Foundation Investigation and Design Report

Bradford Bypass – West Contract, Noise Barrier Wall - G.W.P. 2026-23-00

Ministry of Transportation Ontario

60731727

April 2026

Latitude: 44.127096
Longitude: -79.594268
Geocres No. 31D04-023

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AECOM: 2024-12-21

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Bradford Bypass – West Contract Noise Barrier Wall

G.W.P.2026-23-00

For
Ministry of Transportation Ontario

GEOCRES No. 31D04-023

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1. Introduction

AECOM Canada Ltd. (AECOM) has been retained by the Ministry of Transportation Ontario (MTO) to undertake a foundation investigation for the West Contract of the proposed Bradford Bypass (BBP), located in the County of Simcoe and Regional Municipality of York, Ontario. The new BBP freeway is a 16.3 km rural controlled access highway connecting Highway 400 and Highway 404. This report provides a summary of the findings from the foundation investigation carried out for detailed design of a proposed noise barrier wall along the proposed west contract of the BBP. The location of the wall shown in Drawing No. 1 through Drawing No. 3 and a stratigraphic section is also included in **Appendix A**.

2. Site Description

The site for the proposed noise barrier wall is generally surrounded by a mixture of residential and agricultural areas. There currently exist a housing development and a memorial park in the area, specifically to the south of the proposed noise barrier wall alignment. Two archaeological sites are also nearby the site.

The existing ground surface topography along the proposed noise barrier wall is generally undulating and slopes down from the west to east with a stream valley located near the east end of the proposed noise barrier wall and begins to rise beyond the stream. Site photographs of existing ground conditions are included in **Appendix B**.

Based on the CTS drawings, the proposed noise barrier wall will be a 5 m high wall on traffic barrier, positioned along the east side of the BBP east bound lane, between mainline STA 13+037 and STA 13+830; a section of approximately 793 meters. Specifically, from STA 13+037 to STA 13+700 (663 m long) the noise barrier wall will be built and constructed near grade with sections of cuts and fills being less than 4 m in depth. From STA 13+700 to STA 13+725 (25 m long), the noise barrier wall will be built and constructed on a section of high fill ranging from 4.0 m to 4.5 m in height. The remaining section from STA 13+725 to 13+830 (105 m long) will be constructed at or near grade.

Existing sources of geotechnical information were reviewed to ascertain the expected ground conditions at the site where the noise barrier wall is proposed, generally all consistent with the subsurface conditions encountered for this investigation. Information from well records contained in Ministry of the Environment, Conservation and Parks (MECP) database as well as MTO's GEOCRES database generally described the ground conditions as consisting of upper zones ranging from clayey silt to silt and sand /silty sand /sandy silt. These layers are underlain by stiffer / denser glacial till deposits also reported as varying from cohesive to cohesionless till. Bedrock was locally encountered at over 120 m depths in the reviewed sources. Groundwater conditions are typically shallow, with perched levels in fills and seasonal fluctuation expected.

Prior to the commencement of the investigation, enquiries were made regarding the presence of buried utilities within close proximity to the proposed noise barrier wall alignment. The utility locates results indicated no buried features known to be present along the proposed works.

3. Investigation Procedures

A foundation investigation program consisting of a subsurface exploration program was conducted to supplement the geotechnical information reviewed as part of the desktop study. In the following sections, AECOM's investigation methodology is briefly described followed by a summary of the factual results from the investigation activities.

A total of eleven (11) boreholes, labelled NW-01 through NW-11, were drilled along the proposed noise barrier wall alignment. The fieldwork was carried out in two stages, one being in November 2024 (boreholes NW-01 through NW-08) and the other in July 2025 (NW-09 through NW-11). The borehole drilling was completed by a geotechnical drilling subcontractor, Landshark Drilling.

Soil samples were obtained at regular intervals using a 50-mm split spoon sampler driven with an automatic hammer in general accordance with the Standard Penetration Test (SPT) procedure (ASTM D1586). The split spoon samplers used in the investigation limit the maximum particle size that can be sampled and tested to about 35 mm. Therefore, particles or objects that may exist within the soils that are larger than this dimension would not be sampled or represented in the grain size distributions. Other in situ testing such as field vane tests (FVTs), could not be undertaken because the cohesive soils encountered during the investigation typically exhibited stiff consistency or silty and sandy components. FVTs are not to be conducted in stiff clay or silty and sandy soils as per ASTM D2573 due to the influence on the test results.

The recovered samples from the borehole investigation were identified in the field, placed in labelled containers, and transported to AECOM's Mississauga laboratory for further examination and testing. The recovered soil samples were subjected to Visual Identification (VI) as well as to classification tests, consisting of water content determinations, grain size distribution analyses, and Atterberg limits determinations.

In-situ groundwater levels or cave-in depths were observed at the completion of each borehole. All boreholes were backfilled with a bentonite mixture upon completion in general accordance with Ontario Regulation 903 (as amended) and the ground surface was restored to as near original condition as practicable.

The field work was monitored on a full-time basis by a member of AECOM who located the boreholes in the field, arranged the clearance of underground utilities, directed the sampling and testing, and logged the boreholes. All laboratory tests were carried out in general accordance with MTO and/or ASTM Standards, as applicable.

The borehole locations were surveyed in the field, positioned relative to MTM NAD 83 (Zone 10) northing and easting coordinates, and ground elevation are referenced to Geodetic datum (CGVD28 datum). The borehole locations including the geographical coordinates, ground elevation and depths are summarized in the table below.

The Record of Borehole Logs and Laboratory Test Results for the boreholes drilled at the proposed noise barrier wall are included in **Appendix C** and **Appendix D**, respectively.

Table 1: Boreholes for Proposed Noise Barrier Wall

Borehole ID	MTM Zone 10 Coordinates		Latitude (°)	Longitude (°)	Ground Surface Elevation (mASL)	Depth (mBGS)
	Northing	Easting				
NW-01	4887280	296923	44.125472	-79.598426	279.93	8.23
NW-02	4887311	296995	44.125752	-79.597527	278.48	8.23
NW-03	4887348	297060	44.126086	-79.596715	277.36	8.23
NW-04	4887383	297130	44.126401	-79.595841	275.68	8.23
NW-05	4887422	297196	44.126753	-79.595017	274.09	8.23
NW-06	4887460	297256	44.127096	-79.594268	270.89	8.23
NW-07	4887512	297327	44.127564	-79.593381	269.11	8.23
NW-08	4887549	297385	44.127898	-79.592657	267.22	8.23
NW-09	4887599	297450	44.128349	-79.591846	266.13	12.80
NW-10	4887638	297513	44.128700	-79.591059	267.21	8.23
NW-11	4887680	297573	44.129079	-79.590310	268.74	8.23

Notes: mASL – metres above mean sea level
mBGS – meters below existing ground surface

The approximate locations of the boreholes are shown on the Borehole Location Plans, Drawing No. 1 through Drawing No. 3, provided in **Appendix A**.

4. Site Geology and Stratigraphy

4.1 Regional Geological Conditions

According to the published information (The Physiography of Southern Ontario, Chapman and Putnam, 3rd Edition, 1984), the project site area is located within three major regions of southern Ontario: the Simcoe Lowlands, the Schomberg Clay Plains and the Peterborough Drumlin Field. More in detail, the site lies on the clay plains, which are characterised by flat to gently undulating topography and underlain mainly by glaciolacustrine silts and clays, which origin is the post-glacial Lake Algonquin and Lake Iroquois basins. The drumlins on the other hand, also reported to be present, consist primarily of gravelly sand till or sand and gravel deposits.

In low-lying areas between drumlins, fine-textured lacustrine silts, clays, and fine sands have been deposited, often reaching significant thicknesses. Although these soils typically contain a high proportion of clay-sized particles, the overall behavior of the soil mass is more like a silt. When saturated, the soil becomes very slippery, while in a drier state it is powdery and friable. Organic deposits such as peat may also be present in depressions or former water courses.

The average thickness of these surficial deposits can vary widely across the site, with overburden exceeding 50 m in places, as the site lies in a region of deep drift. These deeper deposits commonly mask the underlying drumlin forms entirely in flatter zones of the terrain.

According to the Bedrock Geology of Ontario, Southern Sheet, Map 2544, published by the Ontario Ministry of Northern Development and Mines, the underlying bedrock in the general area consists of limestone, dolostone, and shale of the Shadow Lake Formation, and other units of the Simcoe Group from the Middle Ordovician period.

Further, the Bedrock Topography of the Alliston Area (Map P.3213) indicates that the bedrock surface in the region varies from approximately 130 m to 160 m below the existing ground surface, confirming the presence of thick overburden.

4.2 Summarized Subsurface Conditions

The following section provides a general description of the major soil types encountered during AECOM's foundation investigation carried out at the noise barrier wall site. It should be noted that the boundaries between the strata have been inferred from drilling observations and non-continuous samples. They generally represent a transition from one soil type to another and should not be inferred to represent exact planes of geological change. The subsurface conditions will vary between and beyond the borehole locations.

The subsurface soil and groundwater conditions encountered in the boreholes, and the results of the field and laboratory testing, are shown on the Record of Borehole Logs in **Appendix C**. A list of abbreviations and symbols are provided to assist in the interpretation of the borehole logs. The Laboratory Test Results are included in **Appendix D.**

4.2.1 Topsoil

A layer of topsoil having a thickness ranging from 75 mm to 900 mm was encountered at the existing ground surface at all the borehole locations. It was generally brown to dark brown in colour and recovered in a dry to moist state. The topsoil thickness may differ beyond the areas where the boreholes were drilled. Some of the variations in topsoil thickness could be attributed to prior agricultural and earthwork activities conducted at the site.

4.2.2 Sandy Clayey Silt

An isolated layer of sandy clayey silt was encountered in boreholes NW-01 and NW-11 below the topsoil. The thickness of this sandy clayey silt ranged from 2.1 m to 3.7 m.

The recorded SPT N values ranged from 4 blows to 26 blows per 305 mm of penetration, indicating a firm to very stiff consistency. The moisture content values of representative sandy clayey silt samples ranged from 9 to 11%.

Grain size distribution of representative samples of the sandy clayey silt are summarized in the below **Table 2** as well as Atterberg limit test results are shown in **Table 3**.

Table 2: Summary of Grain Size Distribution for Sandy Clayey Silt

Borehole ID	Sample ID	Sample Depth (m)	Gravel (%)	Sand (%)	% Fines	
					Silt (%)	Clay (%)
NW-01	SS-3	1.5 – 2.1	5	24	71	
NW-11	SS-3	1.5 – 2.1	8	40	52	
NW-11	SS-5	3.0	3	31	45	21

Table 3: Summary of Atterberg Limits Tests for Sandy Clayey Silt

Borehole ID	Sample ID	Sample Depth (m)	Atterberg Limits			
			Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Behaviour
NW-11	SS-5	3.1 – 3.7	17	12	5	CL-ML

4.2.3 Silty Sand / Gravelly Sand / Sand

A varied cohesionless stratum below the topsoil described as either silty sand, gravelly sand, or sand was encountered in boreholes NW-06 and NW-09. This stratum had a thickness ranging from 1.3 m to 1.4 m.

An additional deeper layer of sand was encountered in borehole NW-09 beneath the glacial till, at a depth of 9.9 mBGS to 11.4 mBGS, and again at a depth of 12.2 mBGS to borehole termination depth of 12.8 mBGS.

The recorded SPT N values ranged from 5 blows to 57 blows per 305 mm of penetration, indicating a loose to very dense relative density. The moisture content of representative silty sand/gravelly sand/sand samples ranged from 9 to 24 %.

Grain size distribution of representative samples of the silty sand/gravelly sand/sand are summarized in **Table 4** below.

Table 4: Summary of Grain Size Distribution for Silty Sand / Gravelly Sand / Sand

Borehole ID	Sample ID	Sample Depth (m)	Gravel (%)	Sand (%)	% Fines	
					Silt (%)	Clay (%)
NW-09	SS-3	1.5 – 2.1	30	57	13	
NW-09	SS-17	12.2 – 12.8	0	82	18	

4.2.4 Clayey Silt

A cohesive stratum of clayey silt was encountered either below the topsoil, silty sand, or gravelly sand in boreholes NW-06 through NW-10. This stratum was encountered at depths of 0.2 mBGS and 2.3 mBGS and extended to 4.6 mBGS.

An additional deeper layer of clayey silt was encountered in borehole NW-09 at a depth of 11.4 mBGS and extended to 12.2 mBGS.

The recorded SPT N values ranged from 6 blows to 21 blows per 305 mm of penetration, indicating a firm to very stiff consistency. The moisture content of representative clayey silt samples ranged from 11% to 26%.

The results of grain size distribution tests are summarized in the below **Table 5** as well as Atterberg limit test results are shown in **Table 6**.

Table 5: Summary of Grain Size Distribution for Clayey Silt

Borehole ID	Sample ID	Sample Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
NW-06	SS-3	1.5 – 2.1	0	12	47	41
NW-07	SS-2	0.8 – 1.4	0	16	56	28
NW-08	SS-5	3.1 – 3.7	1	23	51	25
NW-08	SS-6	3.8 – 4.4	8	17	47	28
NW-09	SS-16	11.4 – 12.0	2	12	26	61
NW-10	SS-4	2.3 – 2.9	0	0	51	49

Table 6: Summary of Atterberg Limits Tests for Clayey Silt

Borehole ID	Sample ID	Sample Depth (m)	Atterberg Limits			
			Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Behaviour
NW-06	SS-3	1.5 – 2.1	32	17	15	CL
NW-07	SS-2	0.8 – 1.4	27	15	12	CL
NW-08	SS-5	3.1 – 3.7	21	12	9	CL
NW-10	SS-4	2.3 – 2.9	32	19	13	CL

4.2.5 Glacial Till

The basal stratum encountered in the boreholes along the noise barrier wall alignment was glacial till. The information provided by the exploratory boreholes indicates the glacial till is heterogeneous although the deposit can be split into a mainly cohesive till type and a non-cohesive till type. The cohesionless member is typically described as silty sand to silt and sand/sand and gravel, with the cohesive part reported as sandy clayey silt to sandy silt. The glacial till was encountered in all the boreholes except for NW-09, of which were terminated within this layer at a depth of 8.2 mBGS.

The recorded SPT N values for the non-cohesive glacial till ranged from 9 blows to over 100 blows per 305 mm of penetration, indicating a loose to very dense relative density. The moisture content of representative non-cohesive glacial till samples ranged from 4% to 20%.

The recorded SPT N values for the cohesive glacial till ranged from 4 blows to 71 blows per 305 mm of penetration, indicating a firm to hard consistency. The moisture content of representative cohesive glacial till samples ranged from 7% to 17%.

The results of the grain size distribution tests for the non-cohesive glacial till are summarized in **Table 7** below.

Table 7: Summary of Grain Size Distribution (Silty Sand / Silt and Sand TILL)

Borehole ID	Sample ID	Sample Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
NW-01	SS-5	3.1 – 3.7	2	51	35	12
NW-03	SS-2	0.8 – 1.4	9	65	26	
NW-03	SS-5	3.1 – 3.7	3	50	34	13
NW-03	SS-9	6.1 – 6.7	1	49	32	18
NW-04	SS-6	3.8 – 4.4	1	49	50	
NW-10	SS-10	6.9 – 7.5	5	40	55	
NW-11	SS-8	5.3 – 5.9	1	47	47	5
NW-11	SS-11	7.6 – 8.2	11	47	42	

The results of the grain size distribution tests for the cohesive glacial till are summarized in **Table 8**. The summary of the results for Atterberg limits is shown in **Table 9**.

Table 8: Summary of Grain Size Distribution (Sandy Clayey Silt / Sandy Silt TILL)

Borehole ID	Sample ID	Sample Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
NW-01	SS-11	7.6 – 8.2	2	38	60	
NW-02	SS-2	0.8 – 1.4	1	31	44	24
NW-02	SS-8	5.4 – 6.0	11	25	64	
NW-02	SS-10	6.9 – 7.5	0	25	52	23
NW-04	SS-10	6.9 – 7.5	12	21	67	
NW-05	SS-3	1.5 – 2.1	0	23	57	20
NW-05	SS-5	3.1 – 3.7	2	43	40	15
NW-05	SS-8	5.4 – 6.0	2	28	54	16
NW-07	SS-6	3.8 – 4.4	4	20	76	
NW-08	SS-9	6.1 – 6.7	14	28	58	
NW-09	SS-6	3.8 – 4.4	5	32	63	
NW-09	SS-9	6.1 – 6.7	3	20	52	25

Table 9: Summary of Atterberg Limits Tests (Sandy Clayey Silt TILL)

Borehole ID	Sample ID	Sample Depth (m)	Atterberg Limits			
			Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Behaviour
NW-02	SS-4	2.3 – 2.9	22	13	9	CL
NW-09	SS-9	6.1 – 6.7	19	9	10	CL

4.3 Groundwater Conditions

Groundwater observations were made in each borehole as they were drilled and upon completion of drilling. No monitoring wells were installed as part of this investigation. The groundwater levels encountered within the boreholes at the time of fieldwork and upon completion of drilling are presented in **Table 10** and in the Record of Borehole Logs in **Appendix C**.

