FINAL REPORT

Foundation Investigation Report

Various Overhead Signs
Highway 400 Widening, Langstaff Road to Major Mackenzie Drive
Vaughan, Ontario
GWP 2836-02-00

Submitted to:

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GEOCRES No.: 30M13-305
Latitude: 43.826858º
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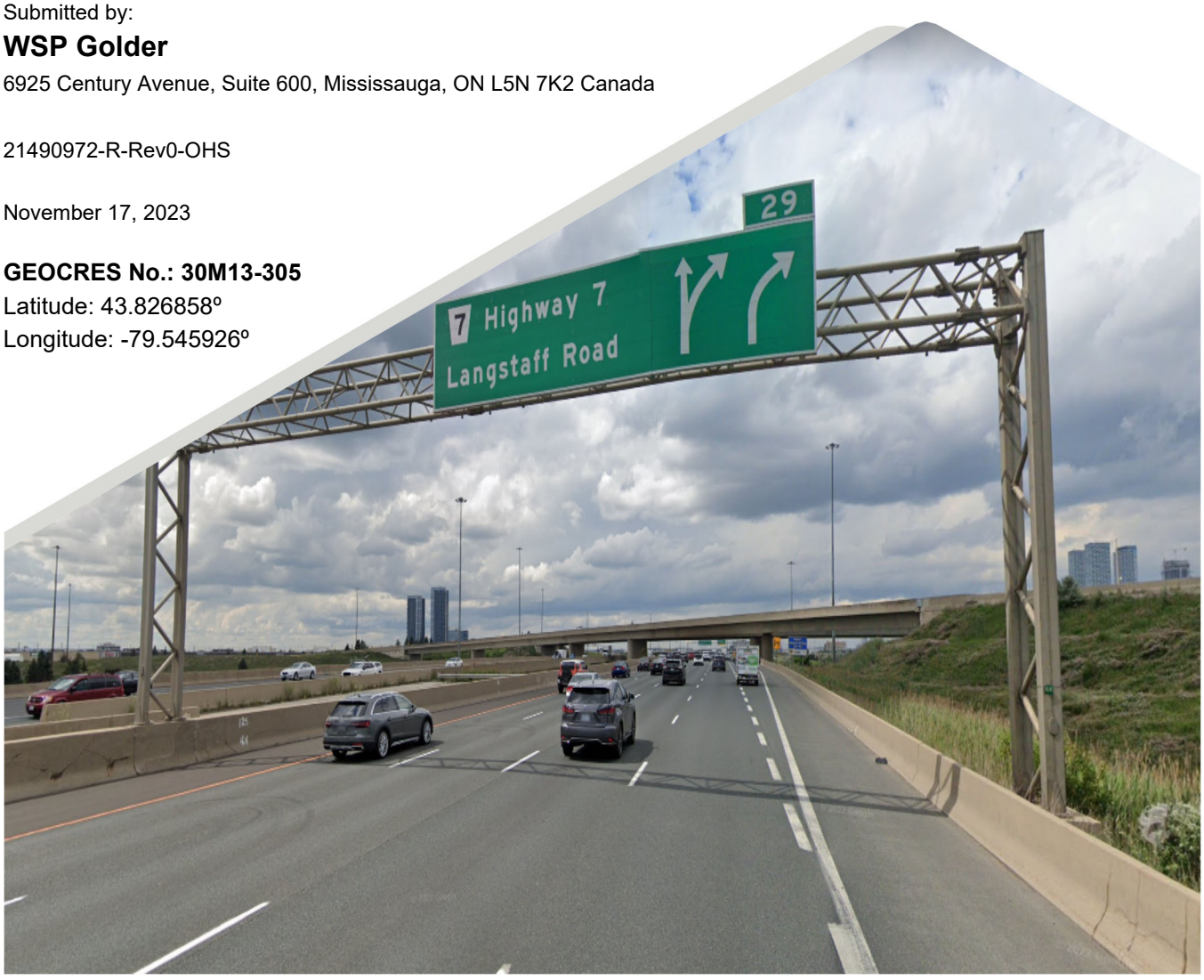

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1.0 INTRODUCTION

WSP Golder (formerly Golder Associates Ltd., now a member of WSP Canada Inc.) has been retained by Parsons Inc. (Parsons) on behalf of the Ministry of Transportation, Ontario (MTO) to provide foundation engineering services for the detail design of the Highway 400 widening and rehabilitation, extending from 1.3 km south of the Langstaff Road interchange to 1.5 km north of Major Mackenzie Drive (a length of approximately 7.3 km) in the City of Vaughan, Ontario. As part of the Highway widening and rehabilitation program, 20 overhead signs (OHS) and two variable message signs (VMS) will be constructed. Of the 22 total signs to be constructed, 8 are new signs associated with the new High Occupancy Vehicle (HOV) lanes and 14 are replacements of existing signs.

This report summarizes the factual results of field and laboratory work (including field investigation procedures, borehole stratigraphy, and geotechnical and analytical laboratory test results) and provides a description of interpreted soil and groundwater conditions for 20 overhead signs and two variable message signs.

