response: See attached Geotechnical Report for your information.
14	-	01 29 83 01 45 00 31 00 99	Question: Sections 01 29 83, 01 45 00 and 31 00 99 contain differing language regarding the engagement and payment of the independent testing laboratory. Please clarify. Response: The Contractor is responsible for retaining the independent testing laboratory. The Contractor is responsible for directing, coordinating, and scheduling the testing laboratory's services. Laboratory invoices shall be paid by the Contractor and administered through the Contract's Material Inspection and Testing Cash Allowance. The \$10,000 Material Inspection and Testing Cash Allowance shall be administered as an allowance within the Contract. The Contractor shall submit invoices/documentation for eligible testing and inspection services, and the actual cost of such services shall be paid through the Contract's progress payment process and charged against the allowance. The unused portion of the allowance, if any, shall be credited to the Owner.
15	S03	-	Question: The retaining wall drainage details appear to reference both connection to the existing catch basin and termination through a solid pipe extension complete with rodent guard/outlet. Please confirm the required number, locations, and termination points for the retaining wall drainage system, including any connections to the existing catch basin and any daylight/embankment outlets. Response: Drainage tile for upper tier wall shall be terminated on the embankment as shown on S03 with applicable rodent guard. The drainage tile for the lower tier wall shall extend to, and terminate in, the nearest catch basin.
16	S05	-	Question: Would 42.2mm (1-11/16") top rail be acceptable to replace the 48.3mm (1-7/8") top rail? The 48.3mm top rail does not have sleeves or rail ends available. Response: The proposed substitution of the 42.2 mm (1-11/16") top rail in lieu of the specified 48.3 mm (1-7/8") top rail shall be reviewed and confirmed by the Contractor's Professional Engineer for compliance with the design requirements, including structural adequacy, connections, and applicable code requirements. Any proposed substitution shall be clearly identified and submitted as part of the Contractor's shop drawings, which are to be prepared, signed, and



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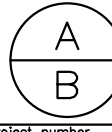
			sealed by the Contractor's Professional Engineer and submitted to AEI for review and approval. Acceptance of the proposed substitution will be subject to AEI's review and approval of the submitted shop drawings.
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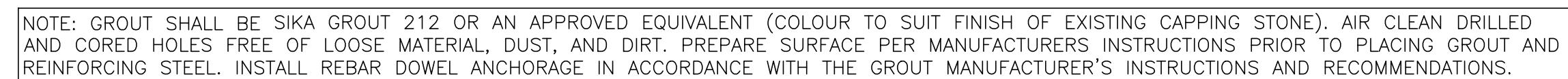
Attached: DWG S05_R1
DWG S08_R0
SPEC 00 42 13
Geotechnical Report

End of Addendum No. 001.



1.	REVISION -- ADDENDUM #1	14-08-26
0.	ISSUED FOR TENDER	04-08-26
revisions		date

ALL REPLACEMENT	client	MUNICIPALITY OF WEST NIPPISSING
IONS AND DETAILS	 art engineering inc. 1000 Highway 100, Suite 100 1000 Highway 100, Suite 100 1000 Highway 100, Suite 100 1000 Highway 100, Suite 100	
checked	D. Berger	 A detail no. de Detail B location drawing no. sur dessin no.
		project number 8611 drawing number S05 designed D.W.B. reviewed D.B. drawn D.W.B. scale AS SHOWN code 000 size AUGUST 4, 2026



S08 1:10

70.3mm Ø X 4.1mm THICK POST (TYP.)

150x150x10mm THICK BASE PLATE (TYP.)

500 625 500 125

POST / BLOCK

BLOCK

POST

1.5" Ø CORE INTO TOP STONE AND BLOCK BELOW (TYP.)

15M REINFORCING BAR ANCHOR GROUTED INTO 1.5" Ø CORED HOLE (TYP.)

200 MIN. EMBED. (TYP.)

EXISTING PROPANE TANK (TO BE INSTALLED AND COMMISSIONED BY OTHERS)

1-15M TOP ALONG PERIMETER HOOK AT ENDS (TYP.)

2-15M BOTTOM ALONG PERIMETER HOOK AT ENDS (TYP.)

1000 CLEAR (TYP.)

240 (TYP.)

30 (TYP.)

1220 MIN. (TYP.)

300

5800

50 mm HI-40 RIGID INSULATION

300x300x12mm THICK GALVANIZED STEEL BASE PLATE ANCHORED TO EQUIPMENT PAD USING (4) 8" Ø GALVANIZED THREADED ROD ANCHORS INSTALLED USING APPROVED ADHESIVE ANCHORING SYSTEM WITH A 200mm MIN. EMBEDMENT (TYP.)

15M @ 300 E.W.

175

75

80

350

200 MIN

200 MIN

CONCRETE CAP (TYP.)

6" (152mm) Ø STANDARD STEEL PIPE FILLED w/ CO (APPLY TWO COATS YELLOW 5mm WALL THICKNESS (TYP.)

SLOPE GRADE AWAY FROM EQUIPMENT PAD (TYP.)

GRANULAR A COMPACTED TO 100% SPMD IN 200 mm MAX. LIFTS (TYP.)

50 mm HI-40
RIGID INSULATION; EXTEND
MIN. 1220mm BEYOND
SLAB LIMITS

5800mm X 2500mm X 175mm THICK
EQUIPMENT PAD FOR PROPANE TANK;
SEE 4/S08 FOR DETAILS

6" (152mm) Ø STANDARD GALVANIZED STEEL PIPE
FILLED w/ CONCRETE, TOP MOUNTED ON
EQUIPMENT PADS; SEE 4/S08 FOR DETAILS
(TYP.)

CONTRACTOR TO PROVIDE BURIED 100mm Ø PVC
PIPE CONDUIT, 16" BELOW FINISHED GRADE, c/w
SAND AND GEOTEXTILE BETWEEN GENERATOR AND
PROPANE TANK EQUIPMENT PADS FOR GAS LINE
TO BE INSTALLED BY OTHERS

4575mm X 2300mm X 175mm THICK
EQUIPMENT PAD FOR PROPANE TANK;
SEE 5/S08 FOR DETAILS

6" (152mm) Ø STANDARD GALVANIZED
STEEL PIPE FILLED w/ CONCRETE, TOP
MOUNTED ON EQUIPMENT PADS; SEE 4/S08
FOR DETAILS
(TYP.)

EXISTING
MANHOLE

EXISTING GENERATOR (TO BE INSTALLED AND COMMISSIONED BY OTHERS)

6" (152mm) Ø STANDARD GALVANIZED STEEL PIPE FILLED w/ CONCRETE (APPLY TWO COATS YELLOW PAINT) MIN. 5mm WALL THICKNESS (TYP.)

300x300x12mm THICK GALVANIZED STEEL BASE PLATE ANCHORED TO EQUIPMENT PAD USING (4) 3/8" Ø GALVANIZED THREADED ROD ANCHORS INSTALLED USING APPROVED ADHESIVE ANCHORING SYSTEM WITH A 200mm MIN. EMBEDMENT (TYP.)

1-15M TOP ALONG PERIMETER HOOK AT ENDS (TYP.)

2-15M BOTTOM ALONG PERIMETER HOOK AT ENDS (TYP.)

1000 CLEAR (TYP.)

240 (TYP.)

30 (TYP.)

15M @ 300 E.W.

175

75

80

350

200 (MIN.)

200 (MIN.)

4575

50 mm HI-40 RIGID INSULATION; EXTEND MIN. 1220mm BEYOND SLAB LIMITS

CONCRETE CAP (TYP.)

SLOPE GRADE AWAY FROM EQUIPMENT PAD (TYP.)