Table 10: Summary of Groundwater Measurements

Borehole Identification Number	Ground Surface Elevation (mASL)	Cave-in Level (mBGS/ Elev)	Groundwater Level (mBGS) / Elevation (mASL)
			Upon Completion
NW-01	279.9	7.6 / 272.3	5.0 / 274.9
NW-02	278.5	6.5 / 272.0	Dry
NW-03	277.4	7.5 / 269.9	Dry
NW-04	275.7	6.2 / 269.5	4.2 / 271.5
NW-05	274.1	3.1 / 271.0	2.9 / 271.2
NW-06	270.9	6.9 / 264.0	4.4 / 266.5
NW-07	269.1	4.1 / 265.0	Dry
NW-08	267.2	6.2 / 261.0	Dry
NW-09	266.1	7.7 / 258.4	7.0 / 259.1
NW-10	267.2	5.2 / 262.0	Dry
NW-11	268.7	6.1 / 262.6	5.2 / 263.5

The groundwater conditions described in this report refer to those observed at the place and date of observation noted in the report. No artesian conditions were found in the open boreholes. These levels and conditions may vary locally due to seasonal fluctuations, groundwater regimes encountered at the site or because of construction, and/or other activities on the site or adjacent land.

5. Closure

The geotechnical fieldwork for this project was carried out under the supervision of Mr. A. Abouzaid and the boreholes were drilled by Landshark Drilling Services.

This Foundation Investigation Report (FIR) was prepared by Alfonso Ruiz. Technical and quality reviews were carried out by Senior Geotechnical/Foundation Engineers, Amer Mohammad, P.Eng. and Taesang Ahn, PhD, P.Eng. and AECOM's Geotechnical Lead Ontario, and Carlos Nascimento, P.Eng., the Designated MTO Foundations Contact for this project.

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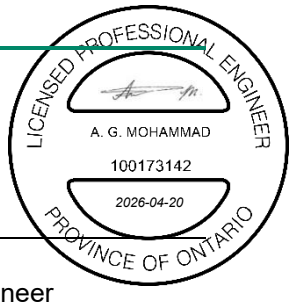

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Part B – Foundation Design Report

Bradford Bypass - West Contract
Noise Barrier Wall

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For
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6. Discussion and Engineering Recommendations

6.1 General

This section provides foundation recommendations for the design and construction of the proposed noise barrier wall along the proposed BBP, east of the 10th Sideroad interchange.

Based on a review of the CTS drawings, the proposed noise barrier wall will be a 5 m high wall, including a 1.0 m high traffic barrier, positioned along the right side of the BBP east bound lane (between mainline STA 13+037 and STA 13+830), for a total length of 793 m. Specifically, from BBP Mainline STA 13+037 to STA 13+700 (663 m long), the noise barrier wall will be built and constructed at or near grade with cut and fill sections being less than 4 m in depth/height. For STA 13+700 to 13+725 (25 m long), the proposed noise barrier wall will be built and constructed on a section of high fill, ranging from 4.0 m to 4.5 m in height. The remaining section from STA 13+725 to 13+830 (105 m long) will be constructed on sections at or near grade. The CTS drawings are included in **Appendix E** for reference.

The foundation recommendations provided herein are based on the interpretation of subsurface information obtained and are prepared in accordance with the Canadian Highway Bridge Design Code (CHBDC), CSA S6:19 and MTO's Guideline for Foundation Engineering Services (April 2022).

This report has been prepared for the Ministry of Transportation Ontario (MTO) and AECOM's design team. The recommendations and discussions herein are not intended for use by other parties, including contractors. Contractors should undertake their own assessment of the factual data provided in Part A – Foundation Investigation Report (FIR). The discussions and recommendations presented in this report are intended to assist the designers with sufficient information that would enable them to proceed with the detailed design of the proposed structure foundations.

Construction comments made herein are based on geotechnical considerations only and should not be relied upon without further independent assessment and qualification in the selection of means and methods for construction. In addition, comments related to construction are provided solely to highlight considerations that may influence design and are not intended to be construed as construction methodology recommendations.

6.2 Noise Barrier Wall Foundations

The proposed noise barrier wall will need to be constructed in accordance with Ontario Provincial Standard Specification OPSS.PROV 760, Construction Specification for Noise Barrier Systems (April 2025). The foundation supporting the proposed noise barrier wall structure is expected to include drilled caisson shafts as per OPSS 903 (Construction Specification for Deep Foundation).

For the assessments described below, the resistance provided by the upper 1.5 m of soil should be neglected to account for frost action. In addition, should the shafts be located within 1.0 m of the edge of the roadway embankment, the shaft depths should be increased by 0.5 m in accordance with OPSS.PROV 760.

Geotechnical design parameters for the design of caisson foundations for the proposed noise barrier wall are provided in the table below based on the subsurface conditions encountered in the boreholes. These parameters are based on field and laboratory test data as well as on accepted correlations.

Table 11: Summary of Characteristic Design Parameters

Approx. STA	Borehole ID	Approx. Design Finished Ground Surface Elev. (mASL)	Stratum	Avg. Depth Below Proposed Grade (mBGS)	Approx. Elevation Range (mASL)	Design Groundwater Level (mBGS)	Cu (kPa)	ϕ′ (°)	γ (kN/m³)	γ′ (kN/m³)	nh (kPa/m)	k_p
13+037 to 13+087	NW-01	280.9 to 280.2 (Incl. avg.1.0 m new fill)	New Compacted Embankment Fill	0-1.0	280.9-279.2	2.9	-	-	21	-	-	-
			Sandy Clayey Silt (firm to very stiff)	1.0-1.5	279.9-278.7		-	-	18	-	-	-
				1.5-3.1	279.4-277.1		80	29	18	8	-	2.9
			Silty Sand (Till) (compact to very dense)	3.2–8.6	277.7-271.6		-	35	20	10	14,000	3.7
			Sandy Clayey Silt (Till) (hard)	8.6-9.2	272.3-271.0		100	30	19	9	-	3.0
13+087 to 13+397	NW-02 to NW-05	280.2 to 274.0 (Incl. avg.1.2 m new fil)	New Compacted Embankment Fill	0-1.2	280.2-272.8	2.9	-	-	21	-	-	-
			Sandy Clayey Silt/Silty Sand (Till) (firm to hard/loose to very dense)	1.2-1.5	279.0-271.5		-	-	18	-	-	-
				1.5-9.2	278.7-264.8		80	29	18	8	-	2.9
13+397 to 13+477	NW-06	274.0 to 272.0 (Incl. avg. 2.4 m of fil)	New Compacted Embankment Fill	0-1.5	274.0-270.5	2.9	-	-	21	-	-	-
				1.5-2.4	271.5-269.6		-	28	21	11	12,000	2.8
			Silty Sand (compact)	2.4-3.7	271.6-268.3		-	28	19	9	6,000	2.8
			Clayey Silt (stiff)	3.7-4.5	270.3-267.5		80	28	18	8	-	2.8
			Silty Sand/Sand and Gravel (Till) (compact to very dense)	4.5-10.4	269.5-261.6		-	35	20	10	14,000	3.7
13+477 to 13+627	NW-07 to NW-08	272.0 to 270.1 (Incl. avg. 3.2 m new fil)	New Compacted Embankment Fill	0-1.5	272.0-268.6	2.9	-	-	21	-	-	-
				1.5-3.2	270.5-266.9		-	28	21	11	12,000	2.8
			Clayey Silt (firm to stiff)	3.2-5.7	269.7-264.4		80	28	18	8	-	2.8
			Sandy Clayey Silt (Till) (stiff to hard)	5.7-10.9	268.4-259.2		100	30	19	9	-	3.0
13-+627 to 13+707	NW-09	270.1 to 268.9 (Incl. avg.4.5 m new fill)	New Compacted Embankment Fill	0-1.5	270.1-267.4	2.9	-	-	21	-	-	-
				1.5-4.5	268.6-264.5		-	28	21	11	12,000	2.8
			Sand/Gravelly Sand (loose to compact)	4.5-5.9	265.6-263.0		-	28	19	9	6,000	2.8
			Clayey Silt (stiff)	5.9-6.6	264.2-262.3		80	28	18	8	-	2.8
			Sandy Clayey Silt (Till) (firm to very stiff)	6.6-13.5	263.5-255.4		100	30	19	9	-	3.0
13+707 to 13+777	NW-10	268.9 to 268.5 (Incl. avg. 2.4 m new fil)	New Compacted Embankment Fill	0-1.5	268.9-267.0	2.9	-	-	21	-	-	-
				1.5-2.4	267.4-266.1		-	28	21	11	12,000	2.8

Approx. STA	Borehole ID	Approx. Design Finished Ground Surface Elev. (mASL)	Stratum	Avg. Depth Below Proposed Grade (mBGS)	Approx. Elevation Range (mASL)	Design Groundwater Level (mBGS)	Cu (kPa)	ϕ′ (°)	γ (kN/m³)	γ′ (kN/m³)	nh (kPa/m)	k_p
			Clayey Silt (stiff to very stiff)	2.4-5.4	266.5-263.1		80	28	18	8	-	2.8
			Silty Sand (Till) (compact to very dense)	5.4-9.8	263.5-258.7		-	35	20	10	14,000	3.7
13+777 to 13+830	NW-11	268.5 to 268.4 (Incl. avg. cut of 0.3m)	Sandy Clayey Silt (firm to very stiff)	0-1.5	268.5-266.9	2.9	-	-	18	-	-	-
				1.5-3.5	267.0-264.9		80	29	18	8	-	2.9
			Silty Sand/Silt and Sand (Till) (dense to very dense)	3.5-7.9	265.0-260.5		-	35	20	10	14,000	3.7

ϕ′: angle of internal friction
c_u: undrained shear strength
γ: bulk unit weight
γ′: effective unit weight below groundwater level
n_h: empirical modulus
K_p: passive earth-pressure coefficient

Note: *Refer to Drawing No. 4 in Appendix A Soil Strata Profile A-A' for depth, thickness and location along the proposed Noise Barrier Wall. The Design Finished Ground Surface Elev. was approximated based on the edge of pavement elevation top for the applicable area (noted by the stationing). The applicable area was assumed to be at mid-way between boreholes where soil layers changed from one borehole to the next adjacent borehole. The Avg. Depth Below Proposed Grade was estimated by taking the average depth of the layer for all boreholes referenced in the same stationing group. The Approx. Elevation Range was estimated by taking the highest Design Finished Ground Surface elevation less the shallowest Avg. Depth Below Proposed Grade and extended to the lowest Design Finished Ground Surface elevation less the deepest Avg. Depth below Proposed Grade. The Design Groundwater Level was assumed to be a constant depth at the site, varying in elevation.*

Design parameters have been given for the strata identified from the ground investigations along the alignment of the proposed noise barrier wall. Provided it is deemed impractical to adjust foundation sizes on a pile-to-pile basis, it is therefore recommended piles be designed considering the worst-case scenario between granular and cohesive ground conditions.

For lateral load resistance, the coefficient of horizontal subgrade reaction can be estimated as follows:

For cohesive soil: $k_s = (67 \times c_u)/d$

- Where:
  - c_u: undrained shear strength (kPa) (see Table 11)
  - d: pile diameter (m)

For cohesionless soil: $k_s = n_h \times (z/d)$

- Where:
  - n_h: empirical modulus (kPa/m) (see Table 11)
  - z: depth below ground surface (m)
  - d: pile diameter (m)

Based on the groundwater observations/readings and cave-in measurements after completion of drilling, the non-stabilized groundwater levels varied from 2.9 to 7.0 mBGS corresponding to elevations near Elev. 259.1 mASL to Elev. 274.9 mASL. Considering the noted groundwater level variations, it is recommended that the design groundwater level is conservatively taken at 2.9 mBGS for design purposes. It should be noted that groundwater monitoring wells were not installed in any of the boreholes, and long-term groundwater monitoring was not included.

The K_p coefficients provided above is intended to be used in locations where flat ground is present. Should a foundation be at/near sloping ground, the passive resistance of the piles shall be revised to accurately predict this. This shall be done by considering ineffective for passive resistance the upper section of pile, down to a point where the distance between foundation edge and the slope face is equal to 4 times the diameter of the foundation.

6.3 Frost Protection

Any shallow foundation as well as pile caps will need to be founded at a minimum depth of 1.5 m below the lowest surrounding final grade, including any distance measured perpendicular to sloping ground surfaces, to provide adequate protection against frost penetration, in accordance with the Ontario Provincial Standard Drawing OPSD 3090.101. All exterior foundation elements (e.g., shallow footings, pile caps) or foundation elements in unheated areas should be provided with a minimum of 1.5 metres of earth cover (or thermal equivalent) including any offset due to sloping terrain for frost protection purposes. Isolated, unheated foundation elements adjacent to surfaces which are cleared of snow cover during winter months should be provided with a minimum of 1.5 metres of earth cover or thermal equivalent using high density polystyrene (HDPE) rigid foam insulation. Frost protection details noted within OPSS.PROV 760 should also be followed.

6.4 Construction Considerations

6.4.1 Caisson Excavation and Placement

As mentioned earlier, the caissons should be designed and constructed in accordance with OPSS.PROV 760 and OPSS 903. Caissons will need to be advanced through the fill and native soils to the design depths/elevations, or deeper until competent strata is encountered. The base of each caisson must be thoroughly cleaned of disturbed or softened material prior to concreting. Temporary steel casings or slurry methods should be used as necessary to maintain shaft stability and allow proper cleaning and inspection. The presence of cobbles, boulders, or debris should be anticipated within the till deposits, as these may delay excavation and require appropriate drilling equipment. A Notice to Contractor has been added in Appendix F.

Concrete placement should be continuous and carried out under proper quality control measures to prevent segregation or contamination of the shaft concrete.

6.4.2 Groundwater and Surface Water Control

Groundwater observations at the borehole locations varied across the site, as detailed in Section 4.3. Groundwater depths ranged anywhere from 2.9 mBGS to 7.0 mBGS, as well as some boreholes being completely dry. Groundwater monitoring wells were not installed in any of the boreholes, and long-term groundwater monitoring was not included.

Depending on caisson depth and construction methodology, groundwater control may be required but is not anticipated. According to the interpretation of the subsurface conditions reported in Part A, foundation caissons are expected to advance through the soils and water seepage may occur during the drilling of the caissons. Therefore, the use of temporary liners or casing is recommended to avoid drill hole collapses during boring. Temporary dewatering and/or concrete placement using tremie methods will likely be needed based on the type of soil and fill materials expected, resulting in short periods of time for the drill hole to remain open. The temporary liners should be withdrawn in such way as to allow for a 0.6 m head of concrete above the concrete being cast.

7. Closure

Interpretation of the field data and preparation of the report was completed by A. Ruiz, and the technical review of the report was completed by A. Mohammad, P.Eng.

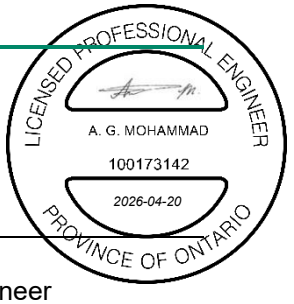
An independent quality review of this report was carried out by Taesang Ahn, PhD, P.Eng. and C. Nascimento, P.Eng., the Designated MTO Foundations Contact and Quality Control Auditor for this assignment.