2.0 SITE DESCRIPTION

The orientation (i.e., north, south, east, and west) stated in the text of this report is referenced to project north and therefore may differ from magnetic north shown on Drawings 1 to 3. For the purpose of this report, Highway 400 is considered to be oriented in a north-south direction with the new overhead and variable message signs perpendicular to the highway in a generally east-west direction.

The overhead and variable message signs for this project are located along the Highway 400 corridor, apart from one OHS which is located on the Rutherford Road N-E/W ramp. Highway 400 across the project limits is currently an eight-lane urban freeway with paved shoulders divided by a concrete median barrier. The Highway 400 grade varies from approximately Elevation 204 m near the south limit to approximately Elevation 230 m near Major Mackenzie Drive, generally rising northward.

Based on the information provided by Parsons, the proposed structure designation, location (station), structure type, existing span length, and number of sign support elements at each structure location is summarized in the table below, listed in order from south to north. The locations of the signs are shown on Drawings 1 to 3. Where single cantilever and variable message sign types are listed in the table below, these signs are associated with new signs for the new HOV lanes or a new VMS sign.

Sign ID.	Location (Station No.)	Sign Type	Existing Span Length (m)	Left (Median) or Right (Ground-Mounted) Footing or Both
OHS-1	12+735 NBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)
OHS-2	13+167 NBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)
OHS-3	13+240 NBL	Tri-Chord	24.2 m	Both
OHS-4	13+668 NBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)
OHS-5	13+820 SBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)
OHS-6	14+226 SBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)
OHS-7	14+523 NBL	Tri-Chord	30.9 m	Both
OHS-8	14+526 SBL	Tri-Chord	34.5 m	Both
OHS-9	14+985 NBL	Tri-Chord	36.0 m	Both
OHS-10	14+988 SBL	Tri-Chord	34.0 m	Both
OHS-11	15+256 NBL	Tri-Chord	31.0 m	Both

Sign ID.	Location (Station No.)	Sign Type	Existing Span Length (m)	Left (Median) or Right (Ground-Mounted) Footing or Both
VMS-1	15+550 SBL	Overhead VMS	32.9 m	Both
OHS-12	15+719 NBL	Tri-Chord	35.0 m	Both
OHS-13	Rutherford S-EW 10+381	Monotube	21.1 m	Both
OHS-14	16+186 NBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)
OHS-15	16+270 SBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)
OHS-16	16+704 SBL	Tri-Chord	34.5 m	Both
OHS-17	17+165 SBL	Tri-Chord	27.3 m	Both
OHS-18	17+374 NBL	Tri-Chord	32.8 m	Both
PVMS-1	17+398 SBL	PVMS	N/A (New Sign)	Right (ground-mounted)
OHS-19	17+835 NBL	Tri-Chord	31.0 m	Both
OHS-20	18+300 NBL	Single Cantilever	N/A (New Sign)	Right (ground-mounted)
OHS-21	18+380 SBL	Single Cantilever	N/A (New Sign)	Left (median-mounted)

The ground surface conditions at the OHS and VMS locations (proposed or existing locations) are shown in Photographs 1 to 23 following the text of this report.

In addition to the 23 signs described above, three additional tri-chord type signs will be impacted at the site; however, these signs consist of new HOV signboards on existing sign support structures (i.e., they do not require foundation investigation) and therefore they are not discussed further in this report. One of these signs includes OHS-20, which was originally proposed to be a new single cantilever sign but will now consist of a new signboard on the existing OHS cantilever structure.

3.0 INVESTIGATION PROCEDURES

The field work for this subsurface exploration program consisted of 23 boreholes (designated OHSS-1 to OHSS-4, MS-6, MS-8, OHSS-7 to OHSS-21, VMS-1 and PVMS-1) – one at or near each sign site. These boreholes were advanced between June 1, 2022 and July 25, 2023, at the approximate locations shown on Drawings 1 to 3.

The boreholes were advanced through the existing roadway shoulders using a truck-mounted CME 75 drill rig supplied and operated by 3D Drilling of Whitchurch-Stouffville, Ontario. The boreholes were advanced through the overburden using 168 mm outside diameter hollow stem augers. Soil samples were obtained at 0.75 m and 1.5 m intervals of depth, using a 50 mm outside diameter split spoon sampler driven by an automatic hammer in accordance with Standard Penetration Test (SPT) procedures (ATM D1586)[1]. The split-spoon samplers used in the investigation limits 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.

The groundwater conditions were noted in the boreholes during and upon completion of drilling and were backfilled in accordance with Ontario Regulation 903 (Wells, as amended), and the asphalt surface was capped with tamped cold patch asphalt. A standpipe piezometer was installed in Borehole OHSS-17 to allow monitoring of the groundwater level. The installed piezometer consists of a 50 mm diameter PVC pipe, with a 3.0 m long

[1] ASTM D1586 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils

slotted screen within a filtered sand pack. The borehole and annulus surrounding the piezometer pipe above the filter sand pack was backfilled to near ground surface with bentonite pellets. The standpipe piezometer was left sticking up out of the ground and protected with a monument cover.