RETAINING WALL

MISC.

approved D. Bottrick

DESIGNED PROFESSIONAL ENGINEER D. BOTTRICK

EQUIPMENT PAD (SLAB ON GRADE) NOTES:

1. MATERIALS:
 - CONCRETE – IN ACCORDANCE WITH CSA A23.1/A23.2/A23.3:
 - SLAB ON GRADE CONCRETE: 32MPa, C-2 EXPOSURE CLASS, 19mm MAX. NOMINAL AGGREGATE.
2. REINFORCEMENT:
 - REINFORCING FABRIC – PLAIN, GRADE 400W IN ACCORDANCE WITH CSA G30.18;
 - WELDED WIRE FABRIC (WWF) – IN ACCORDANCE WITH ASTM A1064.
3. CONCRETE DESIGN COMPLETED IN ACCORDANCE WITH CSA A23.3-19 "DESIGN OF CONCRETE STRUCTURES".
4. FORMWORK DESIGN, FABRICATION, ERECTION AND MATERIAL SHALL BE BY THE CONTRACTOR AND SHALL BE IN ACCORDANCE WITH CSA S269.1-16 AND CSA A23.1-19.
5. FORMWORK SHALL BE LEFT IN PLACE FOR THE ENTIRE DURATION OF THE CURING PERIOD. NO LIVE LOAD FROM EQUIPMENT IS PERMITTED ON THE STRUCTURE DURING CONCRETE PLACEMENT AND CURING.
6. CONCRETE REINFORCING, PLACEMENT AND TOLERANCES SHALL BE IN ACCORDANCE WITH CSA A23.1-19 & A23.2-19.
7. ALL REINFORCING STEEL SHALL BE CLEAN AND FREE OF RUST, OIL OR ANY OTHER DELETERIOUS MATERIAL.
8. SECURE AND SUPPORT REINFORCING STEEL TO PREVENT MOVEMENT DURING THE POURING OF CONCRETE.
9. CLEAR COVER TO REINFORCING STEEL SHALL BE AS FOLLOWS:
 - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH = 75 ± 25 mm;
 - TOP OF SLAB ON GRADE = 50 ± 12 mm;
 - VERTICAL ELEMENTS = 60 ± 20 mm;
10. REINFORCING BAR SPLICES SHALL BE 670 mm LONG MINIMUM FOR 15M BARS. LAP SPLICES SHALL BE OFFSET OR STAGGERED AND SHALL NOT LAP THROUGH ANY CRACK CONTROL JOINTS.
11. CONCRETE SHALL BE MIXED, PLACED, AND CURED IN ACCORDANCE WITH CSA A23.1-19 AND CSA A23.2-19. MAINTAIN RECORDS OF POURED CONCRETE ITEMS. RECORD DATE, LOCATION OF POUR, QUANTITY, AIR TEMPERATURE AND ANY TEST SAMPLES TAKEN.
12. DO NOT POUR CONCRETE OVER A FROZEN SUBGRADE. ENSURE A MINIMUM TEMPERATURE OF 10°C DURING PLACEMENT OF CONCRETE AND FOR A MINIMUM OF 3 DAYS AFTER PLACEMENT.
13. ALL CONCRETE SHALL BE CONSOLIDATED WITH INTERNAL VIBRATORS AND BROOM FINISHED .
14. THE LOCATION AND ORIENTATION OF ALL CONCRETE CONSTRUCTION/COLD JOINTS SHALL BE AS SHOWN ON THESE DRAWINGS. ANY ADDITIONAL PROPOSED CONSTRUCTION JOINTS SHALL BE SUBMITTED TO A/EI FOR APPROVAL, PRIOR TO CONSTRUCTION.
15. CRACK CONTROL JOINTS SHALL BE PROVIDED AT 3.6 m CENTER-TO-CENTER MAXIMUM SPACING IN THE SLAB ON GRADE. CRACK CONTROL JOINTS SHALL BE SAW CUT INTO THE CONCRETE SURFACE 6 TO 18 HOURS AFTER POURING THE CONCRETE. CRACK CONTROL JOINTS SHALL BE 30 ± 5 mm DEEP AND 5 mm WIDE. DO NOT LAP REINFORCEMENT THROUGH CONTROL JOINTS.
16. REINFORCING STEEL BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS, USING MINIMUM BEND DIAMETERS, U.N.O.
17. ALL PERMANENTLY EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 12 mm.
18. THE CONTRACTOR SHALL ENSURE THAT ALL REINFORCING STEEL IS INSPECTED AND APPROVED BY THE ENGINEER UPON COMPLETION AND PRIOR TO PLACING CONCRETE.

NOTE: CONTRACTOR TO PROVIDE EQUIPMENT PADS FOR THE PERMANENT LOCATION OF THE GENERATOR AND PROPANE TANK. RELOCATION AND COMMISSIONING TO BE COMPLETED BY OTHERS OUTSIDE OF THE CONTRACT SCHEDULE. DURING THE WORK, TEMPORARY ELECTRICAL POWER PROVIDED (BY OTHERS) FROM THE EXISTING GENERATOR LOCATION (SAME AS PERMANENT LOCATION) TO THE TEMPORARY LOCATION SHOWN ON DWG. S02. SHALL BE PROTECTED DURING CONSTRUCTION.

NOTE: FINAL POSITION OF EQUIPMENT PADS SHALL ACCOMMODATE A MINIMUM CLEARANCE OF 10FT BETWEEN GENERATOR UNIT AND PROPANE TANK

NOTE: PVC CONDUIT PLACEMENT SHOWN SCHEMATICALLY ONLY. FINAL POSITION OF CONDUIT TO BE DELINEATED ON SITE BY THE CONTRACT ADMINISTRATOR.

NOTE: CONTRACTOR SHALL REVISE ASPHALT REMOVALS AND RECONSTRUCTION IMMEDIATELY AROUND NEW EQUIPMENT PADS AS REQUIRED TO ACCOMMODATE INSTALLATION OF EQUIPMENT PADS AS DETAILED.

0.	IFT - ADDENDUM #1	14-08-2014
revisions		date

project	drawing	client
RETAINING WALL REPLACEMENT		MUNICIPALITY OF WEST NISSIPING
drawing		 art engineering inc. 10750 Highway 10, Suite 100, Oakville, Ontario L6M 4V2 Tel: 905-847-7627 Fax: 905-847-1770 www.art-engineering.com
approved	checked	
D. Battrick	D. Berger	A B A detail not no. of detail B location drawing not sur detail no.

We, the undersigned, having examined the Bid Documents for the above-named project/contract,

PROJECT: Retaining Wall Replacement at 101-225 Holditch St., Sturgeon Falls, Ontario

FROM (BIDDER)

Company Name

Address

City/Town, Province and Postal Code

hereinafter called the "Tenderer".

TO (CONSULTANT)

ART Engineering Inc.
115-1350 Fisher St.

including Addendum Number(s) North Bay, ON, P1B 2H1, and having visited the Place of the Work, hereby offer to perform the Work in accordance with the Bid Documents, for the stipulated price of: \$_____ in Canadian dollars, excluding Value Added Taxes (VAT/HST).
amount in figures

We, the undersigned, declare that:

- .1 If notified of award of Contract, to immediately commence Work assembling all necessary labour forces and equipment on the site and will continue the work with the utmost diligence until completion. Complete Work of construction on the Project, attaining Substantial Performance of the Work till **November 13, 2026**, inclusive of mobilization time from date of receiving notice of award.
- .2 We have carefully examined the site of the proposed Work and existing conditions; the requirements of the construction sequencing; and have satisfied ourselves that the Subcontractors, material suppliers and equipment suppliers on which this Bid is based are capable of executing the Work in accordance with the Contract Documents.
- .3 All bid form supplements called for by the Bid Documents form an integral part of this bid.
- .4 This Bid is made without any connection, collusion, knowledge, comparison of figures or arrangement with any person or persons submitting a Bid for this same Contract.
- .5 In the Contract Lump Sum price, all costs associated with the project specified in these documents, shown or indicated on the drawings, or necessary to complete the work shall be included. Where a specified Unit Price is not provided the cost of all work shall be included in the Contract Lump Sum.
- .6 Bid price breakdown and unit rates:

- .1 The Bidder shall complete the following Bid Price Breakdown table, including all requested unit rates.
- .2 The total of the Bid Price Breakdown shall equal the Bid Price (lump sum).
- .3 The Bid Price Breakdown is provided for the purposes of bid evaluation and, if the Bidder is awarded the Contract, for use in valuing Changes in the Work in accordance with GC 6.1 of the Contract.
- .4 Notwithstanding the inclusion of quantities and unit rates, the Contract is a stipulated price contract, and the Contract Price shall not be subject to adjustment based on variations in quantities from those indicated in this table.
- .5 Unit rates shall be based only where applicable to Changes in the Work as agreed or determined in accordance with the Contract.
- .6 The Bid Price (lump sum) shall govern in all cases.