AECOM Canada ULC

Prepared by

Alfonso Ruiz
Geotechnical Specialist

Reviewed by



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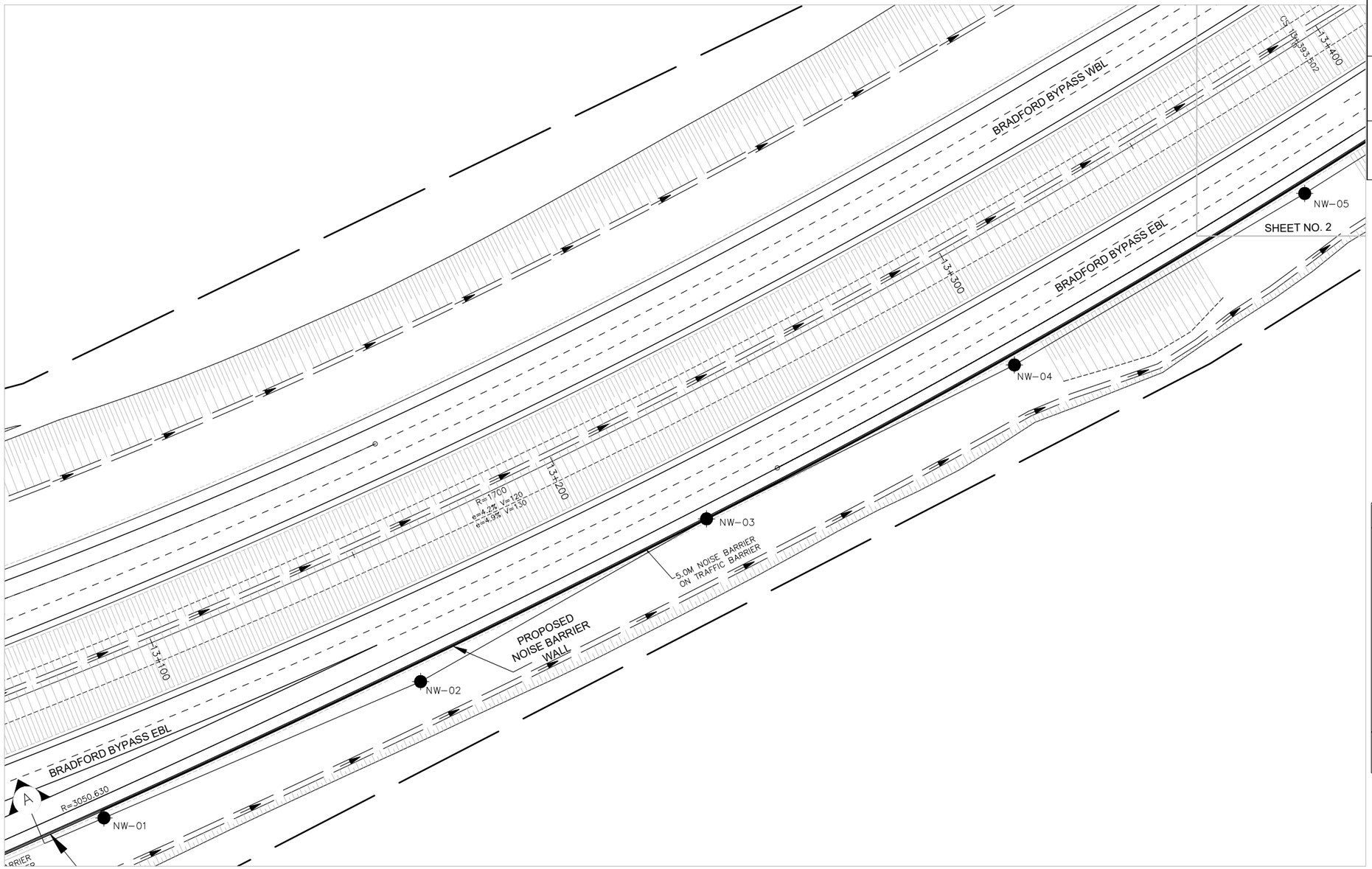
and AECOM's Geotechnical Lead Ontario
Taesang.Ahn@aecom.com

Appendix A

Borehole Location Plans and Soil Strata

MINISTRY OF TRANSPORTATION, ONTARIO



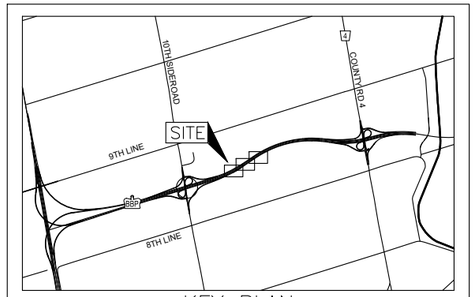
PLAN
SCALE 1:500

0 10 20 Meters

CONT No. 2025–2005
GWP No. 2026–23–00

BRADFORD BYPASS WEST
NOISE BARRIERS – BRADFORD BYPASS
BOREHOLE LOCATION PLAN
STA. 13+100 TO STA. 13+400

AECOM



LEGEND

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- BOREHOLE – PREVIOUS INVESTIGATION (NOT APPLICABLE)
- SEAL
- PIEZOMETER
- N — STANDARD PENETRATION TEST VALUE
- 16 — BLOWS/0.3M UNLESS OTHERWISE STATED (STD. PEN. TEST, 475 J/BLOW)
- 100% — ROCK QUALITY DESIGNATION (RQD)
- WL IN PIEZOMETER, MEASURED ON MMM DD, YYYY
- WL UPON COMPLETION OF DRILLING
- A A' — CROSS SECTION EXTENT

NOTES:

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BOREHOLE COORDINATES (MTM NAD 83 ZONE 10)

No.	ELEVATION	NORTHING	EASTING
NW–01	279.93	4887280	296923
NW–02	278.48	4887311	296995
NW–03	277.36	4887348	297060
NW–04	275.68	4887383	297130
NW–05	274.09	4887422	297196
NW–06	270.89	4887460	297256
NW–07	269.11	4887512	297327
NW–08	267.22	4887549	297385
NW–09	266.13	4887599	297450
NW–10	267.21	4887638	297513
NW–11	268.74	4887680	297573

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NO.	DATE	BY	REVISION
2	MAR. 6	CS	FINAL
1	OCT. 25	AV	DRAFT

Geocres No. 31D04–023

HWY. BRADFORD BYPASS WEST	PROJECT NO. 60731727		DIST. CENTRAL
SUBM'D. __	CHKD. __	DATE: 10/30/2025	SITE:
DRAWN: AV	CHKD. AR	APPD. CN	DWG. 1

PLOT DATE: 2025/11/06
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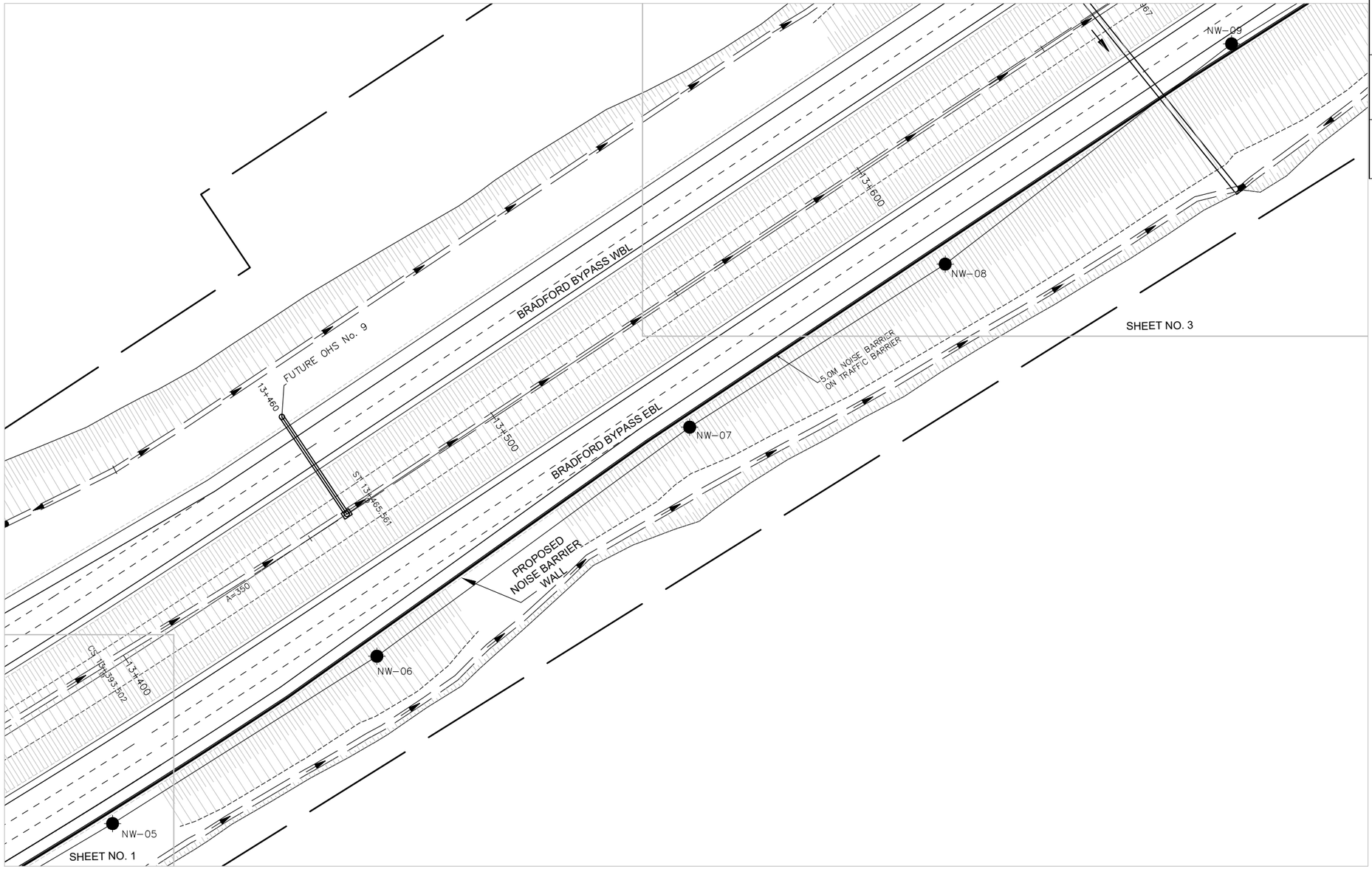
MINISTRY OF TRANSPORTATION, ONTARIO



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PLAN
SCALE 1:500
0 10 20 Meters

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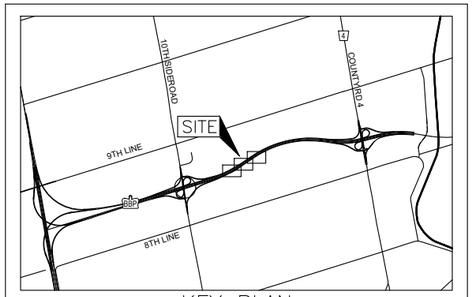
CONT No. 2025–2005
GWP No. 2026–23–00

BRADFORD BYPASS WEST
NOISE BARRIERS – BRADFORD BYPASS
BOREHOLE LOCATION PLAN
STA. 13+400 TO STA. 13+600

AECOM



KEY PLAN
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LEGEND

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- WL UPON COMPLETION OF DRILLING
- A A' — CROSS SECTION EXTENT

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No.	ELEVATION	NORTHING	EASTING
NW–01	279.93	4887280	296923
NW–02	278.48	4887311	296995
NW–03	277.36	4887348	297060
NW–04	275.68	4887383	297130
NW–05	274.09	4887422	297196
NW–06	270.89	4887460	297256
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NW–08	267.22	4887549	297385
NW–09	266.13	4887599	297450
NW–10	267.21	4887638	297513
NW–11	268.74	4887680	297573

NO.	DATE	BY	REVISION
2	MAR. 6	CS	FINAL
1	OCT. 25	AV	DRAFT

Geocres No. 31D04–023

HWY. BRADFORD BYPASS WEST	PROJECT NO. 60731727		DIST. CENTRAL
SUBM'D. __	CHKD. __	DATE: 10/30/2025	SITE:
DRAWN: AV	CHKD. AR	APPD. CN	DWG. 2

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MINISTRY OF TRANSPORTATION, ONTARIO

CONT No. 2025-2005
GWP No. 2026-23-00

BRADFORD BYPASS WEST
NOISE BARRIERS – BRADFORD BYPASS

BOREHOLE LOCATION PLAN
STA. 13+600 TO STA. 13+900

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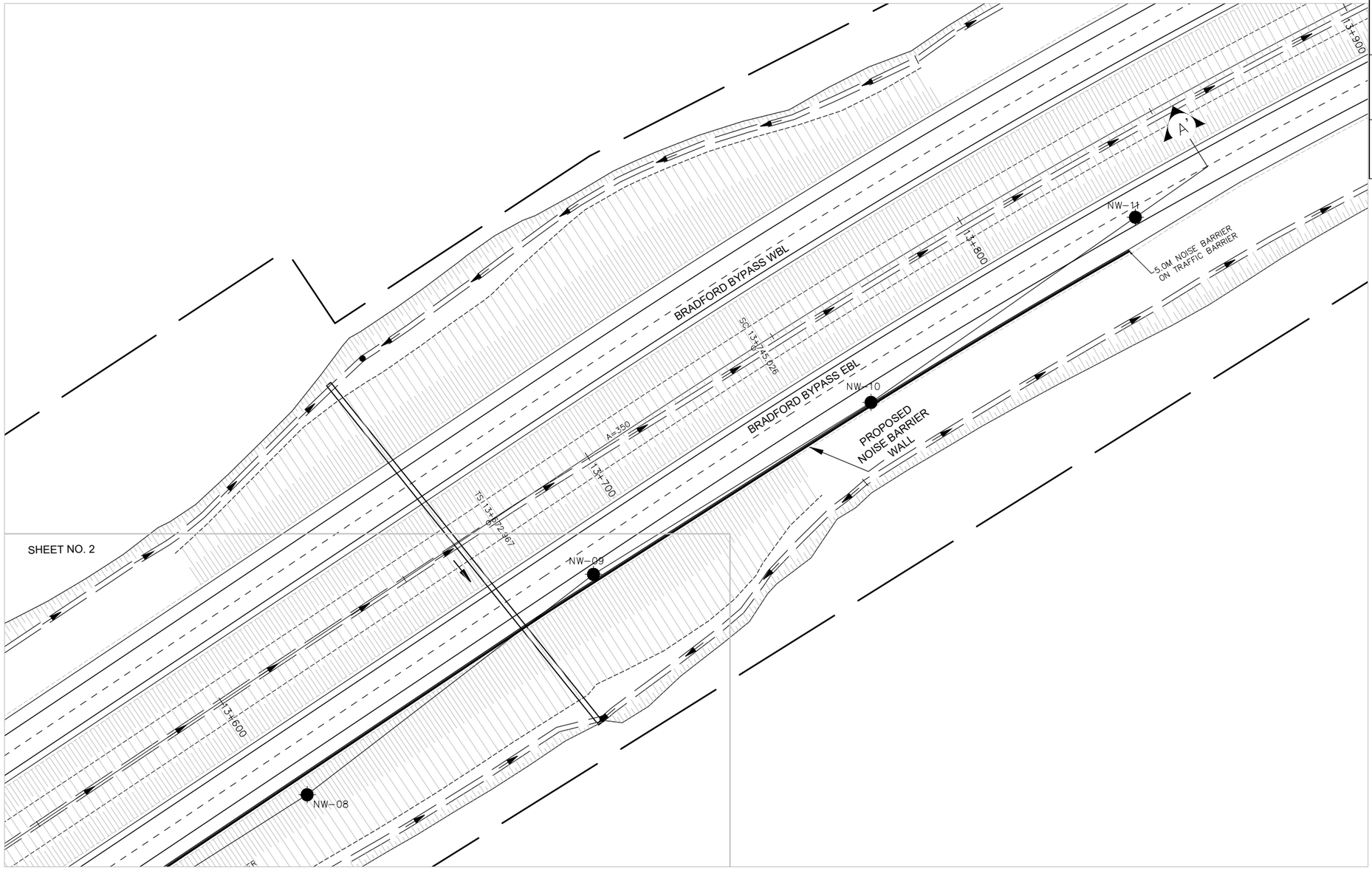

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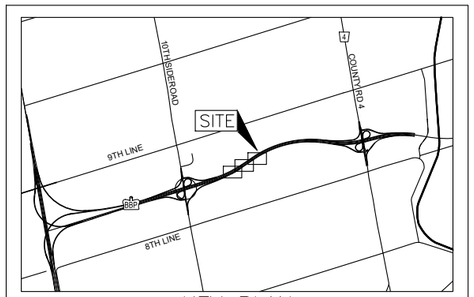

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- A A' — CROSS SECTION EXTENT

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NW–06	270.89	4887460	297256
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NO.	DATE	BY	REVISION
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1	OCT. 25	AV	DRAFT

Geocres No. 31D04-023

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SUBM'D. ___	CHKD. ___	DATE: 10/30/2025	SITE:
DRAWN: AV	CHKD. AR	APPD. CN	DWG. 3