The field work was observed by members of WSP Golder's engineering and technical staff, who located the boreholes, arranged for the clearance of underground services, observed the drilling, sampling and in situ testing operations, and logged the boreholes. The samples were identified in the field, placed in appropriate containers, labelled, and transported to WSP Golder's Mississauga laboratory where the samples underwent further visual examination. Geotechnical laboratory testing (water content, grain size distribution, and Atterberg limits) was carried out on select soil samples, in accordance with MTO and / or ASTM Standards, as appropriate. In addition, select soil samples were submitted to Bureau Veritas Laboratories of Mississauga, Ontario for analysis of select parameters to assess for the potential corrosion of buried steel and deterioration of concrete.

The as-drilled borehole locations and elevations were surveyed by WSP Golder using a Trimble Geo 7x GPS unit. The locations are referenced to NAD 83(CSRS)v6 MTM Zone 10 coordinates and the ground surface elevations are referenced to CGVD28 Geodetic datum benchmark. The borehole locations listed in order from south to north, including geographic coordinates, ground surface elevations, and borehole depths are summarized below.

Borehole No.	MTM NAD83 Northing (Latitude, °)	MTM NAD83 Easting (Longitude, °)	Ground Surface Elevation (m)	Borehole Depth (m)
OHSS-1	4,850,775.1 (43.796932)	301,526.0 (-79.540685)	204.1	7.9
OHSS-2	4,851,199.7 (43.800753)	301,453.7 (-79.541586)	205.8	8.2
OHSS-3	4,851,280.2 (43.801478)	301,486.0 (-79.541186)	205.8	8.2
OHSS-4	4,851,695.3 (43.805214)	301,369.5 (-79.542636)	207.8	8.2
MS-6	4,851,843.9 (43.806560)	301,343.3 (-79.542966)	207.5	6.7
MS-8	4,852,243.5 (43.810156)	301,276.9 (-79.543794)	206.9	6.7
OHSS-7	4,852,544.0 (43.812853)	301,245.8 (-79.544179)	208.3	8.2
OHSS-8	4,852,534.1 (43.812763)	301,192.0 (-79.544848)	208.2	8.2
OHSS-9	4,852,997.7 (43.816936)	301,191.0 (-79.544863)	209.6	8.2
OHSS-10	4,852,995.0 (43.816912)	301,133.2 (-79.545582)	210.6	8.2
OHSS-11	4,853,364.1 (43.820234)	301,159.8 (-79.545254)	211.6	8.2
VMS-1	4,853,555.8 (43.821959)	301,097.0 (-79.546036)	214.7	8.2
OHSS-12	4,853,730.3 (43.823530)	301,139.9 (-79.545504)	218.7	8.2
OHSS-13	4,854,156.6 (43.827368)	301,332.8 (-79.543108)	222.8	8.2

Borehole No.	MTM NAD83 Northing (Latitude, °)	MTM NAD83 Easting (Longitude, °)	Ground Surface Elevation (m)	Borehole Depth (m)
OHSS-14	4,854,194.0 (43.827704)	301,081.6 (-79.546232)	225.0	8.2
OHSS-15	4,854,277.1 (43.828452)	301,076.3 (-79.546298)	225.4	8.2
OHSS-16	4,854,707.5 (43.832325)	301,013.6 (-79.547081)	223.7	8.2
OHSS-17	4,855,165.6 (43.836449)	300,989.9 (-79.547379)	222.0	8.2
OHSS-18	4,855,381.4 (43.838391)	301,018.6 (-79.547023)	223.4	8.2
PVMS-1	4,855,402.8 (43.838584)	300,975.0 (-79.547566)	223.7	8.2
OHSS-19	4,855,841.6 (43.842533)	300,994.5 (-79.547326)	227.6	8.2
OHSS-20	4,856,299.8 (43.846657)	300,903.8 (-79.548458)	229.8	8.2
OHSS-21	4,856,378.1 (43.847362)	300,887.0 (-79.548667)	230.7	8.2

4.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Regional Geology

As delineated in The Physiography of Southern Ontario (Chapman and Putnam, 1984)[2], this section of Highway 400 lies within the region known as the Peel Plain and consists of level to undulating tracts of clayey glacial till soils, which are presumed to have been derived from moraines, interspersed with non-cohesive silts and sands from interstadial stages of Wisconsinan glaciation.

Based on geological mapping by the Ministry of Northern Development and Mines (MNDM)[3], the site is underlain by bedrock from the Upper Ordovician era consisting of shale, limestone, dolostone, and siltstone.

4.2 Subsurface Conditions

The detailed subsurface soil and groundwater conditions encountered in the boreholes and the results of in situ and laboratory testing from the investigation are shown on the borehole records presented in Appendix A; these records are presented in order from south to north. The detailed results of the geotechnical laboratory testing are presented in Appendix B. The results of the in situ field tests (i.e., SPT 'N'-values) as presented on the borehole records and in Section 4.2 are uncorrected. The results of the analytical testing completed on select soil samples are provided in Appendix C.