Bid Price Breakdown:

Item No.	Description of Work	Unit	Total
1.	General Items: Mobilization/ Demobilization, Site Safety, Site Supervision, Project Schedule, Construction Costs, Survey Costs, Temporary Facilities, Clean-Up, Utility Identification and Protection, Etc.	LS	
2.	Temporary Protection and Hoarding	LS	
3.	All Earth Excavation including Removal and Disposal of Existing 5 – Tier Gravity Retaining Wall (for Retaining Wall related Works only)	LS	
4.	Decommissioning and Removal of Existing Monitoring Well; shall be decommissioned by a Licensed Well Contractor Prior to Removing Well Casing	LS	
5.	Prepare Subgrade and have Approved by Geotechnical Engineer Prior to Placing Granular Base / Engineered Fill	LS	
6.	Geotextile Throughout Contract	LS	
7.	Granular 'A' Throughout Contract	LS	
8.	Granular 'B' Throughout Contract	LS	
9.	Rigid Insulation below New Retaining Walls & Equipment Pads	LS	

10.	Supply and Install New 2-Tier Gravity Block Wall with Proprietary Pre-cast Concrete Blocks	LS	
11.	Supply and Install New Chain Link Fence & Single Swing Gate, including Concrete Pier Foundations and Anchorage	LS	
12.	Supply and Install New 100mm Ø Perforated Drainage Tile c/w Clear Stone and Geotextile behind Retaining Walls, including Solid Drainage Pipe Extensions, Rodent Guard, and Connection to Existing Catch Basin	LS	
13.	Pavement Removal, for Retaining Wall Replacement, including Trenching for Drainage Pipe	LS	
14.	Pavement Reconstruction, including Pavement Base Repairs for Retaining Wall Replacement, and Trenching for Drainage Pipe. (40 mm HL3, 60 mm HL8, PGAC 58-22)	LS	
15	Dowel / Anchorage of Precast Top Blocks at Locations of Fence Posts, including Coring, Cleaning, Surface Preparations, Reinforcing Steel, Grout, etc.	LS	
16	Cast-In-Place Exterior Mounted Slab on Grade for Propane Tank and Generator, including concrete, reinforcing steel, formwork, 100mmØ PVC Conduit w/ Sand and Geotextile, etc.	LS	
17	Top Mounted 6" Ø Standard Galvanized Steel Pipe Bollards with Concrete Infill, c/w Base Plate and Anchorage to Equipment Pads	LS	
18	Sodding Throughout Contract include slope stakes as required	LS	
19	Restore and Reinstate Disturbed Areas (Site Cleaning / Restoration)	LS	
20	Cash Allowance: Material Inspection and Testing (Refer to Specification 01 21 00)	LS	\$10,000.00
21	Contingency Allowance (Refer to Specification 01 21 00)	LS	\$20,000.00
22	PROVISIONAL: Implement Rip-Rap Vegetation Growth Mitigation Plan	LS	

23	PROVISIONAL: Replacement of Existing Architectural Wall with New Concrete Curb	LS	
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- .7 This tender is irrevocable from the official closing time and is unconditionally open for acceptance for 60 days after the official closing time, and that if notified of award of the Contract and before starting the Work we will:
- .1 Execute a Contract with The Owner on the specified Form of Agreement.
 - .2 Furnish to The Owner, in care of the Consultant, copies of insurance policies as required by the General Conditions of the Contract.
 - .3 Furnish to The Owner evidence that all Workplace Safety and Insurance Board dues, in accordance with the laws of the Province of Ontario, have been paid.

Note that items noted as “Provisional” shall not be included in the stipulated bid price. “Provisional” items shall not commence unless written direction to proceed has been provided to the Contractor from the Consultant in the form of a Change Order.

Signed and Submitted by:

Legal Name of Company _____

Name of Authorized Signing Officer _____

Title of Authorized Signing Officer _____

Signature of Authorized Signing Officer _____

Name of Witness _____

Signature of Witness _____

Corporate Seal Affixed Hereto:

Dated this _____ day of _____, 20_____

If the tender is submitted by or on the 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 must be affixed. If the tender is submitted by or on behalf of an individual or a partnership, signatures must be witnessed.

END OF SECTION



Geotechnical Investigation and Design Report

The Municipality of West Nipissing

Type of Document:

Report

Project Name:

Proposed Retaining Wall Replacement
West Nipissing Municipal Offices
Sturgeon Falls, Ontario

Project Number:

SUD-25011158-A0

Prepared By:

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Date Submitted:

2025-10-16

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Further to our Proposal No. 24/112/GP_rev.2 dated July 9, 2025 and your subsequent authorization to proceed, EXP Services Inc. (EXP) has completed the field investigation and geotechnical engineering evaluation for the retaining wall replacement. Our comments and recommendations, based on the results of the field investigation and our understanding of the project scope, are provided in this report.

1. Introduction

It is understood by EXP that an existing retaining wall located at the Municipality of West Nipissing municipal offices in Sturgeon Falls, Ontario is to be replaced. The replacement wall is envisioned to be a segmental wall. To assist with the design and construction of the proposed replacement wall, EXP has completed a geotechnical investigation at the site, with the results of the investigation and associated recommendations included within this report.

2. Field Investigation

The field investigation for this project consisted of the advancement of two (2) sampled boreholes advanced at accessible locations free of buried and overhead utilities. The first borehole (BH-1) was advanced at the top of the existing retaining wall, with the second borehole (BH-2) advanced at the toe of the existing wall. The borehole locations are shown on Dwg. No. A-1, included in Appendix A. The boreholes were advanced using a power auger drill rig equipped with 200 mm diameter Hollow Stem Augers (HSA) to depths shown on the attached borehole logs, Figures B-2 to B-12, in Appendix B. Soil samples were obtained using a 51 mm (2 inch) outside diameter split spoon sampler in conjunction with Standard Penetration Tests (ASTM D1586), at depths noted on the attached borehole logs in Appendix B. The Standard Penetration Test (SPT) "N" values were recorded and used to provide an assessment of the in-situ compactness condition of the encountered soils. Where cohesive soils were encountered, field vane tests were completed to assess the undrained shear strengths of the soil. Coring of materials beyond the encountered refusal depth did not form part of this scope of work.

Groundwater levels were measured within the open boreholes upon completion. A standpipe piezometer was installed at Borehole BH-1 to observe long term groundwater levels. Borehole BH-2 was backfilled with auger cuttings and sealed with bentonite. EXP returned to the site on October 16, 2025 to measure the groundwater level within the installed piezometer.

The retained soil samples were logged in the field and then carefully packaged and transported to our laboratory for detailed examination and testing.

The locations of the boreholes were determined in the field using a hand-held GPS unit. The elevations of the boreholes were surveyed to a temporary benchmark (TBM) established on the top of concrete of an existing transformer pad at the location shown on Dwg. No. A-1, in Appendix A. The TBM was given a local, non-geodetic elevation of 100.0 m. The locations and elevations should be considered accurate only to the degree implied by the methods used for purposes of this report and should not be utilized for detailed design purposes.

3. Laboratory Testing

A routine geotechnical laboratory testing program was performed on representative soil samples and consisted of moisture content determinations, particle size analyses, and Atterberg Limits tests. The geotechnical laboratory test results are summarized on the attached borehole logs in Appendix B, with detailed results included in Appendix C.

4. Subsurface Conditions

Details of the soils encountered during the field investigation are summarized on the attached logs in Appendix B. The logs include textural descriptions of the subsoil and indicate the soil boundaries inferred from non-continuous sampling and observations during the field investigation. These boundaries reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. When reading this report, the explanatory notes and definitions provided in Figures B-1A and B-1B in Appendix B should be referenced.

In general, the boreholes encountered topsoil and fill materials overlying native silt, native clay and silt, and a thin layer of native silty sand.

Topsoil was encountered at the surface of Borehole BH-1 and was approximately 50 mm thick. Topsoil thicknesses may vary beyond the borehole location.

Underlying the topsoil at BH-1 was silty sand fill that extended to 1.5 m depth. The silty sand fill was brown in colour, moist, and contained some gravel in the upper portion of the layer. Uncorrected SPT “N” values within the silty sand fill ranged from 4 to 12 blows per 300 mm, classifying the silty sand fill as loose to compact in compactness condition. Measured moisture contents within the silty sand fill ranged from 2 to 12%.

At the surface of Borehole BH-2, and extending to 0.8 m depth, was sand and gravel fill. The sand and gravel fill was brown in colour, moist, and contained some silt. One SPT performed within the sand and gravel fill resulted in an uncorrected “N” value of 15 blows per 300 mm, classifying the sand and gravel fill as compact in compactness condition. Measured moisture content within the sand and gravel fill was 5%.

Underlying the fill materials at both boreholes was native silt. The silt extended to 10.7 m depth at Borehole BH-1, and to the borehole termination depth of 5.2 m at BH-2. At BH-1, the upper portion of the silt was generally sandy and contained trace organics. Overall, however, the silt contained trace to some silt and trace clay. The silt was brown to grey in colour and moist to wet. Uncorrected SPT “N” values within the silt ranged from 7 to 44 blows per 300 mm, classifying the silt as loose to dense in compactness condition. The loose soils were encountered at BH-1 below roughly 6 m depth. Measured moisture contents within the silt ranged from 17 to 29%.

Underlying the silt at Borehole BH-1 and extending to 20.5 m depth, was native clay and silt. The clay and silt was grey in colour, wet, and contained trace sand. Field vane tests performed within the clay and silt resulted in undrained shear strengths ranging from 40 to 48 kPa. As such, the clay and silt is classified as firm in consistency. Measured moisture contents within the clay and silt ranged from 33 to 52.5%. Two Atterberg Limits Tests on the clay and silt resulted in Liquid Limits of 35.1 and 35.2%, Plastic Limits of 20.1 and 20.5%, and Plasticity Indices of 14.7 and 15.1%, indicating the clay and silt has medium plasticity and moderate compressibility.

A thin, 100 mm thick layer of silty sand was encountered below the clay and silt at Borehole BH-1 and extended to auger refusal on suspected bedrock or boulders at 19.9 m depth. The silty sand was grey in colour, wet, and contained some gravel. Measured moisture content within the silty sand was 11%.