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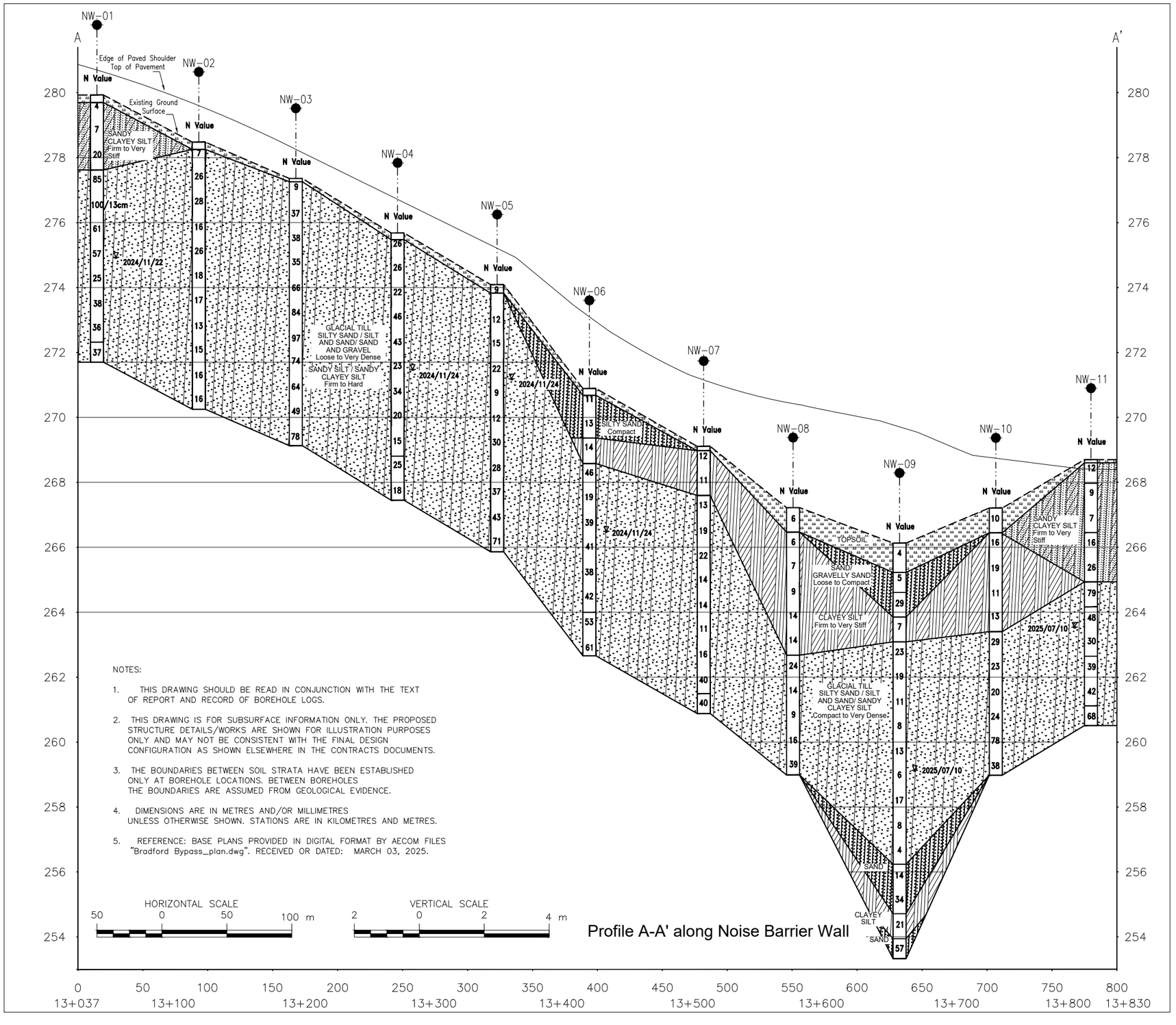
MINISTRY OF TRANSPORTATION, ONTARIO



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HORIZONTAL SCALE
50 0 50 100 m

VERTICAL SCALE
2 0 2 4 m

Profile A-A' along Noise Barrier Wall

PLOT DATE: 2026/04/06
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CONT No. 2025-2034
GWP No. 2026-23-00

BRADFORD BYPASS WEST
NOISE BARRIERS – BRADFORD BYPASS
SOIL STRATA
PROFILE SECTION A-A'

AECOM

LEGEND

- BOREHOLE – CURRENT INVESTIGATION
- BOREHOLE – PREVIOUS INVESTIGATION (NOT APPLICABLE)
- SEAL
- PIEZOMETER
- N STANDARD PENETRATION TEST VALUE
- 16 BLOWS/0.3M UNLESS OTHERWISE STATED (STD. PEN. TEST, 475 J/BLOW)
- 100% ROCK QUALITY DESIGNATION (RQD)
- WL IN PIEZOMETER, MEASURED ON YYYY/MM/DD
- WL UPON COMPLETION OF DRILLING

LEGEND – SOIL STRATA:

- TOPSOIL
- SANDY CLAYEY SILT
- CLAYEY SILT
- SILTY SAND / GRAVELLY SAND / SAND
- GLACIAL TILL SILTY SAND / SILT and SAND / SAND and GRAVEL / SANDY SILT/ SANDY CLAYEY SILT

BOREHOLE COORDINATES (MTM NAD 83 ZONE 10)

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NO.	DATE	BY	REVISION
2	APR 1	SP	FINAL
1	OCT 25	AV	DRAFT

Geocres No. 31D04-023

HWY. BRADFORD BYPASS WEST	PROJECT NO. 60731727		DIST. CENTRAL
SUBM'D. ___	CHKD. ___	DATE: 03/06/2026	SITE:
DRAWN: AV	CHKD. AR	APPD. CN	DWG. 4

Appendix B

Site Photographs

AECOM

Photographic Log

Client Name:	Report Name	Street Name:	Project No.
MTO	Foundation Investigation and Design Report BBP West – Noise Barrier Wall	Bradford Bypass	60731727

Photo No.	Date
1	11/25/2024

Direction Photo Taken

East

Description

- General site conditions
- Borehole NW-01 location.
- Rig in the background drilling Borehole NW-02

Photo No.	Date
2	11/26/2024

Direction Photo Taken

West

Description

- General site conditions
- Location of borehole NW-02.

AECOM

Photographic Log

Client Name:	Report Name	Street Name:	Project No.
MTO	Foundation Investigation and Design Report BBP West – Noise Barrier Wall	Bradford Bypass	60731727

Photo No.	Date
3	11/26/2024

Direction Photo Taken

South

Description

- Wooded area near borehole NW-05.

Appendix C

Record of Borehole Logs

AECOM

TERMINOLOGY USED IN BOREHOLE LOGS

Topsoil: Mixture of soil and humus capable of supporting good vegetative growth.

Peat: A mass of organic matter usually fibrous in texture in various stages of decomposition, generally dark brown to black in colour and of spongy consistency.

Fill: The term fill has been used to describe materials which have been placed by non-natural processes. Fills can often be heterogeneous in nature and those relying on this report should expect them to contain deleterious materials. Such materials can include wood, bricks, slag, porcelain, organics, and obstructions such as scrap metal, storage tanks, and abandoned concrete/steel structures.

Due to the uncertainty of the placement method of the material, the boring samples obtained for this report are not expected to represent other materials at any horizontal or vertical distance from where the sample was obtained.

Fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill site. Unless specifically stated, the fill on this site has not been tested for contaminants that can be considered toxic or hazardous. Testing to determine the toxicity of fill materials can be conducted, if requested.

Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Till must be considered heterogeneous in composition and containing pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) and boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the logs. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Due to the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone. Caution is essential when dealing with sensitive excavations or dewatering programs in till materials.

Terminology describing soil structure

Desiccated: having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.

Stratified: alternating layers of varying material or color with the layers greater than 6 mm thick.

Laminated: alternating layers of varying material or color with the layers less than 6 mm thick.

Fissured: material breaks along plane of fracture.

Varved: composed of regular alternating layers of silt and clay.

Slickensided: fracture planes appear polished or glossy, sometimes striated.

Blocky: cohesive soil that can be broken down into small angular lumps which resist further breakdown.

Lensed: inclusion of small pockets of different soil, such as small lenses of sand scattered through a mass of clay; not thickness.

Seam: a thin, confined layer of soil having different particle size, texture, or color from materials above and below.

Homogeneous: same color and appearance throughout.

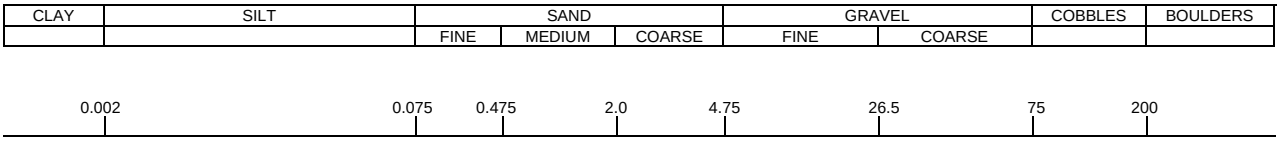
Well Graded: having wide range in grain sized and substantial amounts of all predominantly on grain size.

Uniformly Graded: predominantly on grain size.

Residual: completed weathered sedimentary rock mixed with native soils.

All soil sample descriptions included in this report generally follow the Canadian Foundations Engineering Manual and the Unified Soil Classification System. These systems follow the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by AECOM follow the same system. Note that, with exception of those samples where a grain size distribution analysis has been completed, all samples have been classified by visual inspection. Visual inspection classification is not sufficient to provide exact gain sizing.

ISSMFE / USCS SOIL CLASSIFICATION



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

The standard terminology to describe cohesive soils includes consistency, which is based on undrained shear strength as measured by in-situ vane tests, penetrometer tests, unconfined compression tests or similar field and laboratory analysis. Standard Penetration Test 'N' values can also be used to provide an approximate indication of the consistency and shear strength of fine grained, cohesive soils.

The standard terminology to describe cohesionless soils includes the compactness condition as determined by the Standard Penetration Test 'N' value.

Cohesionless Soils		Cohesive Soils			Composition	
Compactness Condition	**SPT N-Index (blows per 0.3 m)**	**Consistency**	**Undrained Shear Strength (kPa)**	**SPT N-Index (blows per 0.3 m)**	**Term**	**Criteria**
Very loose	0 – 4	Very soft	< 12	< 2	Trace	1% - 10%
Loose	4 – 10	Soft	12 - 25	2 – 5	Some	10% - 20%
Compact	10 – 30	Firm	25 – 50	5 – 8	Adjective	20% - 35%
Dense	30 – 50	Stiff	50 – 100	8 – 15	And	> 35%
Very Dense	> 50	Very Stiff	100 - 200	15 – 30	Noun	> 35% & largest fraction
		Hard	> 200	> 30		

Standard Penetration Test (SPT):

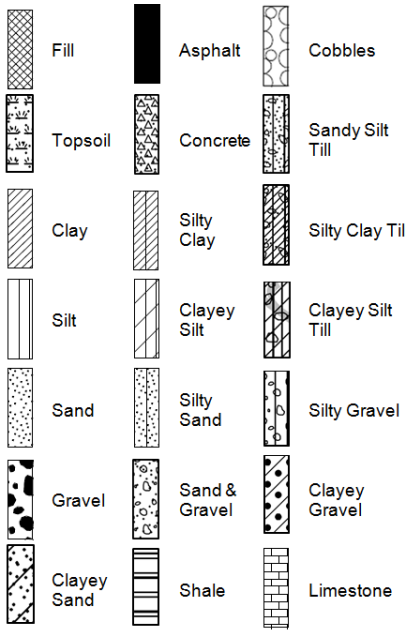
The number of blows required to drive a 50 mm (2 in.) open split spoon sampler from a depth of 150 mm (6 in.) to 450 mm (18 in.) in undisturbed soil. Each blow is driven by a 63.6 kg (140 lb.) hammer free falling a distance of 0.76 m (30 in.).

Sample & Soil Abbreviations	
CORE	Rock core sample
AS	Auger sample
FV	Field vane
PP	Pocket penetrometer
SG	Specific Gravity
GS	Grab sample
SS	Split spoon sample
DCPT	Dynamic cone penetration test
GR	Gravel
SA	Sand
SI	Silt
CL	Clay

Contaminant Abbreviations	
BNAE	base/neutral/acid extractables
BTEX	benzene, toluene, ethylbenzene, xylenes
OCP	organochlorine pesticides
MI	metals & inorganics
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PHC	CCME petroleum hydrocarbons (fractions 1 – 4)
VOC	volatile organic compounds (includes BTEX)

Plasticity Description	Liquid Limit (w_l)
Low	$w_l < 35$
Medium	$35 < w_l < 50$
High	$50 < w_l$

Strata/Graphic Plot



RECORD OF BOREHOLE NW-01

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887280.0; E 296923.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.22 - 2024.11.22 LATITUDE 44.125472 LONGITUDE -79.598426 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
279.9	GROUND SURFACE										
279.7	**TOPSOIL**, dark brown (250 mm)										
0.2	**SANDY CLAYEY SILT**, trace gravel, brown to grey, moist, firm to very stiff		1	SS	4						
			2	SS	7		279				
			3	SS	20		278		○		5 24 (71)
277.6											
2.3	**SILTY SAND**, some clay, trace gravel, brown to grey, moist, compact to very dense (TILL)		4	SS	85						
			5	SS	100/ 13cm		277		○		2 51 35 12
			6	SS	61		276				
			7	SS	57	▽	275		○		
			8	SS	25						
			9	SS	38		274				
			10	SS	36		273		○		
272.3											
7.6	**SANDY CLAYEY SILT**, trace gravel, brown to grey, moist, hard (TILL)		11	SS	37		272				2 38 (60)
271.7											
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 7.6 m.
5. Groundwater level was found at a depth of 5.0 m upon completion of drilling.

AECOM

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE NW-02

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887311.0; E 296995.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.24 - 2024.11.24 LATITUDE 44.125752 LONGITUDE -79.597527 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
278.5	GROUND SURFACE										
278.2	**TOPSOIL**, dark brown (230 mm)										
0.2	**SANDY CLAYEY SILT**, some to trace gravel, brown to grey, moist, firm to very stiff (TILL)		1	SS	7		278				
			2	SS	26				○		1 31 44 24
			3	SS	28		277				
			4	SS	16		276		⊕		
			5	SS	26		275				
			6	SS	18				○		
			7	SS	17		274				
			8	SS	13		273		○		11 25 (64)
			9	SS	15		272				
			10	SS	16				○		0 25 52 23
			11	SS	16		271				
270.2											
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 6.5 m.
5. Borehole was dry upon completion of drilling.

AECOM MTO FOUNDATION LOG BBP WEST LOGS 12 23 25 - NW UPDATES 2026.03.04.GPJ AECOM OTTAWA DATA TEMPLATE.GDT 26-3-4

AECOM

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE NW-03

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887348.0; E 297060.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.24 - 2024.11.24 LATITUDE 44.126086 LONGITUDE -79.596715 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
277.4	GROUND SURFACE										
0.1	**TOPSOIL**, dark brown (75 mm)										
	SILTY SAND, some clay, trace gravel, trace cobbles, brown to grey, moist, loose to very dense (TILL)		1	SS	9		277				
			2	SS	37				○		9 65 (26)
			3	SS	38		276				
			4	SS	35		275				
			5	SS	66		274		○		3 50 34 13
			6	SS	84						
			7	SS	97		273		○		Non-plastic
			8	SS	74		272				
			9	SS	64		271		○		1 49 32 18
			10	SS	49						
			11	SS	78		270		○		
269.1											
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 7.5 m.
5. Borehole was dry upon completion of drilling.

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

AECOM

RECORD OF BOREHOLE NW-04

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887383.0; E 297130.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.24 - 2024.11.24 LATITUDE 44.126401 LONGITUDE -79.595841 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
275.7	GROUND SURFACE										
275.4	**TOPSOIL**, dark brown (230 mm)										
0.2	**SILT and SAND**, trace gravel, trace cobbles, trace clay, brown to grey, moist to very moist, compact to dense (TILL)		1	SS	26		275				
			2	SS	26				○		
			3	SS	22		274				
			4	SS	46		273		○		
			5	SS	43						
			6	SS	23	▽	272		○		1 49 (50)
			7	SS	34		271				
			8	SS	20		270		○		
			9	SS	15						
268.8							269				
6.9	**SANDY CLAYEY SILT**, some gravel, brown to grey, moist, very stiff (TILL)		10	SS	25				○		12 21 (67)
			11	SS	18		268				
267.4											
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 6.2 m.
5. Groundwater level was found at a depth of 4.2 m upon completion of drilling.

AECOM

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE NW-05

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887422.0; E 297196.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.24 - 2024.11.24 LATITUDE 44.126753 LONGITUDE -79.595017 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
274.1	GROUND SURFACE										
273.8	**TOPSOIL**, dark brown (280 mm)		1	SS	9		274		○		
0.3	**SANDY SILT**, some clay, trace gravel, trace cobbles, brown to grey, moist to very moist, stiff to hard (TILL)		2	SS	12		273				
			3	SS	15				○		0 23 57 20
			4	SS	22	▽	272				
	Sample SS-05: pocket / seam described as Silt and Sand (TILL)		5	SS	9		271		○		2 43 40 15
			6	SS	12		270				
			7	SS	30				○		
			8	SS	28		269		○		2 28 54 16
			9	SS	37		268		○		
			10	SS	43		267				
			11	SS	71				○		
265.9							266				
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 3.1 m.
5. Groundwater level was found at a depth of 2.9 m upon completion of drilling.