The stratigraphic boundaries shown in the borehole records are inferred from non-continuous sampling and, therefore, these boundaries represent transitions between soil types rather than exact planes of geological change. For the purposes of interpreting the subsurface conditions at any given sign foundation location,

[2] Chapman, L.J. and Putnam, D.F., 1984, The Physiography of Southern Ontario, Ontario Geological Society, Special Volume 2, Third Edition. Accompanied by Map p. 2715, Scale 1:600,000.)

[3] Ministry of Northern Development of Mines. Bedrock Geology of Ontario – Southern Sheet, Ontario Geological Survey - Map 2544.

reference should be made to the closest borehole location. However, the subsurface conditions will vary between and beyond the borehole locations.

In general, the subsurface conditions at the sign support locations consist of the existing Highway 400 pavement structure underlain by various cohesive fill materials (clayey silt-silt, clayey silt, and silty clay fill). The cohesive fill is generally underlain by an upper cohesive till deposit that varies in composition from clayey silt-silt to silty clay, underlain by various non-cohesive deposits (silt, sandy silt, silty sand, and gravelly sand), in turn, underlain by a lower cohesive till deposit that varies in composition from clayey silt-silt to silty clay.

A more detailed description of the major stratigraphic units encountered in the boreholes is described in the sections below.

4.2.1 Asphalt and Concrete

A layer of asphalt between 80 mm and 380 mm thick was encountered at ground surface in all boreholes. In Boreholes OHSS-3, OHSS-7 and OHSS-21, a layer of concrete was encountered underlying the asphalt and was 180 mm to 450 mm thick.

4.2.2 Granular Fill (Pavement Structure)

A layer of granular fill was encountered underlying the asphalt (and concrete where applicable in Boreholes OHSS-3, OHSS-7 and OHSS-21). The granular fill was encountered at depths ranging from approximately 0.1 m to 0.5 m below ground surface (approximately Elevations 230.2 m and 203.9 m, generally rising northward) and was about 0.5 m to 2.0 m thick, extending down to depths of 0.8 m to 2.2 m below ground surface (approximately Elevations 229.5 m to 202.7 m, generally rising northward).

The SPT “N”-values measured within the granular fill range from 7 to 100 blows per 0.3 m of penetration, indicating a variable, loose to very dense state of compactness. In four instances, the split-spoon sampler did not penetrate the entire SPT depth due to refusal conditions (spoon bouncing or 100 blows for less than 0.3 m of penetration).

Grain size distribution testing was carried out on seven samples of the granular fill and the results are presented on Figure B1 in Appendix B. The water content measured on samples of the granular fill ranges from about 2% to 14%.

4.2.3 CLAYEY SILT-SILT (CL-ML) to SILTY CLAY (CI) (FILL)

A layer of cohesive fill consisting of clayey silt-silt to silty clay was encountered underlying the granular fill in all boreholes except Boreholes OHSS-10, OHSS-21 and VMS-1. The cohesive fill was encountered at depths ranging from approximately 0.8 m to 2.2 m below ground surface (approximately Elevations 228.4 m to 202.7 m, generally rising northward) and was about 0.7 m to 2.8 m thick, extending down to depths of 2.1 to 3.8 m (approximately Elevations 227.6 m to 201.1 m, generally rising northward).

The SPT “N”-values measured within the cohesive fill range from 2 to 48 blows per 0.3 m of penetration, indicating a variable, very soft to hard consistency.

Grain size distribution testing was carried out on 14 samples of the cohesive fill and the results are presented on Figure B2 in Appendix B.

Atterberg limit testing was carried out on 14 samples of the cohesive fill and the results are presented on a plasticity chart in Figures B3-A and B3-B in Appendix B. The Atterberg limits tests measured liquid limits ranging

from about 20% to 48%, plastic limits ranging from about 12% to 18%, and plasticity indices ranging from about 7% to 30%. The Atterberg limits tests generally indicate a clayey silt-silt to silty clay of low to intermediate plasticity. Based on the grain size distribution test on a sample of the cohesive fill recovered from Borehole OHSS-12, together with the results of the Atterberg limits test from this same sample, one sample of the cohesive fill is classified as clayey sand fill of low plasticity. The water content measured on samples of the cohesive fill ranges from about 9% to 31%, generally near the plastic limit of the material with higher values corresponding to the intermediate plasticity silty clay fill materials.

4.2.4 Sandy CLAYEY SILT-SILT (CL-ML) to SILTY CLAY (CI) (TILL) – Upper Deposit

An upper cohesive deposit of glacial till varying in composition from sandy clayey silt-silt to silty clay was encountered underlying the granular fill in Boreholes OHSS-10 and OHSS-21 and underlying the cohesive fill in all other boreholes except Boreholes OHSS-8, OHSS-13, OHSS-15 and VMS-1. The upper cohesive till deposit was encountered at depths ranging from 1.2 m to 3.8 m below ground surface (approximately Elevations 229.5 m to 201.1 m, generally rising northward) and extended to the termination depth of 8.2 m (Elevations 222.5 m to 201.4 m) in Boreholes OHSS-9, OHSS-12, OHSS-16 to OHSS-21, and PVMS-1. In the other boreholes, the upper cohesive till deposit extended to depths of 3.7 m to 6.7 m (Elevations 220.5 m to 199.1 m, generally rising northward). Where fully penetrated in the boreholes, the upper cohesive deposit was approximately 0.8 m to 4.6 m thick.