Upon completion, groundwater was measured at Borehole BH-1 at 11.4 m depth (Local Elev. 91.8 m). Borehole BH-2 was dry during the short term the borehole was left open upon completion. EXP returned to the site on October 16, 2025 to again measure the groundwater level within the installed piezometer at BH-1. Groundwater was encountered at 9.5 m depth (local Elev. 93.69 m) on this date. Seasonal variations in the water table should be anticipated, with higher levels occurring during wet weather conditions (spring thaw and late fall) and lower levels occurring during dry weather conditions.

5. Foundation Recommendations

The type of proposed replacement wall has not been determined; however, it is understood that a segmental block wall is preferred. Factors such as the site condition (i.e. availability of space), constructability, cost, aesthetics, height of wall, etc. should be considered in selecting the type of wall. Overall, gravity walls, like a segmental block wall, would be appropriate for the soil conditions encountered.

EXP should be retained to review the final design and specifications of the retaining wall to confirm that they are in general agreement with the assumptions on which our recommendations are based. Slope stability analysis should be carried out once the detailed design of the retaining wall is completed.

The native subgrade soils will be highly susceptible to disturbances from construction activity and weather. As such, the silt subgrade soils should be protected by placing engineered fill over the subgrade immediately following subgrade approval. A non-woven geotextile separator (Terrafix 270R or equivalent) is to be used between the subgrade soils and engineered fill. A minimum 300 mm thick layer of compacted Granular "A" (OPSS 1010) is to be placed below the proposed wall foundation. If upfill is required below the Granular "A", it is to consist of Granular "B" Type I or Type II (OPSS 1010). All engineered fill must be placed in maximum 150 mm thick lifts and be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) within 1.5% of optimum moisture content. Where engineered fill is to be placed below the wall foundation, it is to extend horizontally a minimum of 1.0 m beyond the edges of the foundation and slope down to the native soils at 1H:1V to ensure the foundation loads are properly transferred to the underlying subgrade. Engineered fill placement and compaction below foundations is to be continuously monitored on a full-time basis by a qualified geotechnical representative from EXP.

Prior to placing any engineered fill all in-situ fill, organics, fill materials, or other deleterious materials must be removed down to the native soils. The exposed subgrade must be proof rolled to identify any soft or unstable areas. The exposed subgrade and proof rolling are to be inspected by a representative from EXP prior to placing fill materials or concrete. Any soft or loose areas encountered below the foundation locations or any areas that are subject to softening/loosening when exposed to water and construction activities should be excavated down to a firm subgrade and replaced with Granular "A" or Granular "B" Type II in accordance with Ontario Provincial Standards and Specifications (OPSS) 1010.

The location of any foundation on an engineered soil pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie.

Wall foundations bearing on engineered fill overlying undisturbed, compact, native soils, can be designed with a factored geotechnical resistance at Ultimate Limit States (ULS) of 150 kPa, calculated using a geotechnical resistance factor of 0.5. A bearing pressure at Serviceability Limit States (SLS) of 100 kPa may be used. Foundations designed with the recommendations contained herein are expected to settle less than 25 mm total and 20 mm differential.

The coefficient of friction, $\tan \delta$, may be taken as 0.4 between precast concrete (blocks) and the granular pad, and 0.55 for mass (poured) concrete on the granular pad, for construction in-the-dry. These values are unfactored.

Foundations which are to be placed at different elevations in soils or near service trenches should be located such that the footings are set below a line drawn up at 10 horizontal to 7 vertical from the near edge of a lower foundation or bottom of a service trench, as indicated on Figure 5-1 below.

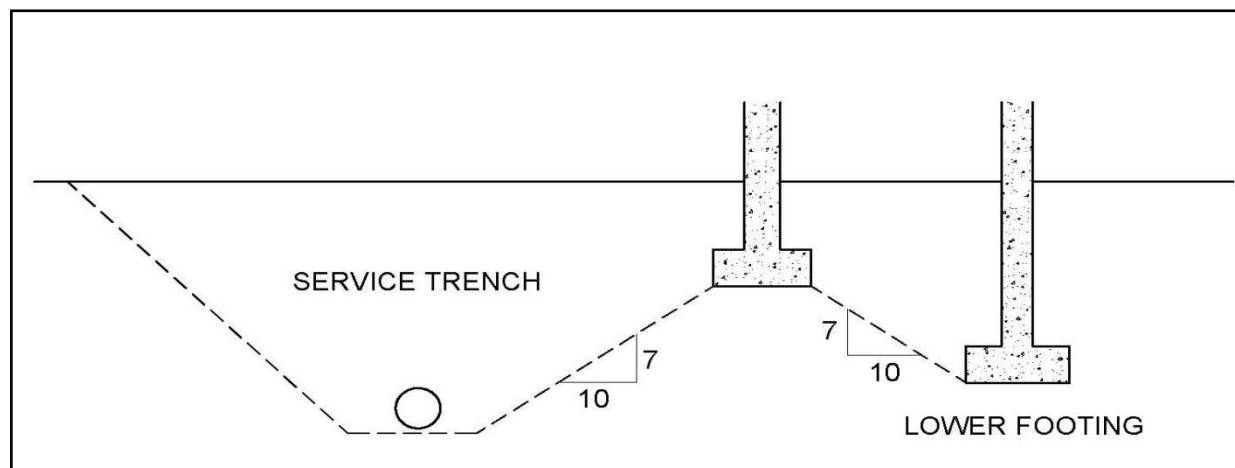


Figure 5-1: Footings near Service Trenches or at Different Elevations

These foundation recommendations do not account for loadings from heavy machinery or vibrations.

5.1 Soil Parameters for Wall Design

The soil parameters outlined on Table 5-1, below, may be used for the design of the retaining wall. Values given for horizontal earth pressures are for horizontal backfill behind the wall.

Table 5-1: Soil Parameters

Material	Total Stress Analysis		Effective Stress Analysis		Earth Pressure Coefficients			Unit Weight, γ (kN/m ³)
	C (kPa)	ϕ (°)	c' (kPa)	ϕ' (°)	Active (k_a)	Passive (k_p)	At Rest (k_o)	
Silt	0	28	0	28	0.36	2.8	0.53	18
Clay and Silt	35	0	0	25	0.41	2.5	0.57	17
Granular "A" *	0	38	0	38	0.24	4.2	0.38	22
Granular "B" Type I *	0	35	0	35	0.27	3.7	0.43	21
Granular "B" Type II *	0	38	0	38	0.24	4.2	0.38	21

* All engineered fill must be compacted to 100% of the SPMDD.

5.2 Frost Considerations

The freezing index in the Sturgeon Falls area is approximately 1,200 C degree-days. There is potential for up to 2.0 m of frost penetration to occur over the winter months in unprotected, unheated areas. Foundations for unheated structures should be provided with a minimum of 2.0 m of earth cover frost protection.

Where sufficient earth cover frost protection is not provided for the foundations, insulation would be required. Insulation should consist of rigid extruded polystyrene, have a minimum compressive strength of 275 kPa, and an R-Value of 5 for every 25.4 mm of thickness, (i.e. Styrofoam HIGHLOAD 40). Any exposed insulation is to be protected against sunlight and physical damage. A rough estimate for cost evaluation purposes can be made by assuming that 25.4 mm of rigid insulation designed for below grade installation is equivalent to 300 mm of soil cover. Note that insulation for unheated structures must extend below the entire foundation. Higher compressive strength insulation (i.e. Styrofoam HIGHLOAD 60 or 100, etc.) may be required if insulation extends below foundations, depending on foundation loading conditions.

Detailed insulation recommendations can be provided by EXP, if necessary, once the final foundation designs have been determined.

5.3 Site Classification for Seismic Response

The Site Classification for Seismic Response has been estimated based on the boreholes advanced at the site. As the Site Classification for Seismic Response is based on soil conditions in the upper 30 m, assumptions were made by EXP for the soil conditions below the borehole termination depths.

Based on EXP's assumptions and previous experience with the soil conditions at depth within the project area, the site is classified as Site Class E as per the OBC clause 4.1.8.4, Site Properties and Table 4.1.8.4 A, Site Classification for Seismic Response.

These earthquake/seismic design parameters should be reviewed in detail by the structural engineer and incorporated into the design as required. As this site class is based on an assumption of the soil conditions, the site class may not be sufficient, and it may result in an overdesign of the structure. If a precise Site Classification is required based on shear wave velocity testing, EXP can provide a quote to perform the necessary testing.

6. Excavations

The in-situ native soils may be classified as Type 3 soils for excavations terminating above the groundwater level and Type 4 soils for excavations terminating below the groundwater level in conformance with the Ontario Occupational Health and Safety Act (OHSA). Excavation side slopes in Type 3 soils should remain stable at a slope of 1H:1V. Excavation side slopes in Type 4 soils should remain stable at a slope of 3H:1V. The need to excavate flatter side slopes if excessively wet or soft/loose materials, or concentrated seepage zone are encountered, should not be overlooked.