AECOM

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE NW-06

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887460.0; E 297256.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.24 - 2024.11.24 LATITUDE 44.127096 LONGITUDE -79.594268 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
270.9	GROUND SURFACE										
270.7	**TOPSOIL**, dark brown (200 mm)										
0.2	**SILTY SAND**, some clay, yellowish brown, moist, compact		1	SS	11				○		
269.4			2	SS	13		270				
1.5	**CLAYEY SILT**, some sand, brown, moist, stiff		3	SS	14		269		○		0 12 47 41
268.6											
2.3	**SILTY SAND**, some to trace clay, trace gravel, grey, moist, compact to dense (TILL)		4	SS	46		268				
			5	SS	19				○		
			6	SS	39	▽	267				
			7	SS	41		266		○		
			8	SS	38		265		○		
			9	SS	42				○		
264.0							264				
6.9	**SAND AND GRAVEL**, grey, moist to very moist, very dense (TILL)		10	SS	53						
262.7			11	SS	61		263		○		
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 6.9 m.
5. Groundwater level was found at a depth of 4.4 m upon completion of drilling.

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

AECOM

RECORD OF BOREHOLE NW-07

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887512.0; E 297327.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.25 - 2024.11.25 LATITUDE 44.127564 LONGITUDE -79.593381 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
269.1	GROUND SURFACE										
269.0	**TOPSOIL**, moist, dark brown (180 mm)										
0.2	**CLAYEY SILT**, some sand, brown, moist, stiff		1	SS	12		269				
			2	SS	11		268				0 16 56 28
267.6											
1.5	**SANDY CLAYEY SILT**, trace gravel, brown to grey, moist, stiff to hard (TILL)		3	SS	13		267				
			4	SS	19						
			5	SS	22		266				
			6	SS	14		265				4 20 (76)
			7	SS	14		264				
			8	SS	11						
			9	SS	16		263				
			10	SS	40		262				
			11	SS	40		261				
260.9											
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 4.1 m.
5. Borehole was dry upon completion of drilling.

AECOM MTO FOUNDATION LOG BBP WEST LOGS 12 23 25 - NW UPDATES 2026.03.04.GPJ AECOM OTTAWA DATA TEMPLATE.GDT 26-3-4

AECOM

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE NW-08

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887549.0; E 297385.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY PAK

DATUM Geodetic (CGVD28) DATE 2024.11.25 - 2024.11.25 LATITUDE 44.127898 LONGITUDE -79.592657 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
267.2	GROUND SURFACE										
	TOPSOIL, moist, dark brown		1	SS	6		267		○		
266.5											
0.8	**CLAYEY SILT**, some sand, trace gravel, brown, moist to very moist, firm to stiff		2	SS	6				○		
			3	SS	7		266		○		
			4	SS	9		265		○		
			5	SS	14		264		⊖		1 23 51 25
			6	SS	14		263		○		8 17 47 28
262.6											
4.6	**SANDY CLAYEY SILT**, some gravel, grey, moist, stiff to hard (TILL)		7	SS	24				○		
			8	SS	14		262				
			9	SS	9		261		○		14 28 (58)
			10	SS	16		260				
259.0			11	SS	39				○		
8.2	**END OF BOREHOLE**						259				

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 6.2 m.
5. Borehole was dry upon completion of drilling.

AECOM MTO FOUNDATION LOG BBP WEST LOGS 12 23 25 - NW UPDATES 2026.03.04.GPJ AECOM OTTAWA DATA TEMPLATE.GDT 26-3-4

AECOM

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE NW-09

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887599.0; E 297450.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY MF

DATUM Geodetic (CGVD28) DATE 2025.07.09 - 2025.07.10 LATITUDE 44.128349 LONGITUDE -79.591846 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
266.1	GROUND SURFACE										
265.2	**TOPSOIL**, brown, dry		1	SS	4		266				
0.9 / 264.6	**SAND**, some gravel, yellowish brown, wet, loose		2	SS	5		265				
1.5 / 263.8	**GRAVELLY SAND**, brown, very moist, compact		3	SS	29		264				30 57 (13)
2.3 / 263.1	**CLAYEY SILT**, some gravel, brown, moist to very moist, firm		4	SS	7		263				
3.0	**SANDY CLAYEY SILT**, trace gravel, brown to grey, moist to very moist, firm to very stiff (TILL)		5	SS	23						
			6	SS	19		262				5 32 (63)
			7	SS	11		261				
			8	SS	8						
			9	SS	13		260				3 21 52 25
			10	SS	6	▽	259				
			11	SS	17		258				
			12	SS	8						
			13	SS	4		257				
256.2											
9.9 / 254.7	**SAND**, grey, moist, compact to dense		14	SS	14		256				
			15	SS	34		255				
11.4 / 253.9	**CLAYEY SILT**, trace gravel, some sand, grey, moist, very stiff		16	SS	21						2 12 26 61
12.2 / 253.3	**SAND**, trace to some silt, trace to some clay, grey, very moist, very dense		17	SS	57		254				0 82 (18)
12.8	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 7.7 m.
5. Groundwater level was found at a depth of 7.0 m upon completion of drilling.

○ $^{3\%}$ STRAIN AT FAILURE

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

AECOM

RECORD OF BOREHOLE NW-10

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887638.0; E 297513.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY MF

DATUM Geodetic (CGVD28) DATE 2025.07.10 - 2025.07.10 LATITUDE 44.128700 LONGITUDE -79.591059 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
267.2	GROUND SURFACE										
	TOPSOIL, brown, dry		1	SS	10		267				
266.4											
0.8	**CLAYEY SILT**, trace gravel, trace sand, brown, moist to very moist, stiff to very stiff		2	SS	16		266		○		
			3	SS	19						
			4	SS	11		265		● ⊢⊣		0 0 51 49
			5	SS	13		264				
263.4											
3.8	**SILTY SAND**, some gravel, trace clay, brown, moist, compact to very dense (TILL)		6	SS	29		263		○		
			7	SS	23						
			8	SS	20		262		○		
			9	SS	24		261				
			10	SS	78		260		○		5 40 (55)
	Sample SS11: trace cobbles		11	SS	38						
259.0							259				
8.2	**END OF BOREHOLE**										

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 5.2 m.
5. Borehole was dry upon completion of drilling.

AECOM MTO FOUNDATION LOG BBP WEST LOGS 12 23 25 - NW UPDATES 2026.03.04.GPJ AECOM OTTAWA DATA TEMPLATE.GDT 26-3-4

AECOM

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE NW-11

1 OF 1 **METRIC**

G.W.P. 2026-23-00 LOCATION Noise Barrier Wall N 4887680.0; E 297573.0 / MTM Zone 10 ORIGINATED BY AK

DIST Central HWY BBP BOREHOLE TYPE Truck Mount CME 75 / HSA COMPILED BY MF

DATUM Geodetic (CGVD28) DATE 2025.07.10 - 2025.07.10 LATITUDE 44.129079 LONGITUDE -79.590310 CHECKED BY BG

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" VALUES	GR	SA	SI	CL
268.7	GROUND SURFACE							
0.1	**TOPSOIL**, brown, dry							
	SANDY CLAYEY SILT, trace gravel, brown, moist, firm to very stiff	1	SS	12				
		2	SS	9				
		3	SS	7	8	40		(52)
		4	SS	16				
		5	SS	26	3	31	45	21
264.9								
3.8	**SILTY SAND**, brown, moist, very dense (TILL)	6	SS	79				
264.2								
4.6	**SILT AND SAND**, trace gravel, trace clay, brown, wet, dense (TILL)	7	SS	48				
		8	SS	30	1	47	47	6
262.6								
6.1	**SILTY SAND**, trace cobbles, grey, moist to very moist, dense (TILL)	9	SS	39				
		10	SS	42				
261.1								
7.6	**SILT AND SAND**, some gravel, grey, moist, very dense (TILL)	11	SS	68	11	47		(42)
260.5								
8.2	**END OF BOREHOLE**							

Notes:
1. This log is to be read in conjunction with the subject report and project number as presented above.
2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project.
3. The borehole was backfilled with a bentonite hole plug.
4. The borehole caved in at a depth of 6.1 m.
5. Groundwater level was found at a depth of 5.2 m upon completion of drilling.

ELEVATION SCALE: 268, 267, 266, 265, 264, 263, 262, 261

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L

WATER CONTENT (%): 20 40 60

UNIT WEIGHT γ kN/m^3

REMARKS & GRAIN SIZE DISTRIBUTION (%)

○ 3% STRAIN AT FAILURE

+ 3, × 3: Numbers refer to Sensitivity

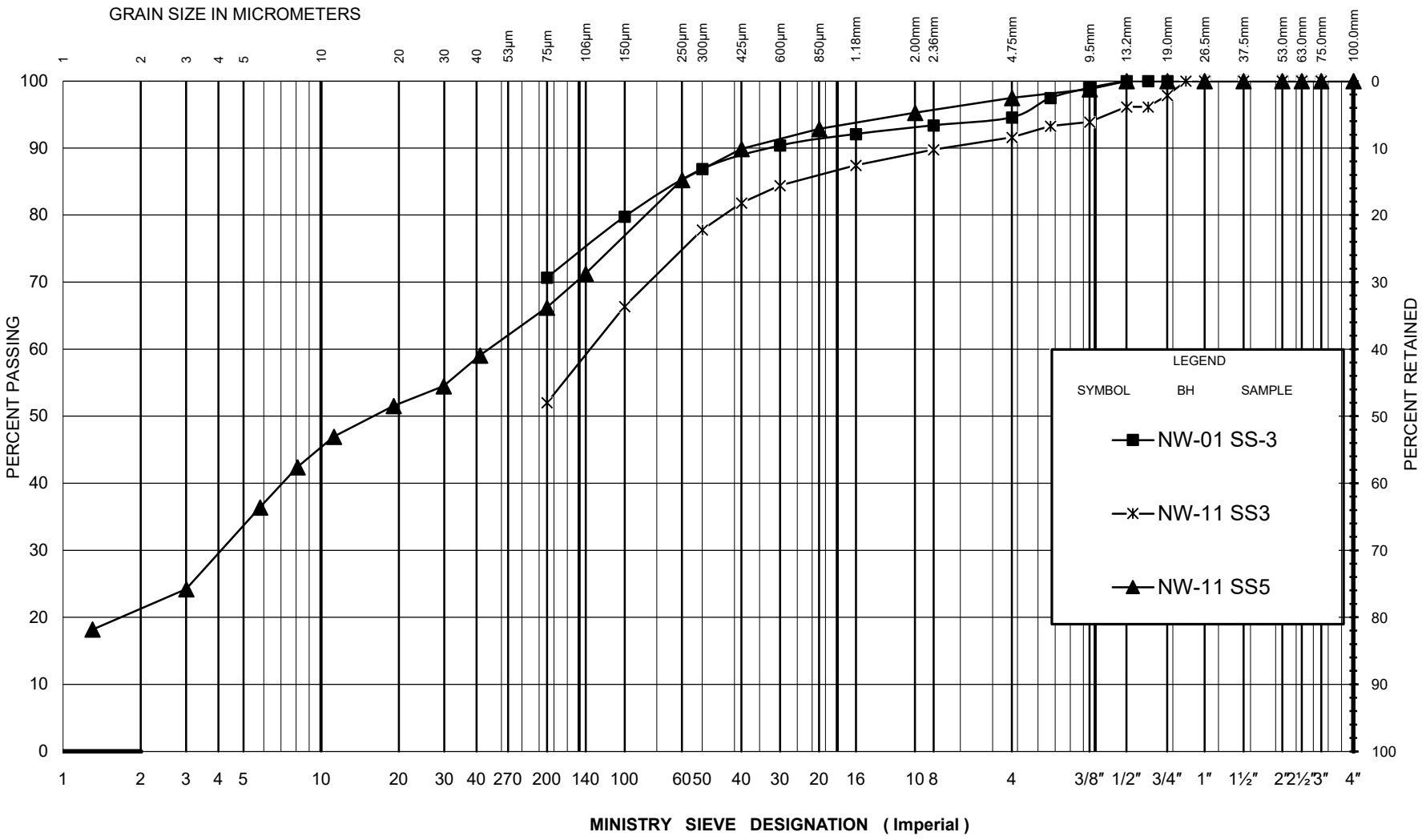
AECOM

Appendix D

Laboratory Test Results

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			Gravel		Cobbles
	Fine	Medium	Coarse	Fine	Coarse	