The SPT “N”-values measured within the upper cohesive deposit ranges from 1 to 95 blows per 0.3 m of penetration; the SPT “N”-values generally indicate that the upper cohesive deposit has a stiff to hard consistency, apart from the SPT “N”-values measured in Boreholes OHSS-9, OHSS-11, OHSS-12, OHSS-16, OHSS-21 and VMS-1. In these boreholes, softer zones occurring over more than one sampling interval were encountered and the SPT “N”-values measured 1 to 7 blows per 0.3 m of penetration, indicating a very soft to firm consistency. In three instances in Borehole OHSS-21, the split-spoon sampler did not penetrate the entire SPT depth due to refusal conditions (100 blows for less than 0.3 m of penetration).

Grain size distribution testing was carried out on 21 samples of the upper cohesive deposit and the results are presented on Figures B4-A to B4-C in Appendix B. Although not specifically encountered during the investigation, cobbles and boulders should be expected in the glacially derived, upper deposit of sandy clayey silt-silt to silty clay. Atterberg limit testing was carried out on 20 samples of the upper cohesive deposit and the results are presented on a plasticity chart in Figures B5-A and B5-B. The Atterberg limits tests measured liquid limits ranging from about 16% to 41%, plastic limits ranging from about 11% to 18%, and corresponding plasticity indices ranging from about 5% to 23%. The Atterberg limits tests generally indicate a clayey silt-silt to silty clay of low to intermediate plasticity. Based on the grain size distribution test on a sample of the upper cohesive deposit recovered from Borehole VMS-1, together with the results of the Atterberg limits test from this same sample, one sample of the upper cohesive deposit is classified as clayey sand of low plasticity. The water content measured on samples of the upper cohesive deposit ranges from about 9% to 36%, generally near the plastic limit of the material with higher values associated with the intermediate plasticity zones of silty clay till.

4.2.5 Silt (ML), Silty Sand (SW-SM) and Gravelly Sand (SW)

A non-cohesive deposit varying in composition from silt (trace sand to sandy), silty sand, and gravelly sand was encountered underlying the cohesive fill in Boreholes OHSS-8, OHSS-13 and OHSS-15 and underlying the upper cohesive deposit in Boreholes OHSS-1 to OHSS-4, MS-6, MS-8, OHSS-7, OHSS-10, OHSS-11, OHSS-14 and VMS-1. The non-cohesive deposit was encountered at depths ranging from 2.2 m to 7.2 m below ground surface (approximately Elevations 221.7 m to 196.9 m, generally rising northward) and extended to the termination depth

of 7.9 m to 8.2 m (Elevations 217.2 m to 196.2 m) in Boreholes OHSS-1, OHSS-3, OHSS-4, MS-6, OHSS-15 and VMS-1. In the other boreholes, the non-cohesive deposit extended to depths of 4.1 m to 7.6 m (Elevations 220.9 m to 196.9 m, generally rising northward). In Borehole OHSS-15, the non-cohesive deposit was interlayered with the lower cohesive deposit described in section 4.2.6, below. Where fully penetrated in the boreholes, the composite thickness of the non-cohesive deposit was approximately 0.4 m to 4.2 m thick.

The SPT "N"-values measured within the non-cohesive deposit ranges from 2 to 165 blows per 0.3 m of penetration; the SPT "N"-values typically measured 10 blows upwards to 46 blows per 0.3 m of penetration, indicating a compact to dense state of compactness. One loose to very loose zone (SPT N = 2), limited to one sampling interval, was encountered in Borehole OHSS-15 at about 4 m depth (Elevation 221.4 m) whereas one very dense zone (SPT N = 165), also limited to one sampling interval, was encountered in Borehole OHSS-1. In three instances in Borehole OHSS-1, the split-spoon sampler did not penetrate the entire SPT depth due to refusal conditions (100 blows for less than 0.3 m of penetration).

The water content measured on samples of the non-cohesive deposit ranges from about 10% to 22%.

Grain size distribution testing was carried out on 13 samples of the non-cohesive deposit and the results are presented on Figures B6-A and B6-B in Appendix B. The grain size distribution tests on the samples of gravelly sand and silty sand indicate a well graded gravelly sand and a well graded silty sand.

Atterberg limit testing was carried out on the fines portion of three samples of the non-cohesive deposit and the results are presented on a plasticity chart in Figure B7. One Atterberg limits test indicated a non-plastic silt and the other two Atterberg limits tests measured liquid limits of 13% and 15%, plastic limits of 12% and 13%, and a corresponding plasticity index of 1% and 2%. These results indicate that the fines portion of the non-cohesive deposit has slight plasticity.