Water (i.e. surface water runoff) should not be permitted to enter and/or pond within the construction area.

Excavations must be completed so as not to undermine nearby infrastructure and existing foundations. If the underside of footing elevation for the existing building on site is unknown, it is recommended to expose a footing prior to final wall design to confirm the existing footing elevations and understand how it may impact the wall construction. Temporary shoring may be required to support existing foundations and infrastructure during excavation. The safety of excavations and stability of temporary construction slopes and shoring are the contractor's responsibility. A detailed temporary shoring system design should be provided by the contractor, if necessary, based on the encountered soil and groundwater conditions at the time of the excavations.

All excavations must be completed in accordance with the most recent regulations in the Ontario Occupational Health and Safety Act. The contractor should be aware that slope height, slope inclination, or excavation depths, should in no case, exceed those specified in local, provincial or federal safety regulations. Such regulations are strictly enforced and, if not followed, the owner, the contractor or earthwork or utility subcontractor could be liable for substantial penalties.

It is important to note that soils encountered in the construction excavations may vary significantly across the site. Our preliminary soil classifications are based solely on the materials encountered in widely spaced explorations. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, we recommend that EXP be contacted immediately to evaluate the conditions encountered.

6.1 Re-Use of Excavated Material

The in-situ fill materials and native soils are too fine-grained to be re-used as free draining engineered fill. The excavated materials may be used for general landscaping purposes, away from areas where free draining fill is specified, provided it is environmentally safe to do so.

7. Dewatering

As noted previously, groundwater was measured within the installed piezometer at Borehole BH-1 at 11.4 m depth (Local Elev. 91.8 m) upon completion. On October 16, 2025, groundwater was measured at 9.5 m depth (Local Elev. 93.69 m) within the installed piezometer. Borehole BH-2 was dry during the short term the borehole was left open upon completion.

Based on the above, groundwater should be anticipated for excavations approaching or extending below Local Elev. 94.0 m. As excavations are not anticipated to approach this depth, significant dewatering is not anticipated for the wall construction. Above this depth, potential perched groundwater should be possible to remove using conventional construction pumps.

Dewatering requirements will be governed by the time of the year the construction is performed. It is the responsibility of the Contractor to propose a suitable dewatering system based on the time of construction and groundwater levels. The method used should not undermine any adjacent structures or buried services. The dewatering method is the responsibility of the Contractor and the Contractor should submit his proposal to the Prime Consultant for review and approval prior to construction.

8. Construction Constraints Under Cold Weather Conditions

For all construction activities at this site, the following applies:

- During excavations, all subgrade soils must be maintained at a minimum temperature of 5° C.
- No granular material may be placed under frozen conditions, with all fill material maintained at a minimum temperature of 5° C prior to and during installation. If granular fill is to be placed in freezing conditions, the granular fill must be restricted to Granular "B" Type II material. Since Granular "B" Type II has a larger aggregate size, care should be taken to prevent point loading on the underside of the concrete.
- Soils and granular fill material that are in direct contact with fresh concrete must be at a minimum temperature of 5° C prior to pouring the concrete and must be free of snow and ice fragments.
- All granular fill, prior to placement of concrete, must be reviewed by this office to ensure that it is free of frost, buried ice and snow.
- All reinforcing steel in the concrete forms must be free of ice and snow, and must be maintained at a minimum temperature of 5° C.
- During the placement of concrete in cold weather conditions, a field cured cylinder should be placed beside the heated form for a period of 6 days. The field cured cylinder should be returned to a designated laboratory on the sixth day for 7-day compressive strength testing.
- All heated and tarped areas should be monitored for temperature using a max/min thermometer.
- All concrete is to have a minimum of 6% to 8% air entrainment to prevent cracking and shall be maintained at a minimum temperature of 10° C for a period of 4 to 7 days.

The 6% to 8% air entrained concrete during cold weather placement is to prevent significant strength loss of concrete as a result of freezing and thawing. The air entrainment will provide the capacity to absorb stresses during freeze/thaw action.

9. Construction Quality Control

Construction quality control of the “earthworks” should be provided throughout the project by a representative of EXP to verify all design assumptions, recommendations, and confirmation of the subsurface soil conditions. This includes inspection of the excavation and subgrade prior to the placement of any structural fill and foundations, to ensure that any and all deleterious materials have been removed and to ensure that the actual conditions are not markedly different than those on which the recommendations made herein are based. Compaction control of structural fill is also recommended as standard practice, as is sampling and testing of aggregates and concrete.

10. Design Review

The recommendations made in this report are considered preliminary and in accordance with our present understanding of the project and are provided solely for the design team responsible for the project. If there are any changes, such as relocation of any structures or other features which may affect our analysis, the information obtained during this investigation may be inadequate and additional field work and reporting may be required.

EXP Services Inc. should be retained to review the final design and specifications to confirm that we are in general agreement with the assumptions on which our recommendations are based. If not accorded the privilege of making this review, EXP will assume no responsibility for interpretation of the recommendations in this report.

11. Limitations

A subsurface investigation is a limited sampling of a site. Should any conditions at the site be encountered that differ from those reported at the test locations, we require that we be notified immediately in order to allow reassessment of our recommendations.

Whereas this investigation has estimated the groundwater level at the time of the fieldwork, and commented on general construction problems, the presence of conditions, which would be difficult to establish from our test holes, may affect the type and nature of dewatering procedures which should be used in practice. These conditions include local and seasonal fluctuations in the groundwater table, erratic changes in the soil profile between the tests, and thin layers of soil with large or small permeabilities compared with the general soil mass, etc.

The comments given in this report are intended only for the guidance of the design team responsible for the project. The number of test holes required to determine the localized underground conditions between test holes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for preliminary design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual test hole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The investigation and comments are necessarily ongoing as new information of underground conditions becomes available. For example, more specific information is available with respect to in-situ subsurface conditions between test locations once construction is underway. Subsurface soil interpretation between test holes, as well as the recommendations of this report, should be verified through field inspections provided by EXP to validate the current information for use during the construction stage.

Virtually no scope of work, no matter how exhaustive, can identify all contaminants or all conditions above or below ground. For example, conditions elsewhere on the property may differ from those encountered, and conditions may change with time. Therefore, no warranty is provided that the entire site condition is represented by those identified at specific borehole locations.

This report in no way reflects any on-site environmental considerations.

12. Closure

We trust that these comments provide you with sufficient information to proceed with design. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

EXP Services Inc.



Ian MacMillan, P.Eng.
Project Manager, Earth & Environmental Services
Northeastern Ontario



Yves Beauparlant, P.Eng.
Manager Earth & Environmental Services
Northeastern Ontario

Project Number: SUD-25011158-A0
Date: October 16, 2025

Appendix A - Drawing

\\exp\dev\dwg\SUD-25011158-A0\60 Execution\65 Drawing\65 Drawing\SUD-25011158-A0 - BH LOCATION PLAN.dwg
Oct 16, 2025 - 6:50am



KEYPLAN - N.T.S.

LEGEND



EXP BOREHOLE



TEMPORARY BENCHMARK, TBM
(TOP OF CONCRETE PAD)

— NOTES —

- 1) The boundaries and soil types have been established only at Test Hole locations. Between Test Holes, they are assumed and may be subject to considerable error.
- 2) Do not use Test Hole elevations for design purposes.
- 3) Soil samples will be retained in storage for 3 month and then destroyed unless client advises that an extended time period is required.
- 4) Quantities should not be established from the information provided at the Test Hole locations.
- 5) This drawing forms part of the report, project number as referenced, and should be used only in conjunction with this report.

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REVISIONS		
No.	DESCRIPTION	DATE

CLIENT	THE MUNICIPALITY OF WEST NIPISSING
PROJECT	PROPOSED RETAINING WALL REPLACEMENT STURGEON FALLS, ON
PROJECT NO.	SUD-25011158-A0

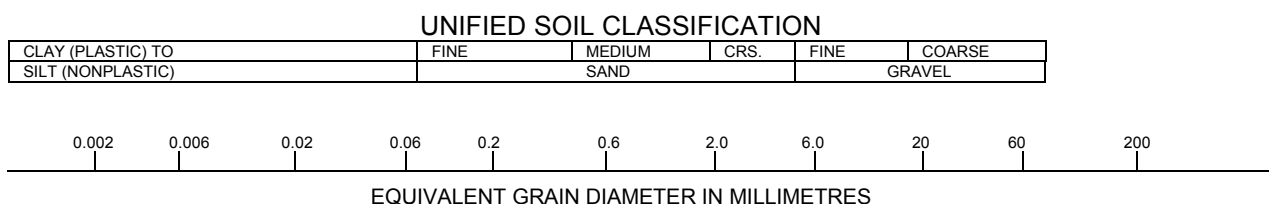
TITLE: BOREHOLE LOCATION PLAN		
DATE OCTOBER 2025	SCALE: NTS	DWG NO. A-1

Project Number: SUD-25011158-A0
Date: October 16, 2025

Appendix B – Borehole Logs

Notes on Sample Descriptions

1. All sample descriptions included in this report follow the International Society for Soil Mechanics and Foundation Engineering (ISSMFE), as outlined in the Canadian Foundation Engineering Manual. Note, however, that behavioral properties (i.e. plasticity, permeability) take precedence over particle gradation when classifying soil. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.



ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

2. **Fill:** Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.
3. **Till:** The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Notes On Soil Descriptions

4. The following table gives a description of the soil based on particle sizes. With the exception of those samples where grain size analyses have been performed, all samples are classified visually. The accuracy of visual examination is not sufficient to differentiate between this classification system or exact grain size.

Soil Classification		Terminology	Proportion
Clay and Silt	<0.060 mm	"trace" (e.g. Trace sand)	1% to 10%
Sand	0.060 to 2.0 mm	"some" (e.g. Some sand)	10% to 20%
Gravel	2.0 to 75 mm	adjective (e.g. sandy, silty)	20% to 35%
Cobbles	75 to 200 mm	"and" (e.g. and sand)	35% to 50%
Boulders	>200 mm		

The compactness of Cohesionless soils and the consistency of the cohesive soils are defined by the following:

Cohesionless Soil		Cohesive Soil		
Compactness	Standard Penetration Resistance "N" Blows / 0.3 m	Consistency	Undrained Shear Strength (kPa)	Standard Penetration Resistance "N" Blows / 0.3 m
Very Loose	0 to 4	Very soft	<12	<2
Loose	4 to 10	Soft	12 to 25	2 to 4
Compact	10 to 30	Firm	25 to 50	4 to 8
Dense	30 to 50	Stiff	50 to 100	8 to 15
Very Dense	Over 50	Very Stiff	100 to 200	15 to 30
		Hard	>200	>30

5. ROCK CORING

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of the core covered, counting only those pieces of sound core that are 100 mm or more length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very Poor Quality	<25
Poor Quality	25 to 50
Fair Quality	50 to 75
Good Quality	75 to 90
Excellent Quality	90 to 100

$$\text{Recovery Designation \% Recovery} = \frac{\text{Length of Core Per Run}}{\text{Total Length of Run}} \times 100$$

Log of Borehole BH-1

Project No. SUD-25011158-A0

Figure No. B-2

Project: Proposed Retaining Wall Replacement

Sheet No. 1 of 2

Location: Sturgeon Falls, ON

582170E; 5135321N

Date Drilled: August 18, 2025

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer

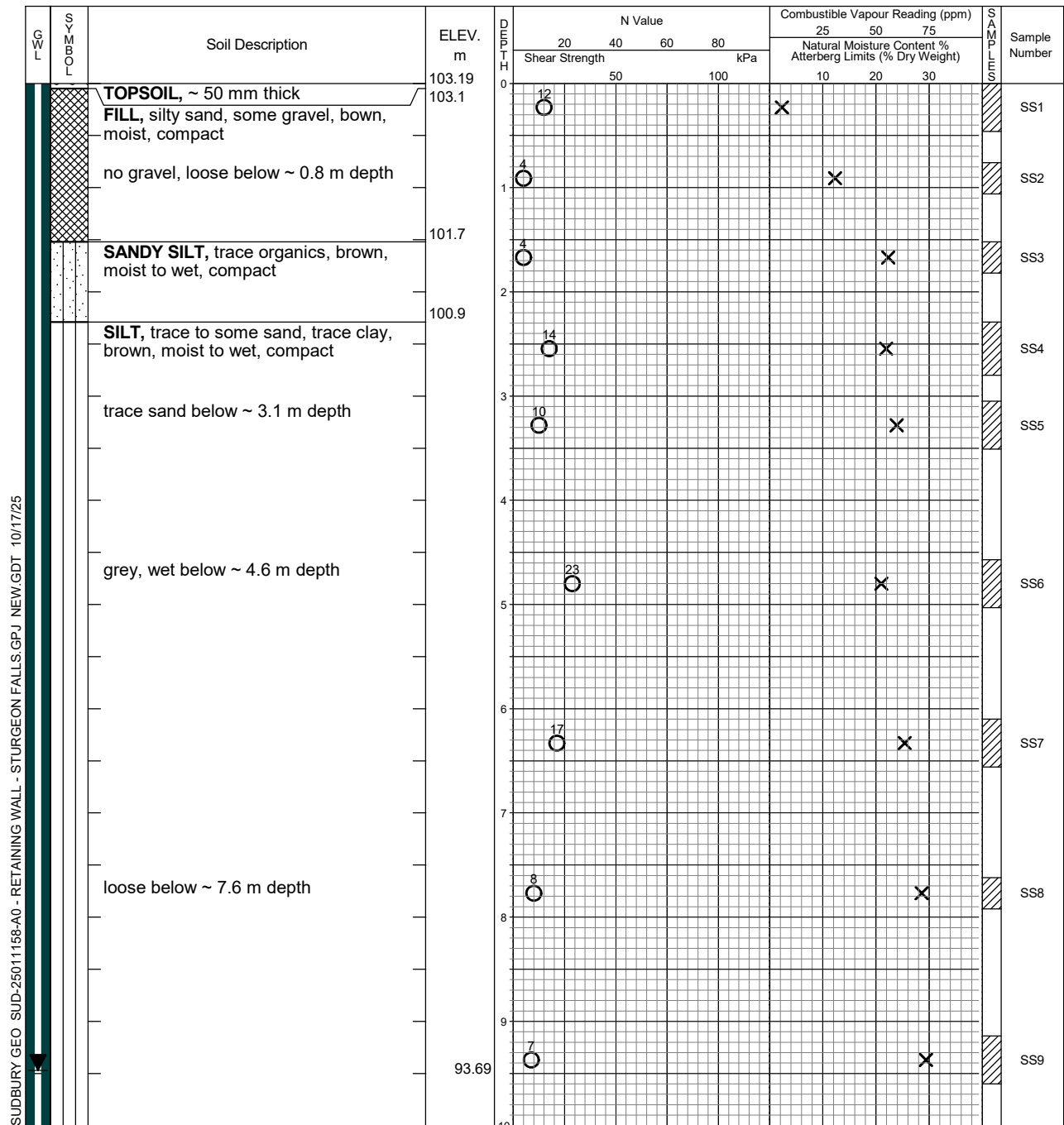
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Continued Next Page



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Borehole data requires
interpretation assistance from
EXP before use by others.

See Figures B-1A and B-1B for
Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	11.4	Open
October 16, 2025	9.5	