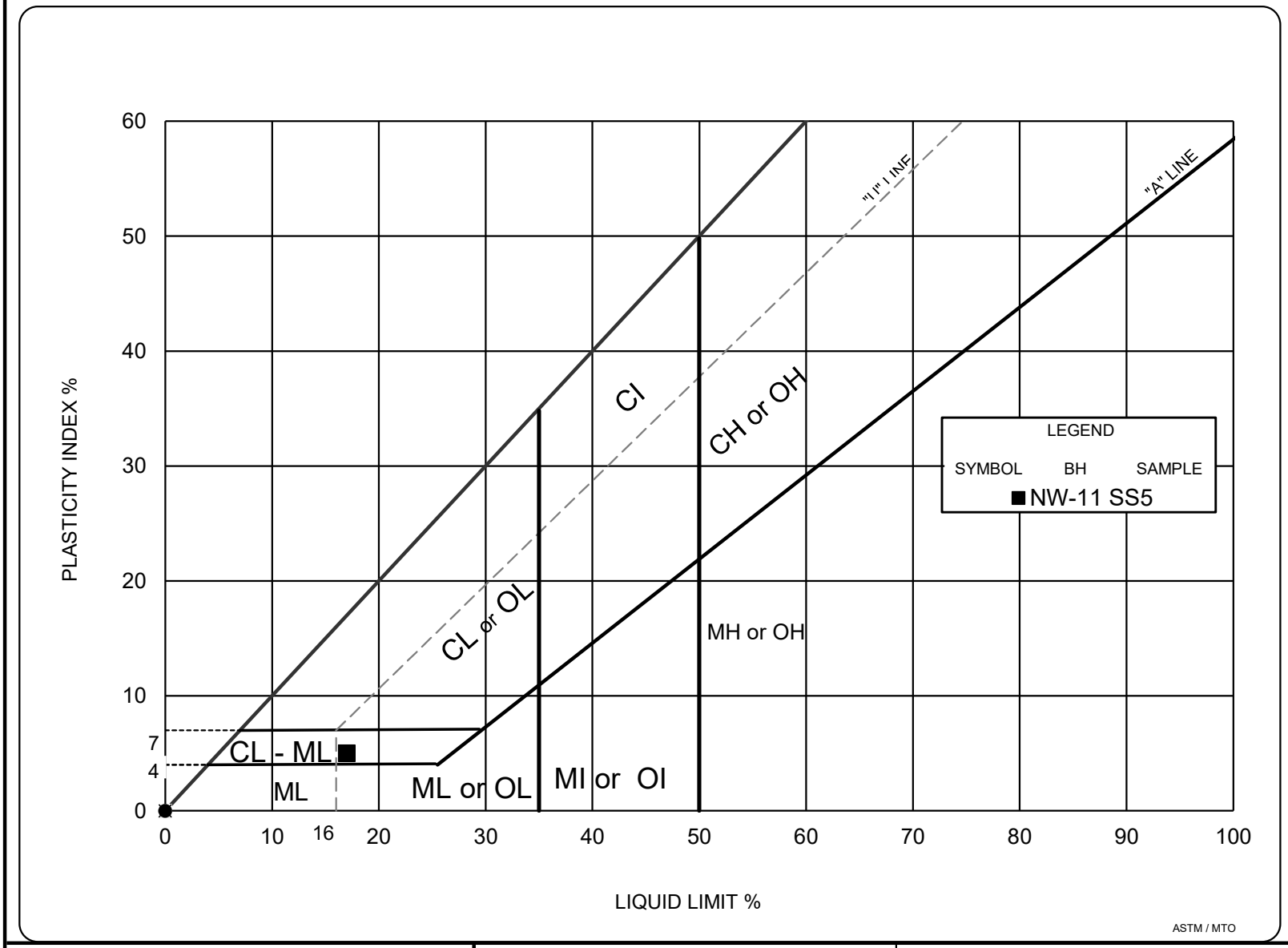
Ministry of Transportation
Ontario

GRAIN SIZE DISTRIBUTION

Sandy Clayey SILT

Figure No.	1
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

PLASTICITY CHART



Ministry of Transportation
Ontario

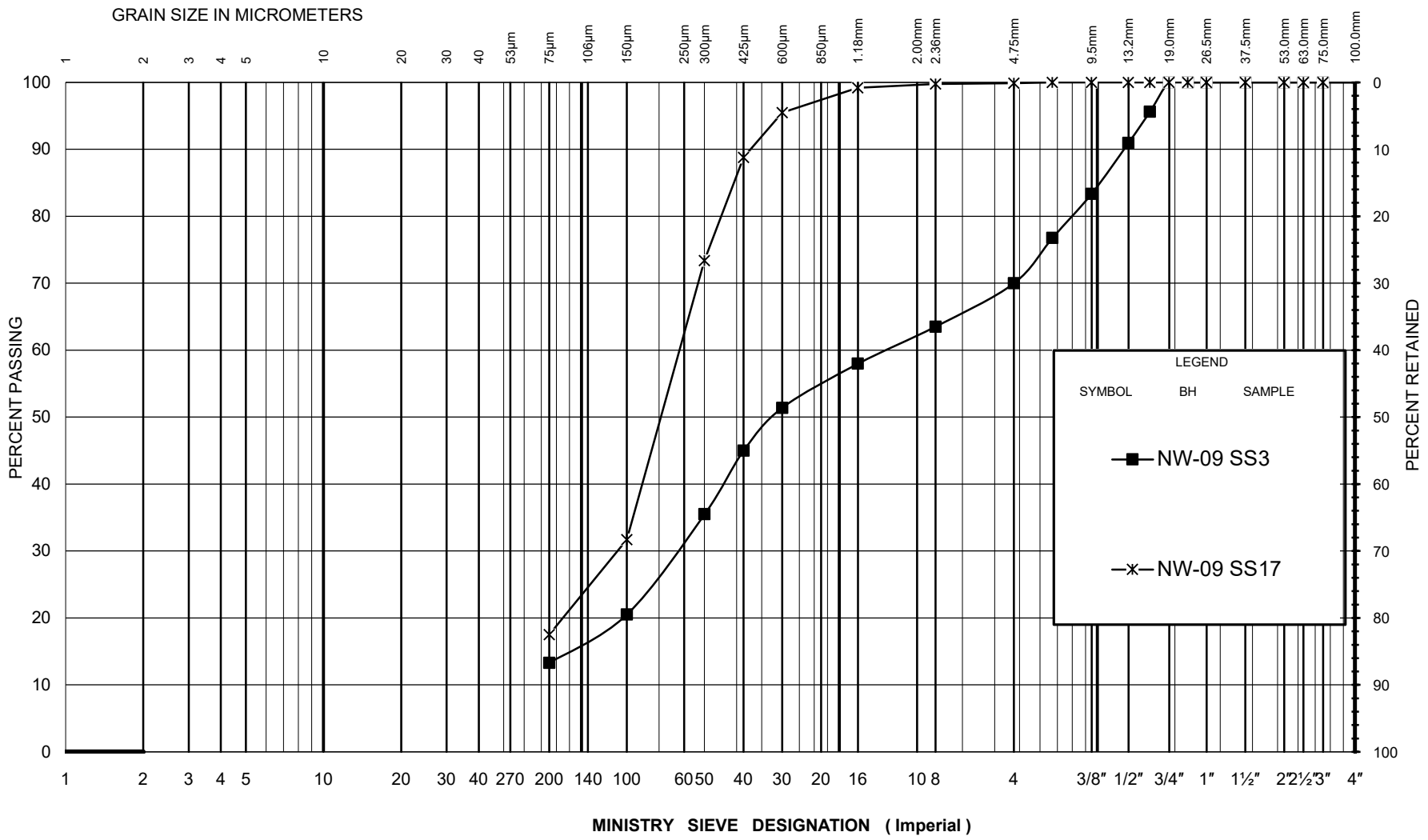
PLASTICITY CHART

Sandy Clayey SILT

Figure No.	2
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			Gravel		Cobbles
	Fine	Medium	Coarse	Fine	Coarse	



Ministry of Transportation
Ontario

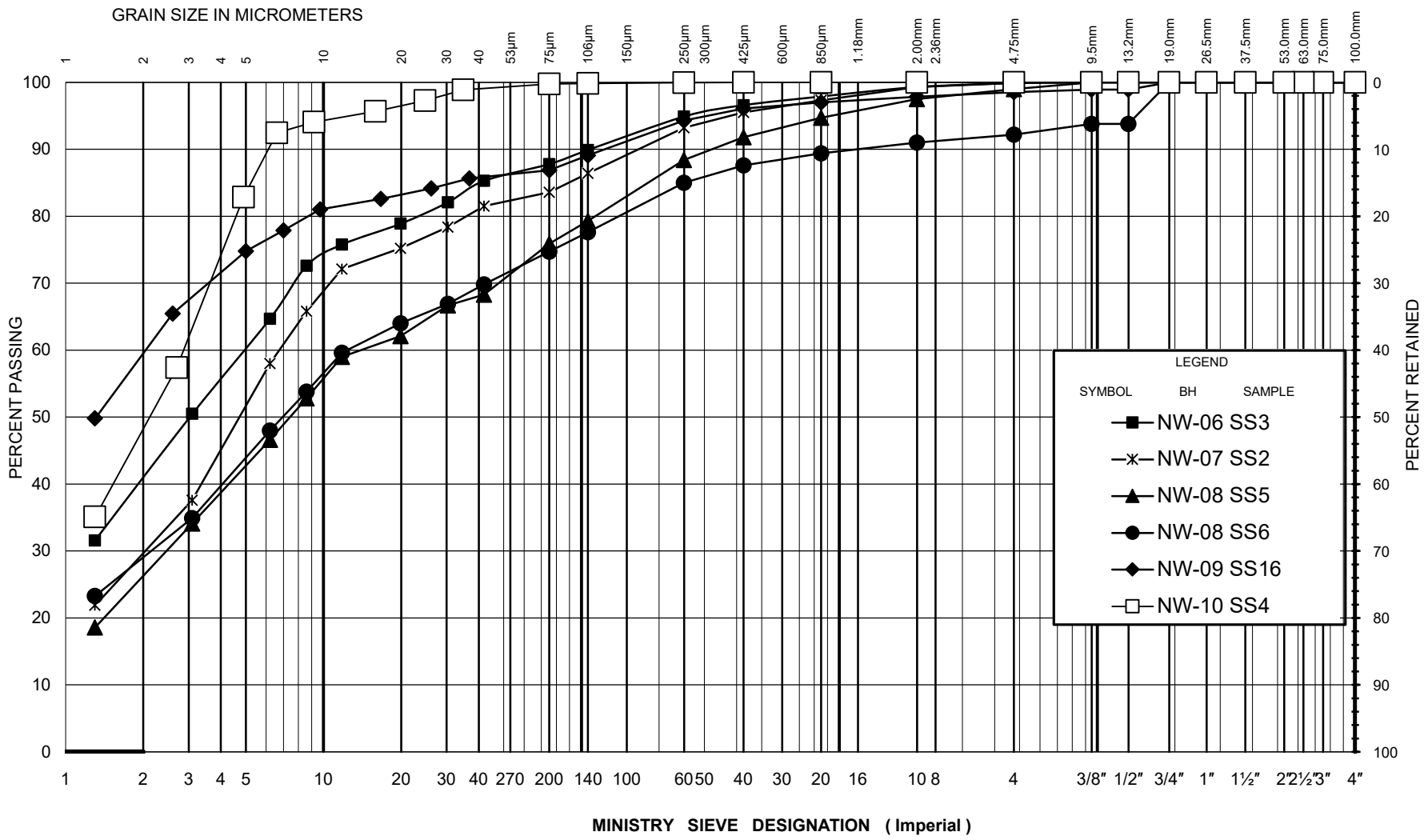
GRAIN SIZE DISTRIBUTION

Silty SAND / Gravelly SAND / SAND

Figure No.	3
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			Gravel		Cobbles
	Fine	Medium	Coarse	Fine	Coarse	



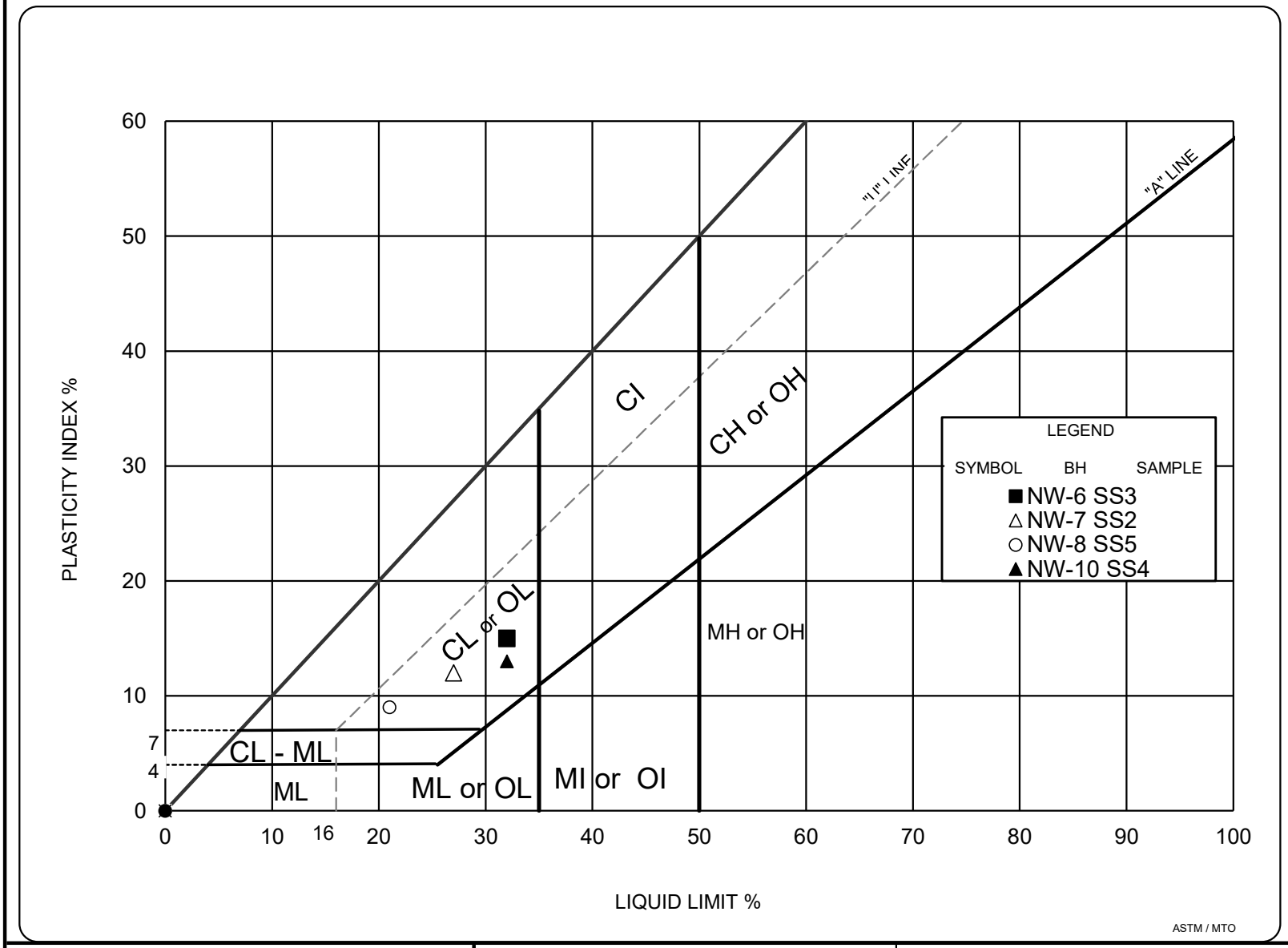
Ministry of Transportation
Ontario

GRAIN SIZE DISTRIBUTION

Clayey SILT

Figure No.	4
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

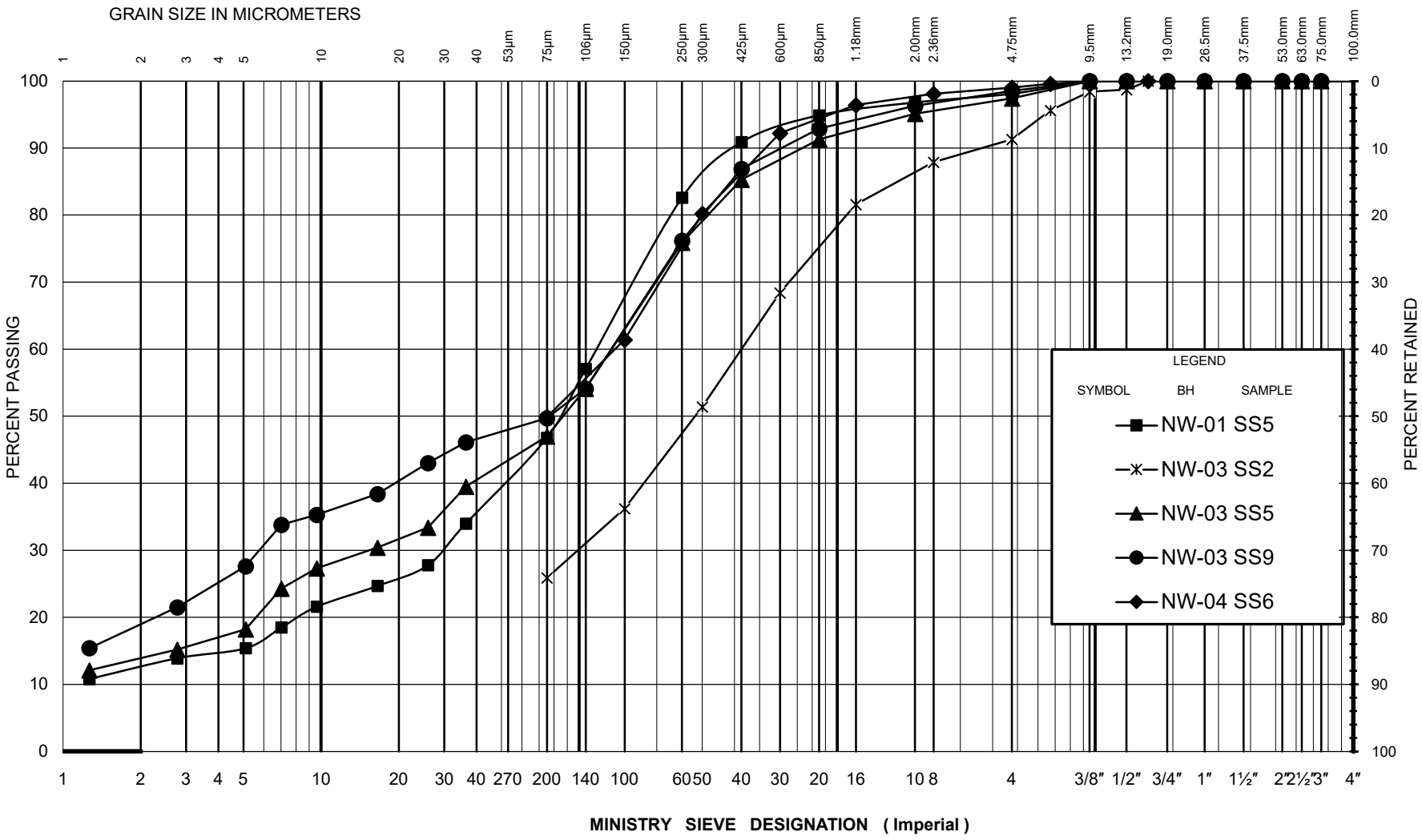
PLASTICITY CHART



Ministry of Transportation, Ontario	PLASTICITY CHART **Clayey SILT**	Figure No. 5 Project No. 60731727 Project Name BBP West Noise Barrier Wall

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			Gravel		Cobbles
	Fine	Medium	Coarse	Fine	Coarse	