4.2.6 (CL-ML) Sandy CLAYEY SILT-SILT (CL-ML) to SILTY CLAY (CI) (TILL) – Lower Deposit

A lower cohesive deposit of glacial till varying in composition from sandy clayey silt-silt to silty clay was encountered underlying the non-cohesive deposit in Boreholes OHSS-2, MS-8, OHSS-7, OHSS-8, OHSS-10, OHSS-11, OHSS-13, OHSS-14 and OHSS-15. The lower cohesive deposit was encountered at depths ranging from 4.1 m to 7.6 m below ground surface (approximately Elevations 220.9 m to 200.2 m, generally rising northward) and extended to the termination depth of 8.2 m (Elevation 218.2 m to 197.6 m), except in Borehole OHSS-15. In Borehole OHSS-15, the lower cohesive deposit was 2.7 m thick and was interlayered with the non-cohesive deposit described in Section 4.2.5, above.

The SPT "N"-values measured within the lower cohesive deposit ranges from 6 to 90 blows per 0.3 m of penetration, indicating a variable stiff to hard consistency.

Grain size distribution testing was carried out on six samples of the lower cohesive deposit and the results are presented on Figure B8 in Appendix B. Although not specifically encountered during the investigation, cobbles and boulders should be expected in the glacially derived, lower deposit of sandy clayey silt-silt to silty clay till.

Atterberg limit testing was carried out on seven samples of the lower cohesive deposit and the results are presented on a plasticity chart in Figure B9. The Atterberg limits tests measured liquid limits ranging from about 17% to 26%, plastic limits ranging from about 11% to 14%, and corresponding plasticity indices ranging from about 4% to 13%. The Atterberg limits tests indicate a clayey silt-silt to silty clay of low to intermediate plasticity.

The water content measured on samples of the lower cohesive deposit ranges from about 7% to 17%, generally near the plastic limit of the till.

4.3 Groundwater Conditions

The groundwater levels measured in the open boreholes at the time of the investigation are not considered representative of the stabilized hydrostatic groundwater levels at the site. All water levels recorded as part of this subsurface exploration program were taken shortly after drilling operations and therefore represent an unstabilized groundwater level. The unstabilized groundwater levels measured in the open boreholes upon completion of drilling are presented in the borehole records in Appendix A and are summarized below. Based on the colour transition from brown to grey in recovered soil samples from these boreholes as well as observations of soil moisture condition and soil caving on completion of drilling (where applicable), it is interpreted that the stabilized groundwater level is at approximately Elevation 201 m to 219 m within the project limits, also noted in the table below. In addition, perched groundwater may be present within non-cohesive fill materials, above cohesive fill or native soils.

Sign No.	Borehole No.	Unstabilized Groundwater Level in Open Borehole		Comments
		Depth (m)	Elevation (m)	
OHS-1	OHSS-1	4.7	199.4	Water level interpreted at approximately Elev. 200.5 m based on colour transition
OHS-2	OHSS-2	Dry	N/A	Water level interpreted at approximately Elev. 200 m based on colour transition
OHS-3	OHSS-3	4.6	201.2	Water level interpreted at approximately Elev. 199 m based on colour transition and caving on completion of drilling
OHS-4	OHSS-4	Dry	N/A	Water level interpreted at approximately Elev. 201 m based on colour transition
OHS-5	MS-6	3.1	204.4	Samples of sand deposit wet below Elevation 203.8 m
OHS-6	MS-8	5.6	201.3	Observed water level in open borehole is near colour transition from brown to grey
OHS-7	OHSS-7	3.5	204.8	Wet silty sand to silt observed below Elevation 203.7 m
OHS-8	OHSS-8	3.5	204.7	Water level within sandy silt to silty sand may be higher
OHS-9	OHSS-9	6.7	202.9	Water level interpreted at approximately Elev. 204 m based on colour transition
OHS-10	OHSS-10	Dry	N/A	Water level interpreted at approximately Elev. 206.5 m based on colour transition
OHS-11	OHSS-11	1.4	209.4	Observed water level in open borehole consistent with observed sample moisture conditions
OHS-12	OHSS-12	4.3	214.4	Water level interpreted at approximately Elev. 214 m based on colour transition
OHS-13	OHSS-13	5.0	217.8	Water level interpreted at approximately Elevation 218.5 m based on colour transition

Sign No.	Borehole No.	Unstabilized Groundwater Level in Open Borehole		Comments
		Depth (m)	Elevation (m)	
OHS-14	OHSS-14	Dry	N/A	Water level interpreted at approximately Elevation 219 m based on colour transition and sample moisture condition
OHS-15	OHSS-15	6.2	219.2	Water level interpreted at approximately Elevation 222 m based on sample moisture conditions
OHS-16	OHSS-16	6.8	216.9	Water level interpreted at approximately Elevation 219 m based on colour transition
OHS-17	OHSS-17[1]	Dry[1]	N/A[1]	Water level interpreted at approximately Elevation 216.5 m based on colour transition. Water level measured in standpipe piezometer at a depth of approximately 5.4 m (Elevation 216.6 m) on October 31, 2023.
OHS-18	OHSS-18	6.5	216.9	Water level interpreted at approximately Elev. 219 m based on colour transition
OHS-19	OHSS-19	Dry	N/A	Water level interpreted at approximately Elev. 222 m based on colour transition and caving below this level
OHS-20	OHSS-20	Dry	N/A	Water level interpreted at approximately Elev. 225 m based on colour transition
OHS-21	OHSS-21	Dry	N/A	Water level interpreted at approximately Elev. 225 m based on colour transition
PVMS-1	PVMS-1	4.8	218.9	Water level interpreted at approximately Elev. 218 m to 219 m based on colour transition
VMS-1	VMS-1	3.5	211.2	Water level interpreted at approximately Elev. 212 m based on sample moisture condition

Groundwater levels are subject to seasonal fluctuations and precipitation events and should be expected to be higher during wet periods of the year.