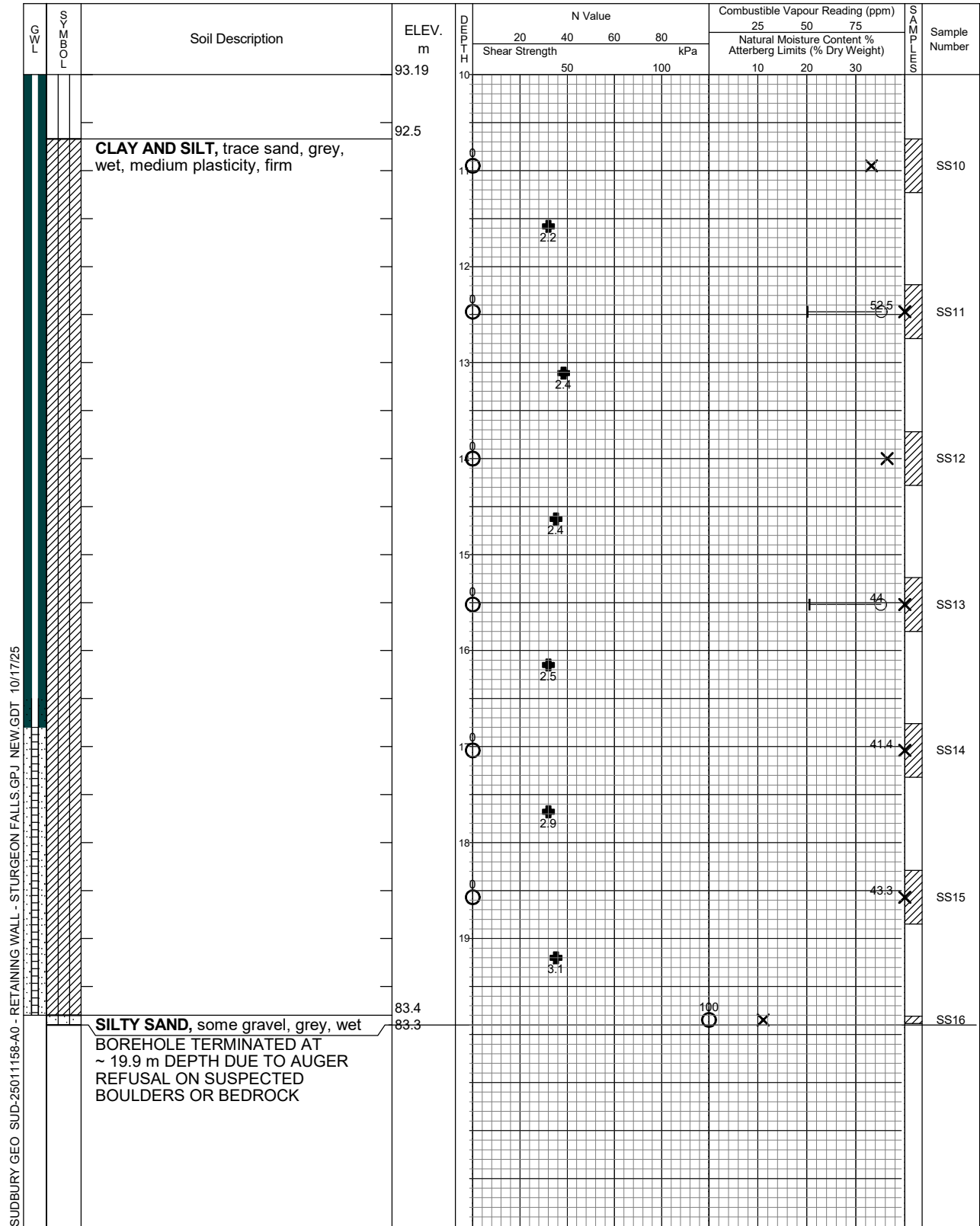
Log of Borehole BH-1

Project No. SUD-25011158-A0

Figure No. B-2

Project: Proposed Retaining Wall Replacement

Sheet No. 2 of 2



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Borehole data requires interpretation assistance from EXP before use by others.

See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	11.4	Open
October 16, 2025	9.5	

Log of Borehole BH-2

Project No. SUD-25011158-A0

Figure No. B-3

Project: Proposed Retaining Wall Replacement

Sheet No. 1 of 1

Location: Sturgeon Falls, ON

582170E; 5135334N

Date Drilled: August 18, 2025

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer

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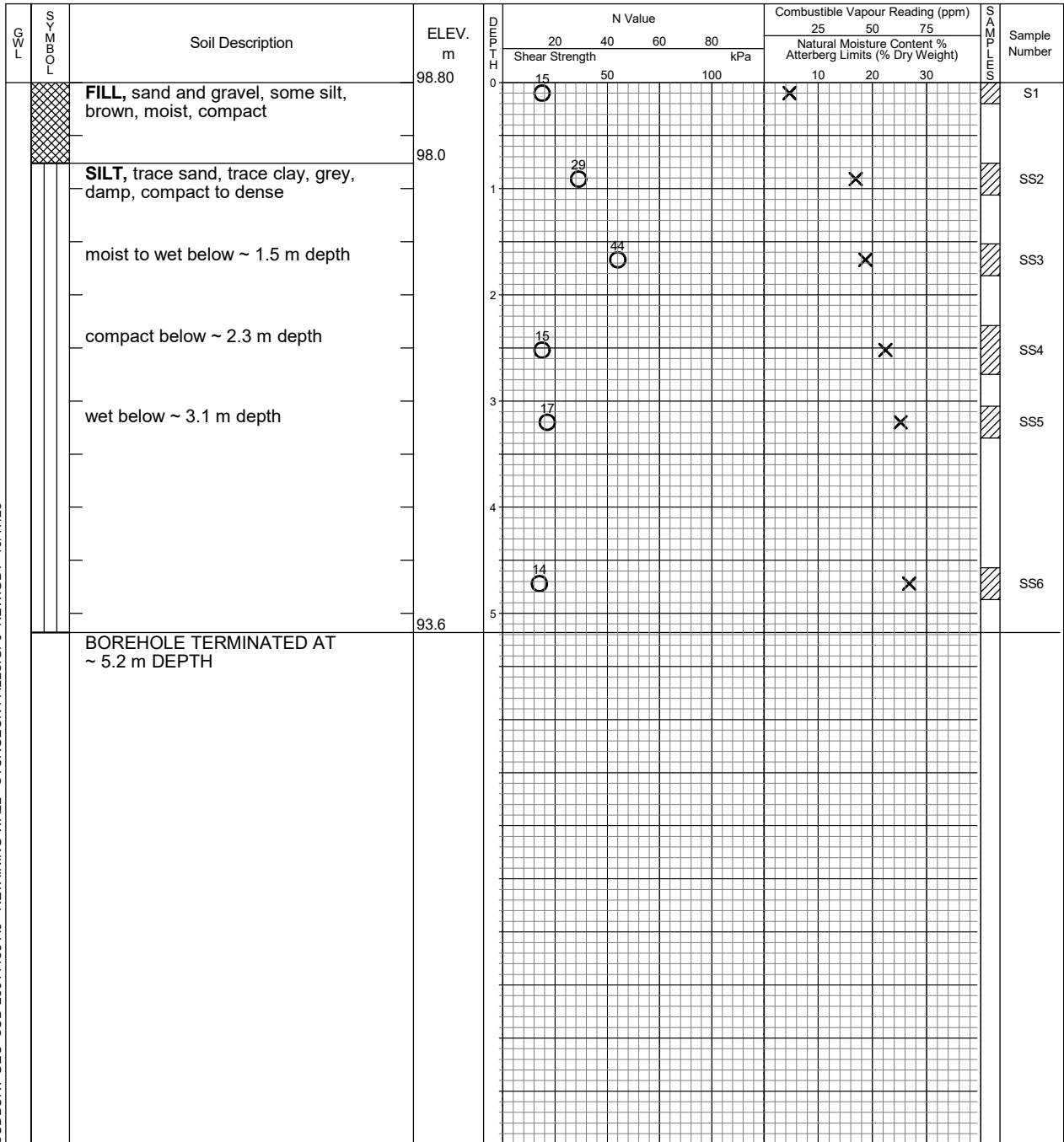
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Datum: Local (non-geodetic)