Ministry of Transportation
Ontario

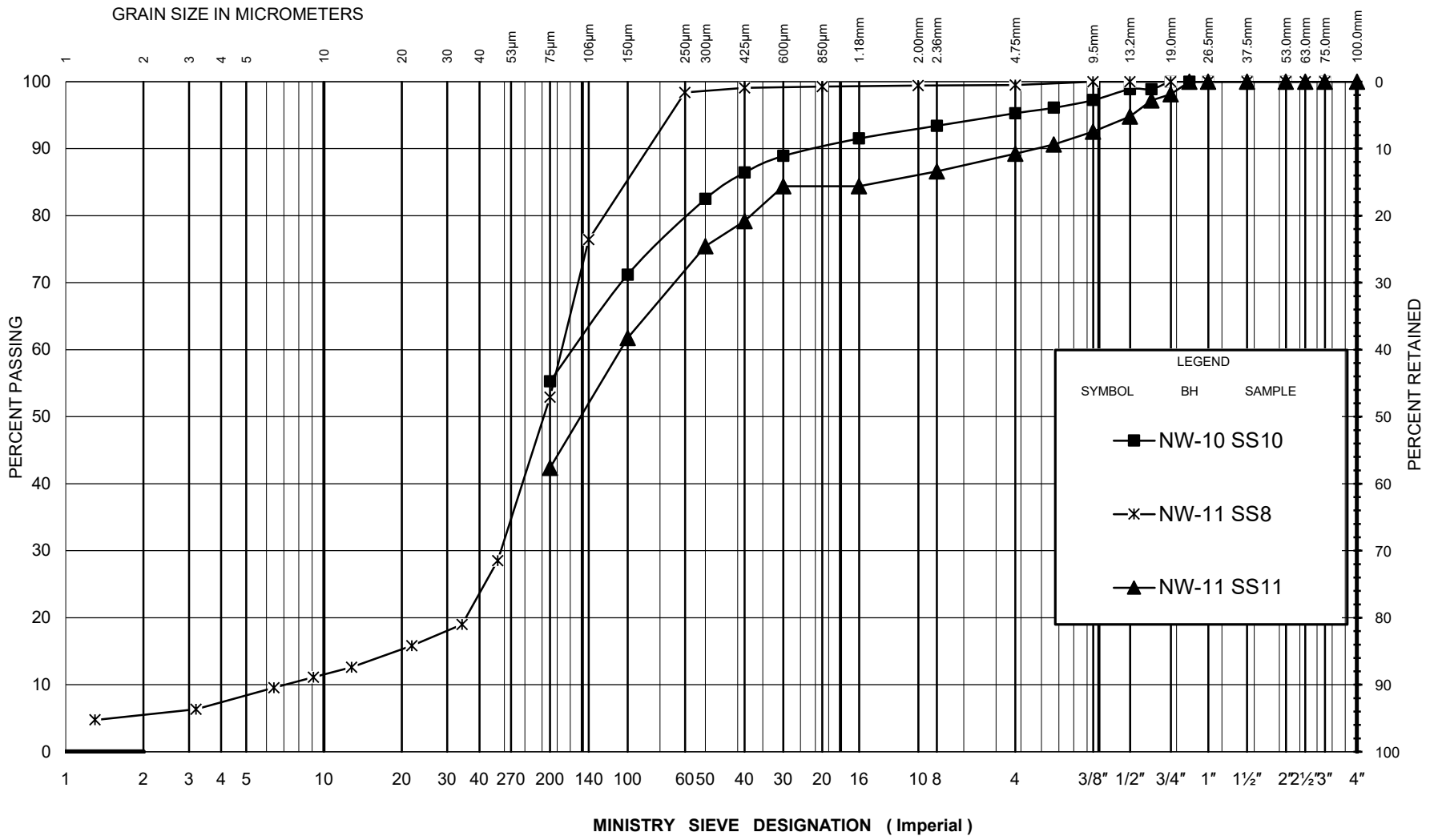
GRAIN SIZE DISTRIBUTION

SILT and SAND / Silty SAND (TILL)

Figure No.	6
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			Gravel		Cobbles
	Fine	Medium	Coarse	Fine	Coarse	



Ministry of Transportation
Ontario

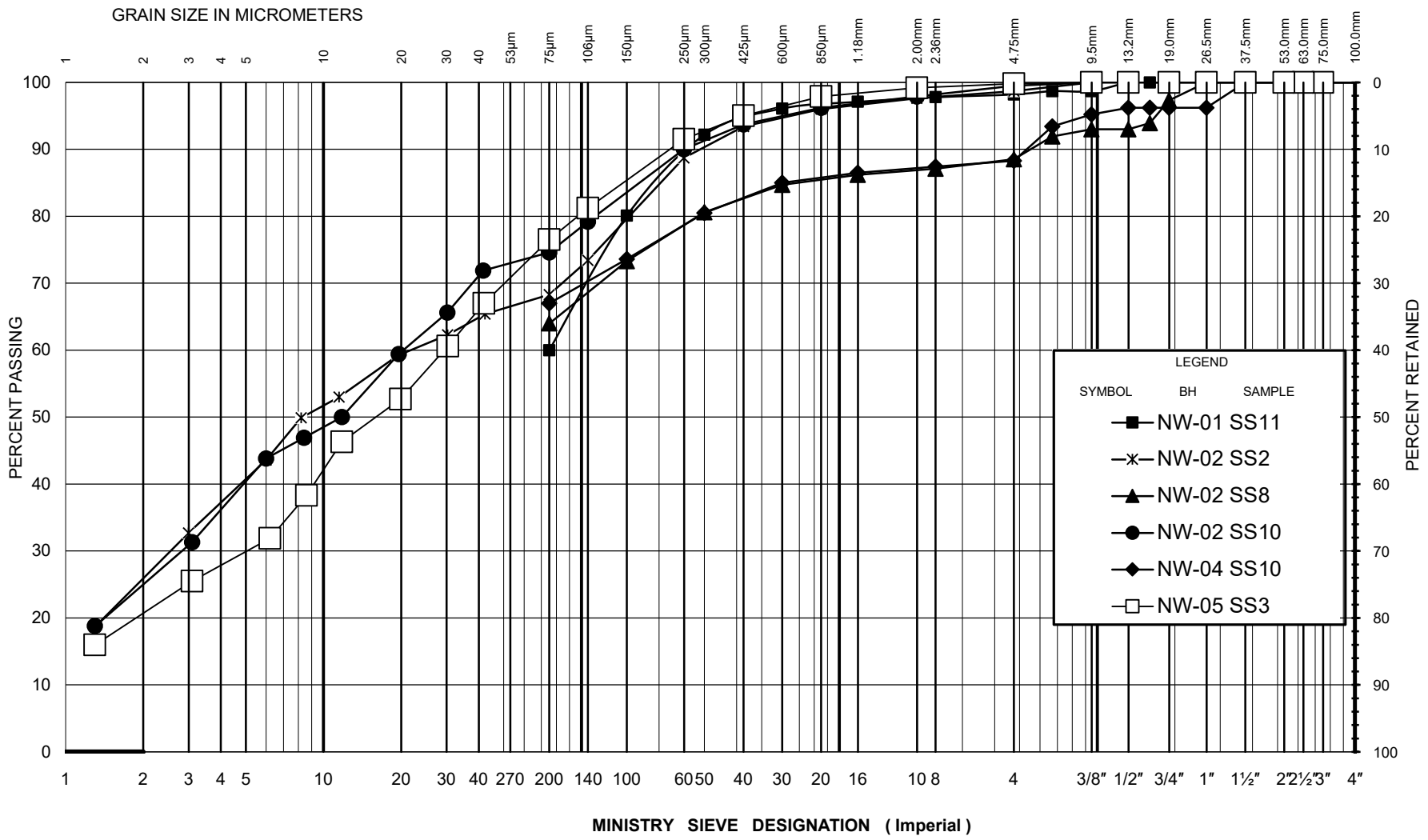
GRAIN SIZE DISTRIBUTION

SILT and SAND / Silty SAND (TILL)

Figure No.	7
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			Gravel		Cobbles
	Fine	Medium	Coarse	Fine	Coarse	



Ministry of Transportation
Ontario

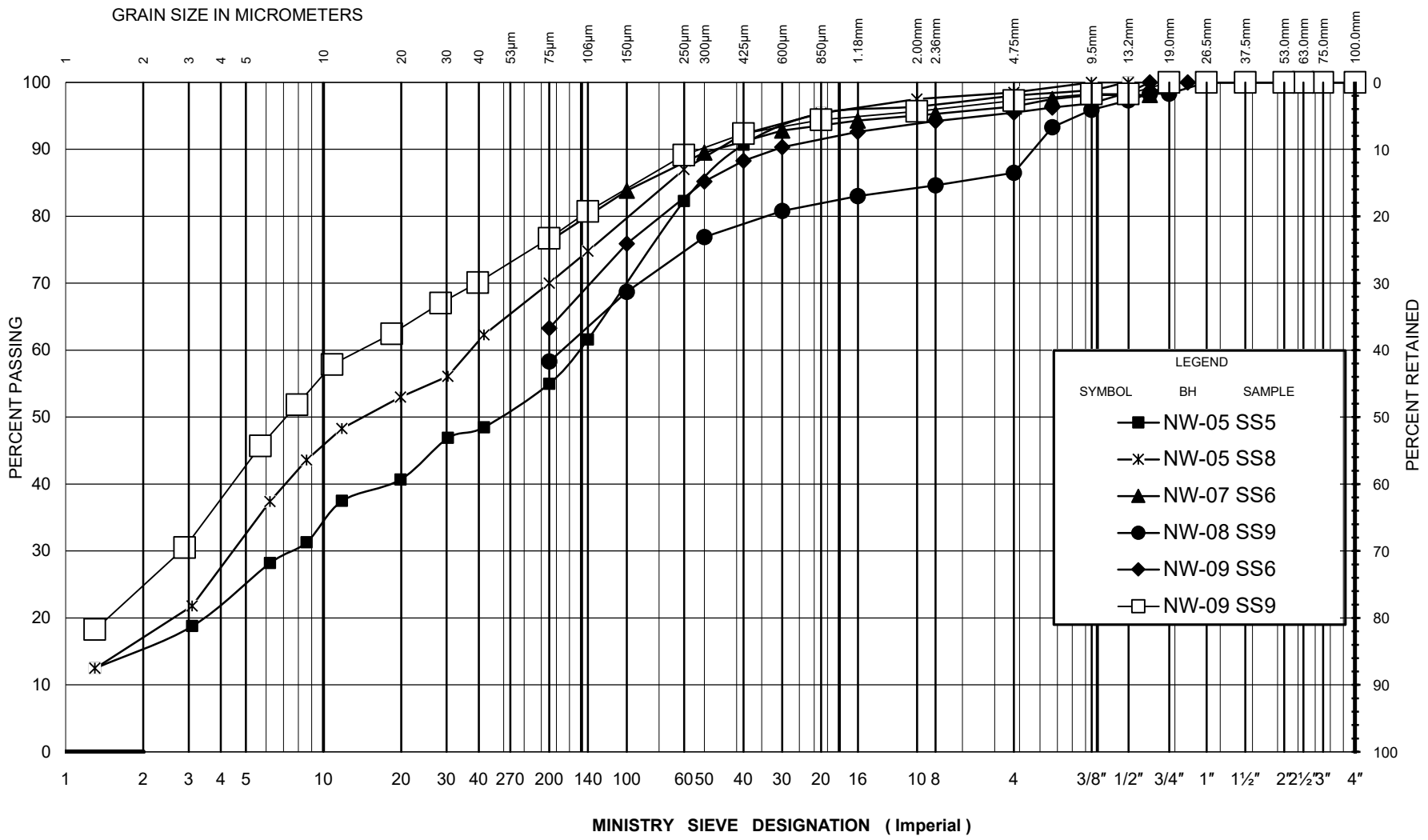
GRAIN SIZE DISTRIBUTION

Sandy Clayey SILT / Sandy SILT (TILL)

Figure No.	8
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			Gravel		Cobbles
	Fine	Medium	Coarse	Fine	Coarse	



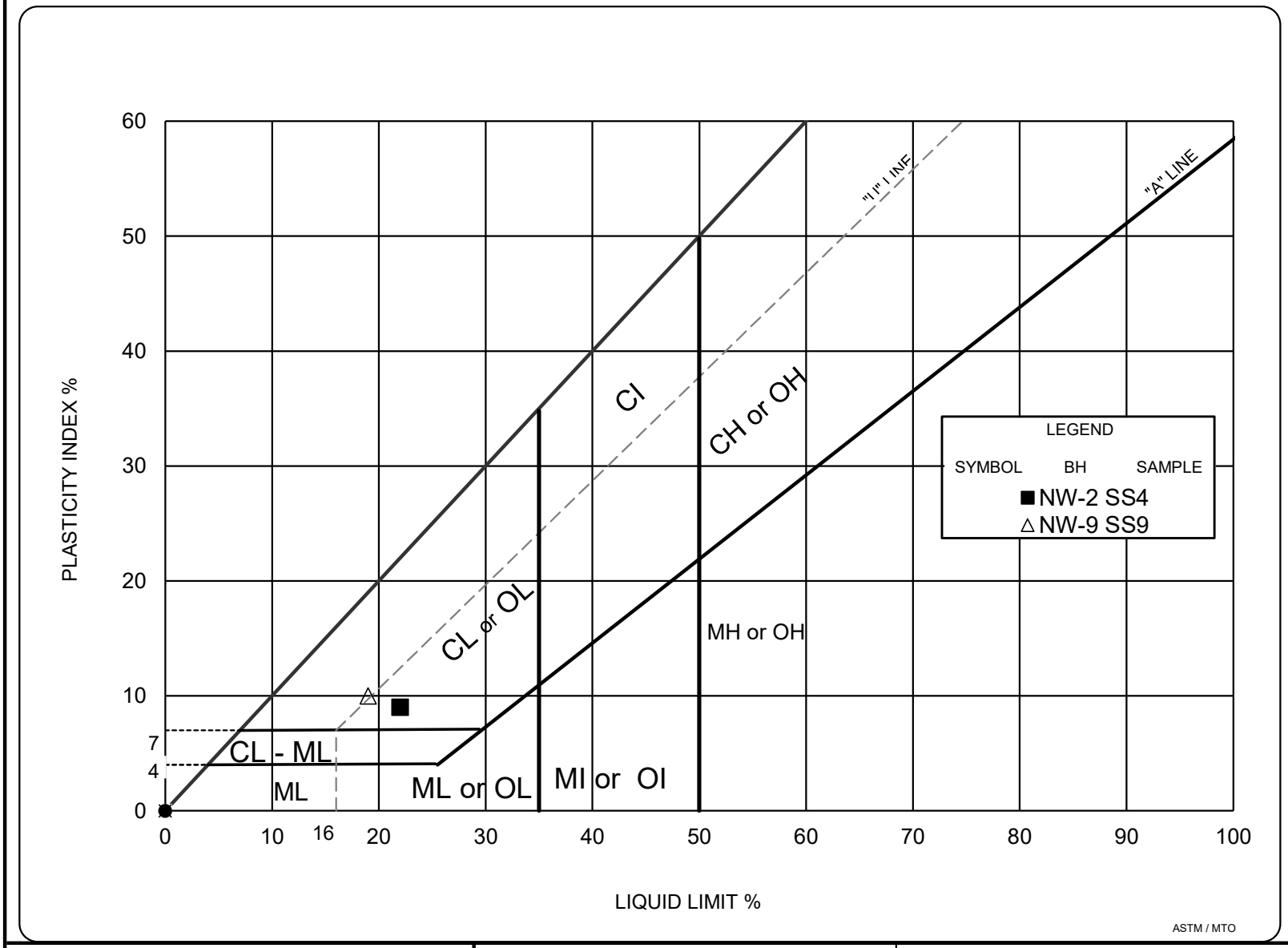
Ministry of Transportation
Ontario

GRAIN SIZE DISTRIBUTION

Sandy Clayey SILT / Sandy SILT (TILL)

Figure No.	9
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

PLASTICITY CHART



Ministry of Transportation
Ontario

PLASTICITY CHART

Sandy Clayey SILT (Till)