4.4 Analytical Testing

Twenty-two soil samples were collected and submitted for analyses of parameters used to assess corrosion potential and sulphate attack. Detailed analytical test results are included in Appendix C and the test results are summarized below.

Borehole No., Sample No.	Sample Depth / Elevation (m)	Parameters				
		Chloride (µg/g)	Sulphate (µg/g)	pH	Conductivity (µmho/cm)	Resistivity (ohm-cm)
OHSS-1, SA-5	3.8 / 200.3	700	72	8.15	1180	850
OHSS-2, SA-6	4.6 / 201.2	1000	67	8.08	1700	590
OHSS-3, SA-7	6.1 / 199.7	380	230	7.93	1120	890
OHSS-4, SA-6	4.6 / 203.2	680	300	7.86	1740	570
MS-6, SA-3	2.6 / 204.9	1500	99	7.89	2630	380
MS-8, SA-3	2.6 / 204.3	2900	<20	7.44	4810	210
OHSS-7, SA-7B	6.4 / 201.9	620	150	8.07	1490	670
OHSS-8, SA-7B	6.4 / 201.8	91	84	7.92	414	2400
OHSS-9, SA-5	3.8 / 205.8	1400	160	7.89	2440	410
OHSS-10, SA-5B	4.1 / 206.5	270	150	7.64	778	1300
OHSS-11, SA-7B	6.3 / 204.5	700	54	7.85	1400	720
OHSS-12, SA-5	3.8 / 214.9	940	79	7.91	1710	580
OHSS-13, SA-6	4.6 / 218.2	480	80	7.79	1060	940
OHSS-14, SA-6	4.6 / 220.4	1200	42	8.04	2210	450
OHSS-15, SA-6	4.6 / 220.8	730	47	8.08	1470	680
OHSS-16, SA-6	4.6 / 219.1	740	59	7.88	1480	670
OHSS-17, SA-6	4.6 / 217.4	910	190	7.86	1830	550
OHSS-18, SA-5	3.8 / 219.6	730	66	7.94	1600	620
OHSS-19, SA-6	4.6 / 223.0	710	22	7.90	1400	710
OHSS-20, SA-5	3.8 / 226.3	750	23	7.89	1430	700
OHSS-21, SA-5	3.8 / 226.9	980	58	7.95	1920	520
PVMS-1, SA-5	3.8 / 219.8	610	41	7.83	1250	800
VMS-1, SA-6	3.8 / 210.9	1500	96	7.91	2480	400

5.0 CLOSURE

This Foundation Investigation Report was prepared by Ms. Sunduss Asghar, EIT, and Mr. Mark Henderson, P.Eng., a Geotechnical Engineer with WSP Golder. Ms. Lisa Coyne, P.Eng., a Fellow and MTO Designated Foundations Contact for WSP Golder, conducted an independent technical and quality control review of this report.