SUDBURY GEO SUD-25011158-A0 - RETAINING WALL - STURGEON FALLS.GPJ NEW.GDT 10/17/25



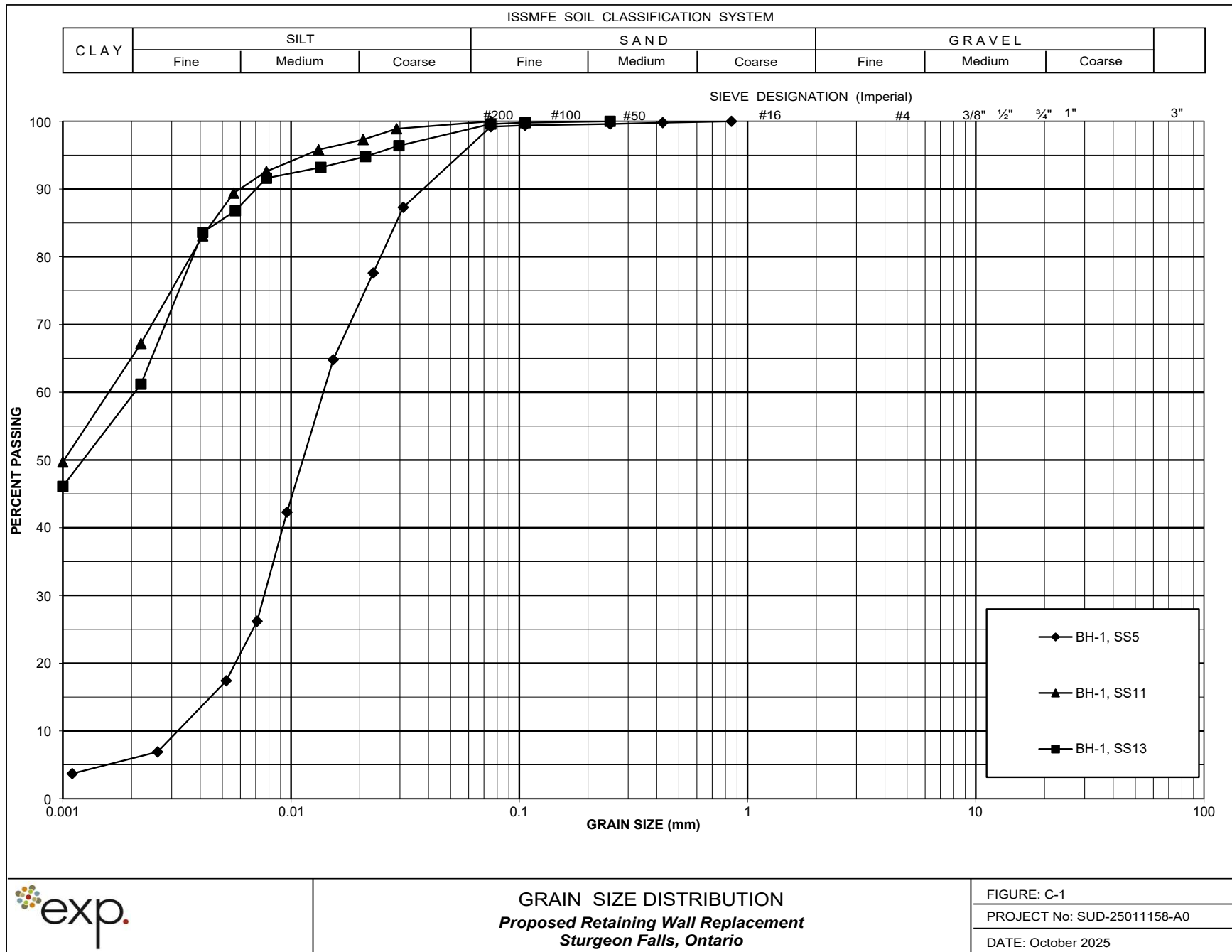
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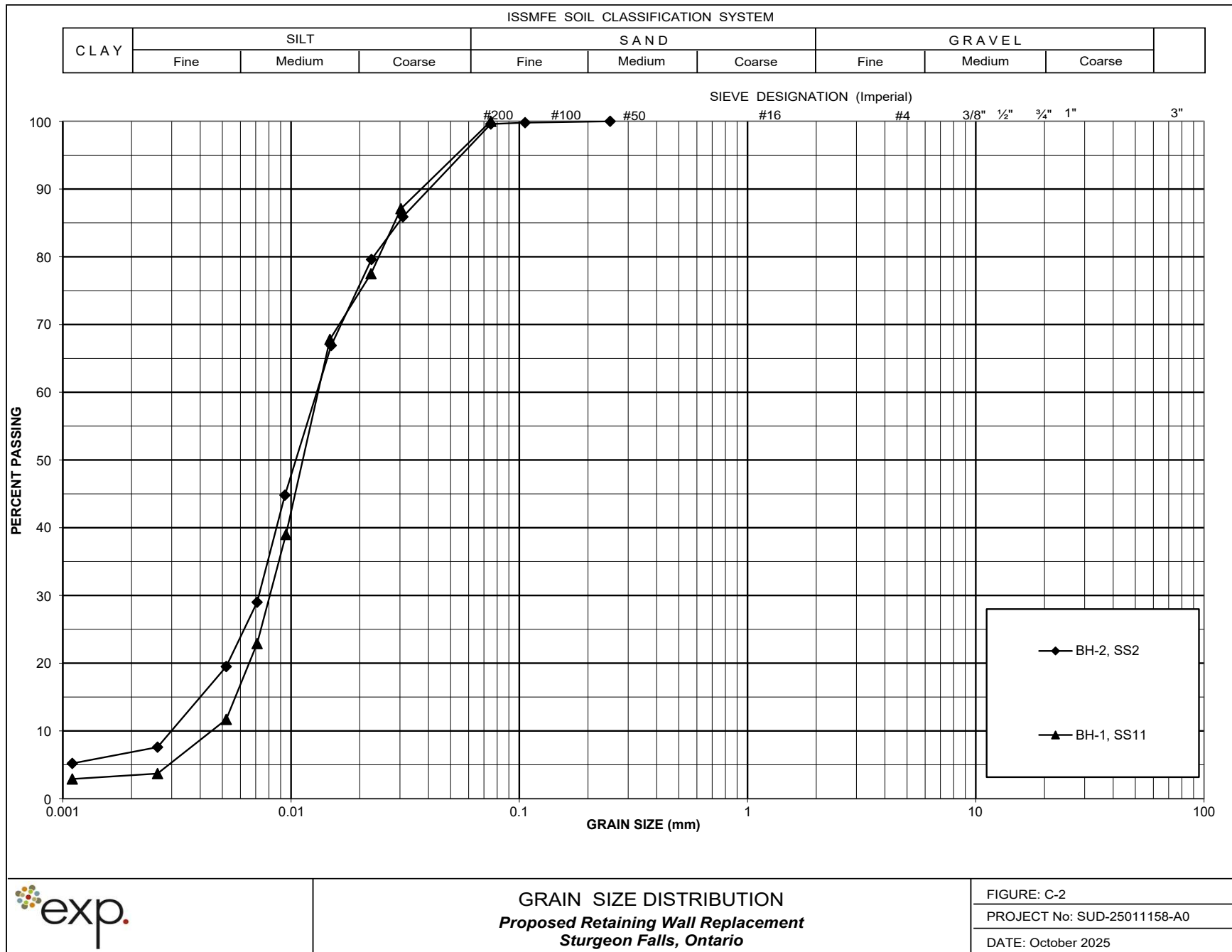
Borehole data requires interpretation assistance from EXP before use by others.

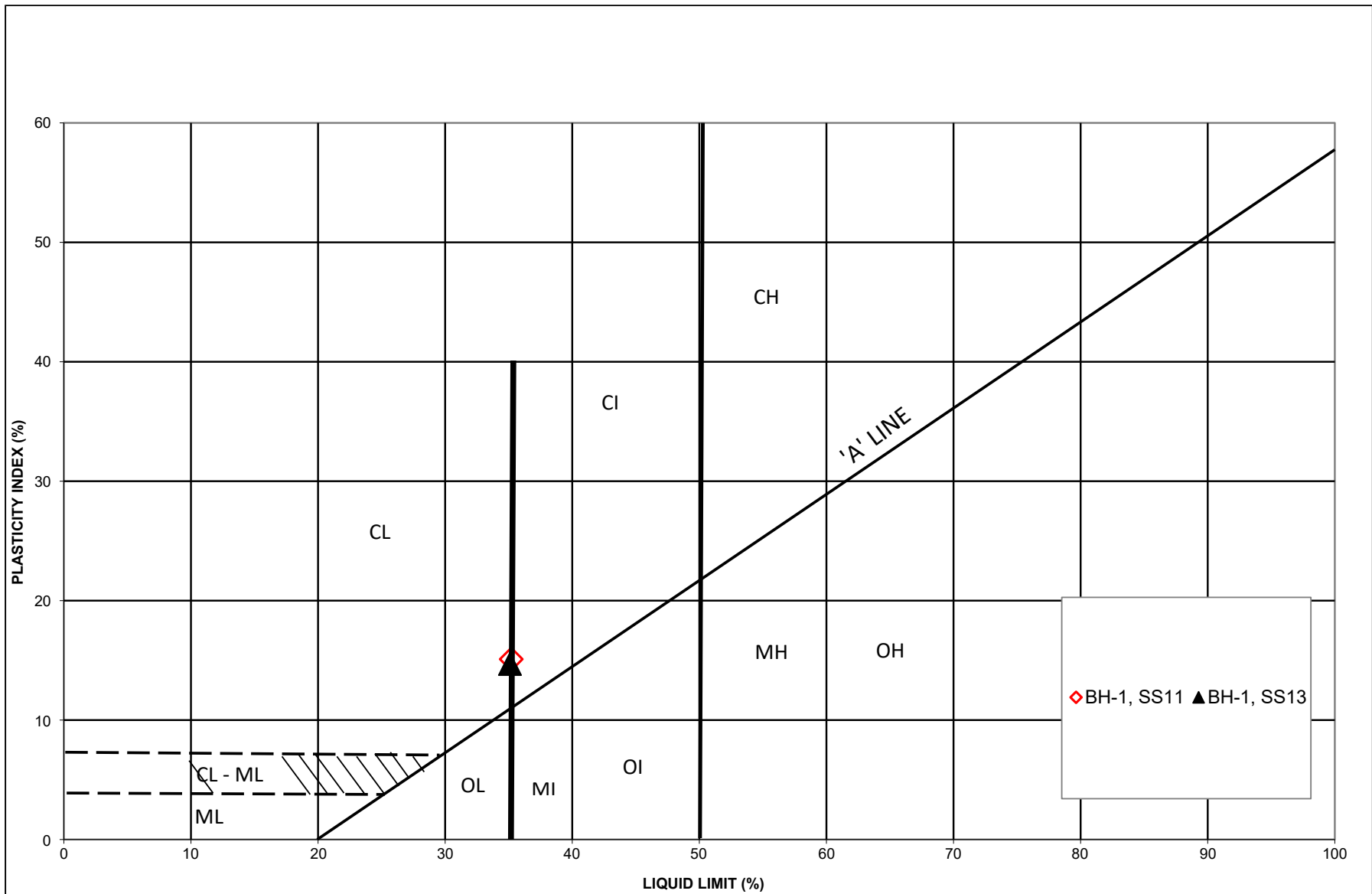
See Figures B-1A and B-1B for Notes on Sample Description

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

Appendix C – Laboratory Testing







PLASTICITY CHART
Proposed Retaining Wall Replacement
Sturgeon Falls, Ontario

FIGURE: C-3
 PROJECT No: SUD-25011158-A0
 DATE: October 2025