Figure No.	10
Project No.	60731727
Project Name	BBP West Noise Barrier Wall

Appendix E

Designed Noise Barrier Wall Profile

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

10m 0 10 20 30 HORIZONTAL
1m 0 1 2 3 VERTICAL

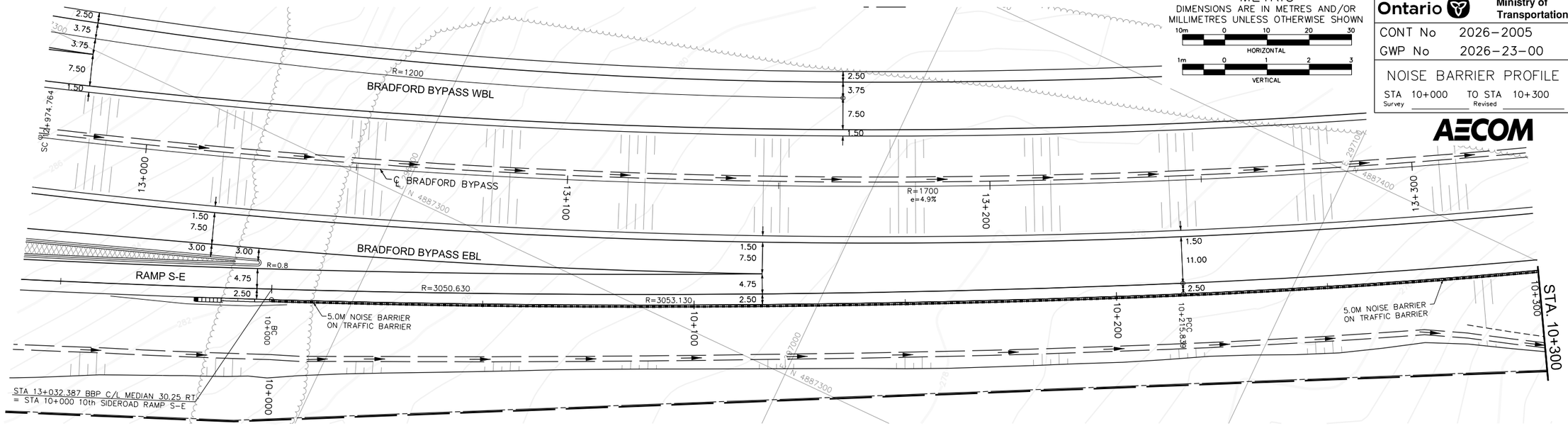
Ontario — Ministry of Transportation

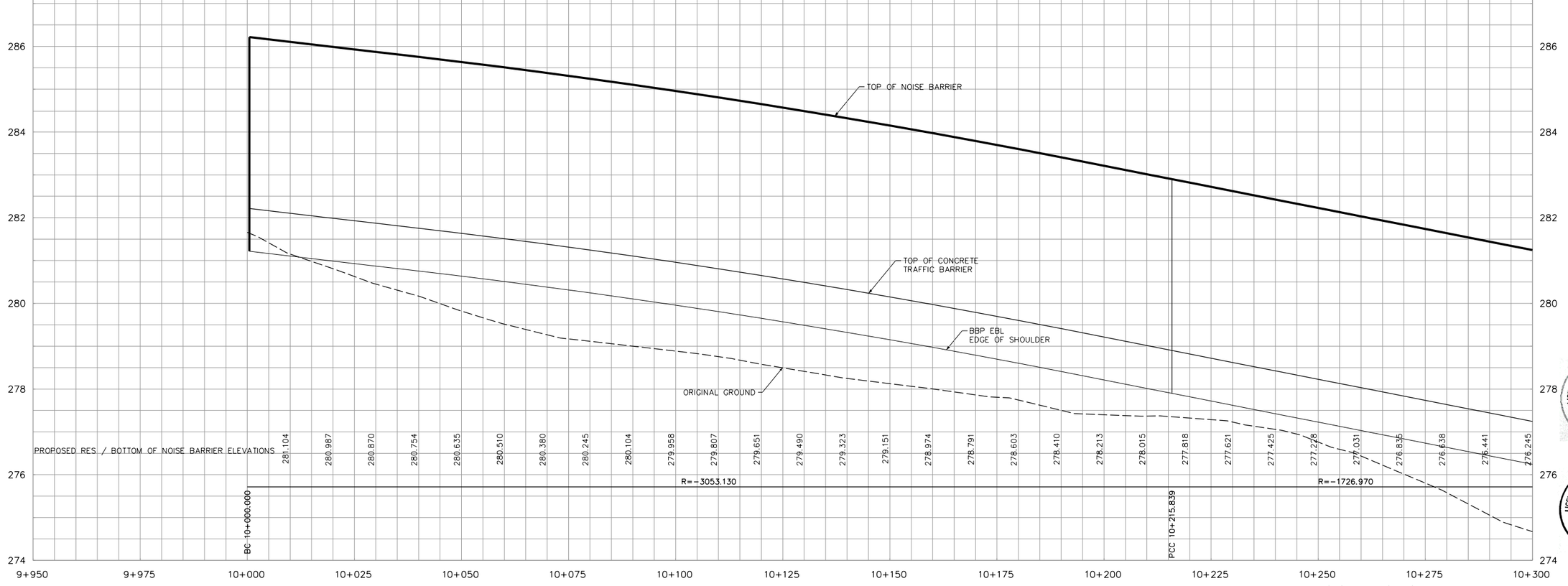
CONT No 2026-2005
GWP No 2026-23-00

NOISE BARRIER PROFILE
STA 10+000 TO STA 10+300
Survey Revised

SHEET 591

AECOM





LICENSED PROFESSIONAL ENGINEER J. R. NEWMAN Jan 30, 2026 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER R. A. SHEIKH 100153451 01/30/2026 PROVINCE OF ONTARIO

REVISIONS	DATE	BY	DESCRIPTION

DRAWING NAME: NAME.DGN
CREATED: JANUARY, 2026
MODIFIED:

MINISTRY OF TRANSPORTATION, ONTARIO PH-D-302 89-10

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

10m 0 10 20 30 HORIZONTAL

1m 0 1 2 3 VERTICAL

Ontario — Ministry of Transportation

CONT No 2026-2005

GWP No 2026-23-00

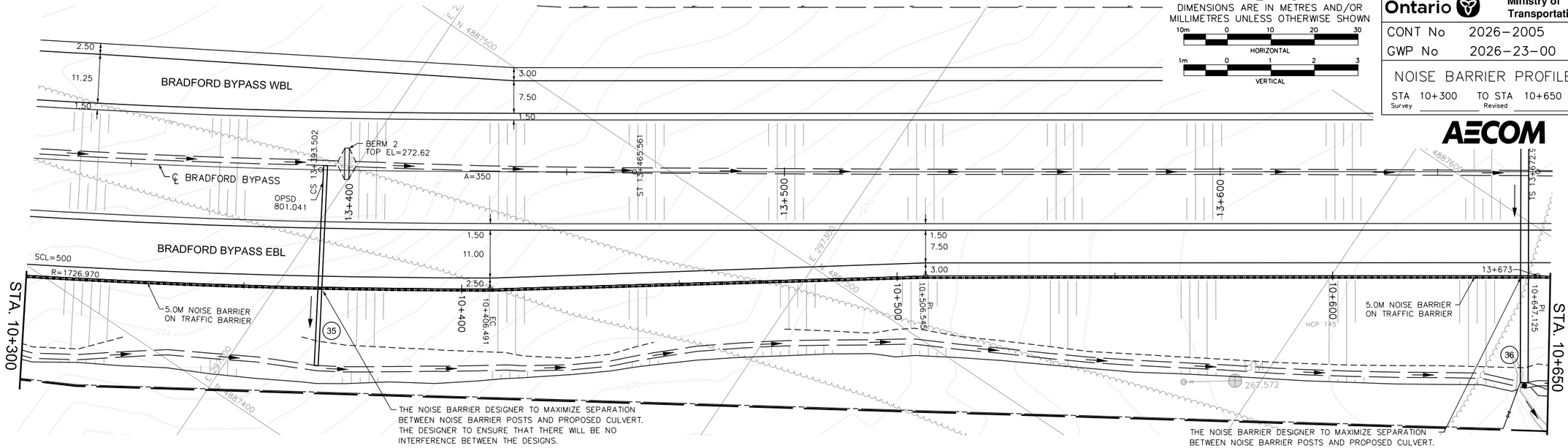
NOISE BARRIER PROFILE

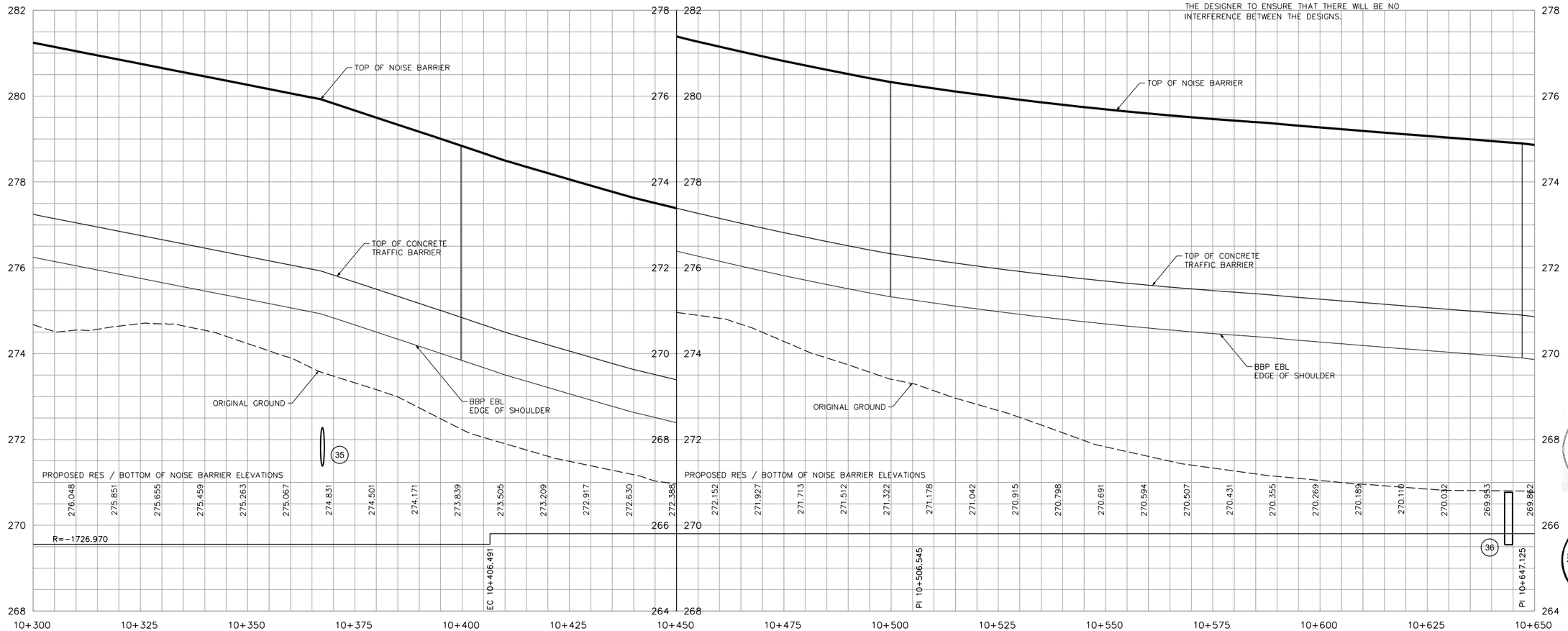
STA 10+300 TO STA 10+650

Survey ____ Revised ____

SHEET 592

AECOM





LICENSED PROFESSIONAL ENGINEER J.R. NEWMAN Jan 30, 2026 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER R.A. SHEIKH 100153451 01/30/2026 PROVINCE OF ONTARIO

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION, ONTARIO PH-D-302 89-10

DRAWING NAME: NAME.DGN
CREATED:
MODIFIED: JANUARY, 2026

MINISTRY OF TRANSPORTATION, ONTARIO PH-D-302 89-10

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN
10m 0 10 20 30 HORIZONTAL
1m 0 1 2 3 VERTICAL

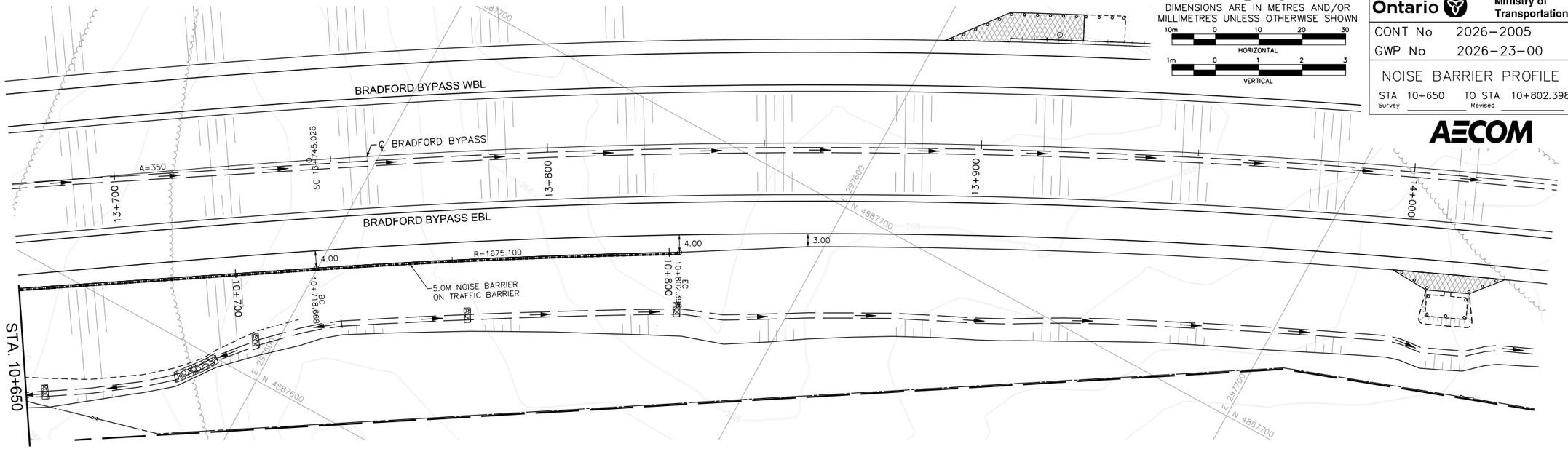
Ontario — Ministry of Transportation

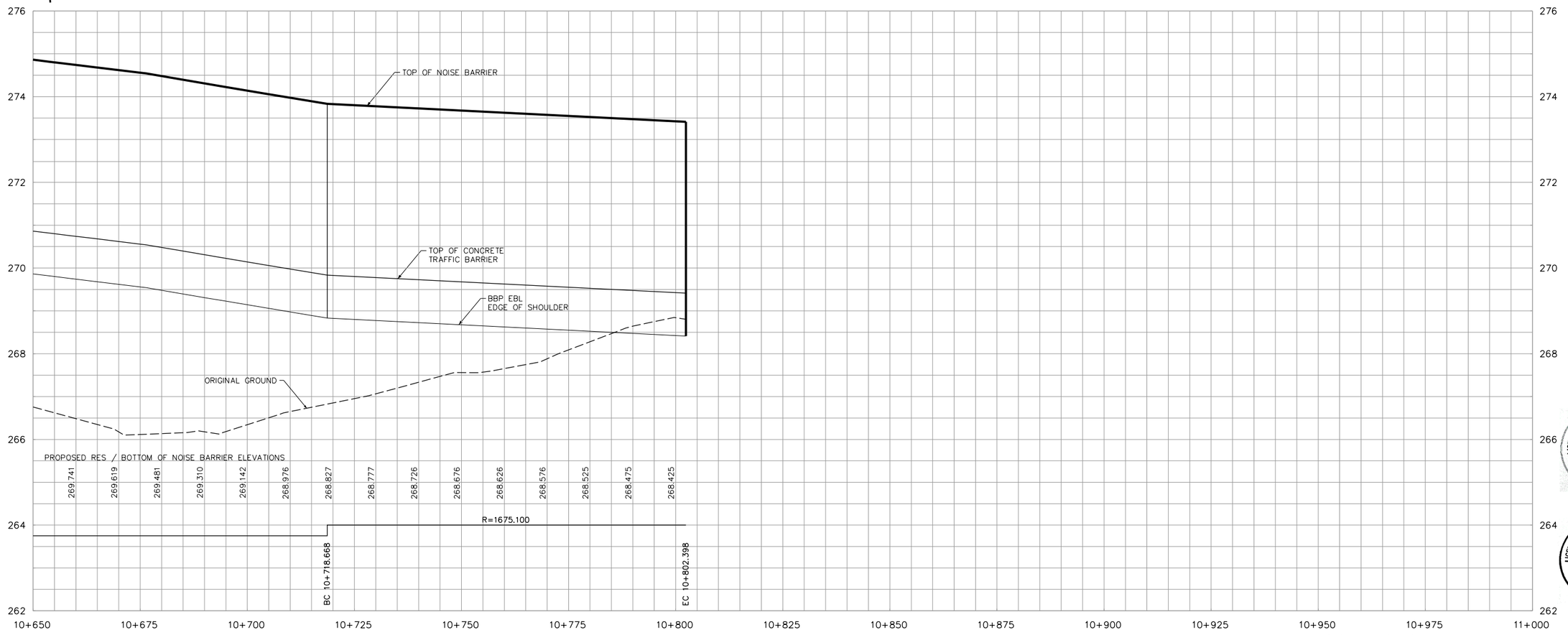
CONT No 2026-2005
GWP No 2026-23-00

NOISE BARRIER PROFILE
STA 10+650 TO STA 10+802.398
Survey Revised

SHEET 593

AECOM





LICENSED PROFESSIONAL ENGINEER J. R. NEWMAN Jan 30, 2026 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER R. A. SHEIKH 100153451 01/30/2026 PROVINCE OF ONTARIO

REVISIONS	DATE	BY	DESCRIPTION

DRAWING NAME: NAME.DGN
CREATED: MODIFIED: JANUARY, 2026

Appendix F

Notice to Contractor and NSSP

Notice to Contractor - Presence of Cobbles, Boulders and Other Obstructions

The Contractor shall be aware of the potential presence of cobbles, boulders, and construction debris within the existing embankment fills, the silty sand to sandy silt upper till, and the 100-blow sandy clay to clay lower till deposits. Considerations of the presence of such obstructions must be made in the selection of appropriate equipment and procedures for excavations, tunnelling, installation of temporary protection systems and deep foundations. Contractor's equipment must be able to advance and penetrate through any such obstructions.

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