Signature Page

WSP Golder

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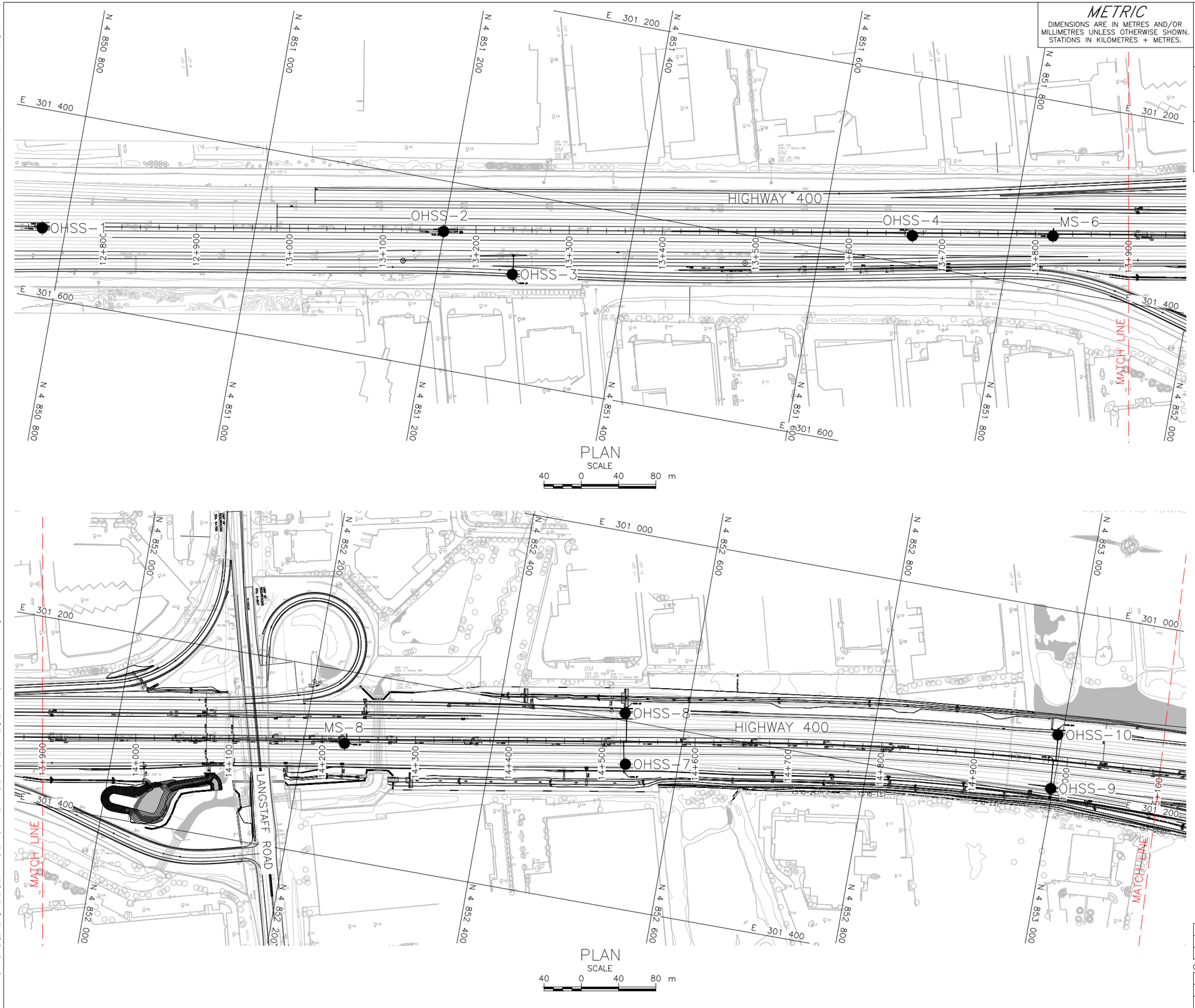
SA/MH/LCC/al

https://golderassociates.sharepoint.com/sites/152126/project files/6 deliverables/3. foundations/2. reports/03. ohs/final/21490972-r-rev0-fir_ohs_2023'11'17.docx

MINISTRY OF TRANSPORTATION, ONTARIO



PLAN
SCALE
40 0 40 80 m

PLAN
SCALE
40 0 40 80 m

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS IN KILOMETRES + METRES.

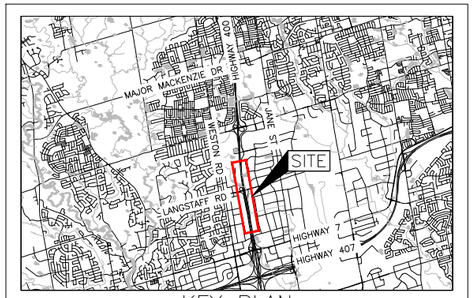
CONT No.
GWP No. 2836-02-00

HIGHWAY 400 WIDENING
OVERHEAD SIGNS

BOREHOLE LOCATION PLAN

SHEET

wsp



KEY PLAN
SCALE
2 0 2 4 km

LEGEND

● Borehole – Current Investigation

BOREHOLE CO-ORDINATES

No.	ELEVATION	NORTHING	EASTING
MS-6	207.5	4851843.9	301343.3
MS-8	206.9	4852243.5	301276.9
OHSS-1	204.1	4850775.1	301526.0
OHSS-2	205.8	4851199.7	301453.7
OHSS-3	205.8	4851280.2	301486.0
OHSS-4	207.8	4851695.3	301369.5
OHSS-7	208.3	4852544.0	301245.8
OHSS-8	208.2	4852534.1	301192.0
OHSS-9	209.6	4852997.7	301191.0
OHSS-10	210.6	4852995.0	301133.2

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NOTES

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REFERENCE

Base plans provided in digital format by Parsons, drawing file nos. Hwy400_Exsting Survey-Topo.dwg, H400-ROD-PLN.dwg, 73-400.xml, received June 1, 2022.
Design plan provided by Parsons, file no. H400-478918-ROD-PLN-S_Binded 2023-10-18.dwg, received October 18, 2023.
Horizontal alignment provided in digital format by Parsons, drawing file no. Hwy 400 Alignments.xml, received October 24, 2023.

NO.	DATE	BY	REVISION
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Geocres No. 30M13-305

HWY. 400	PROJECT NO. 21490972		DIST. .
SUBM'D. MH	CHKD. MH	DATE: 11/15/2023	SITE: .
DRAWN: DD	CHKD. MH	APPD. LCC	DWG. 1

PLOT DATE: November 16, 2023
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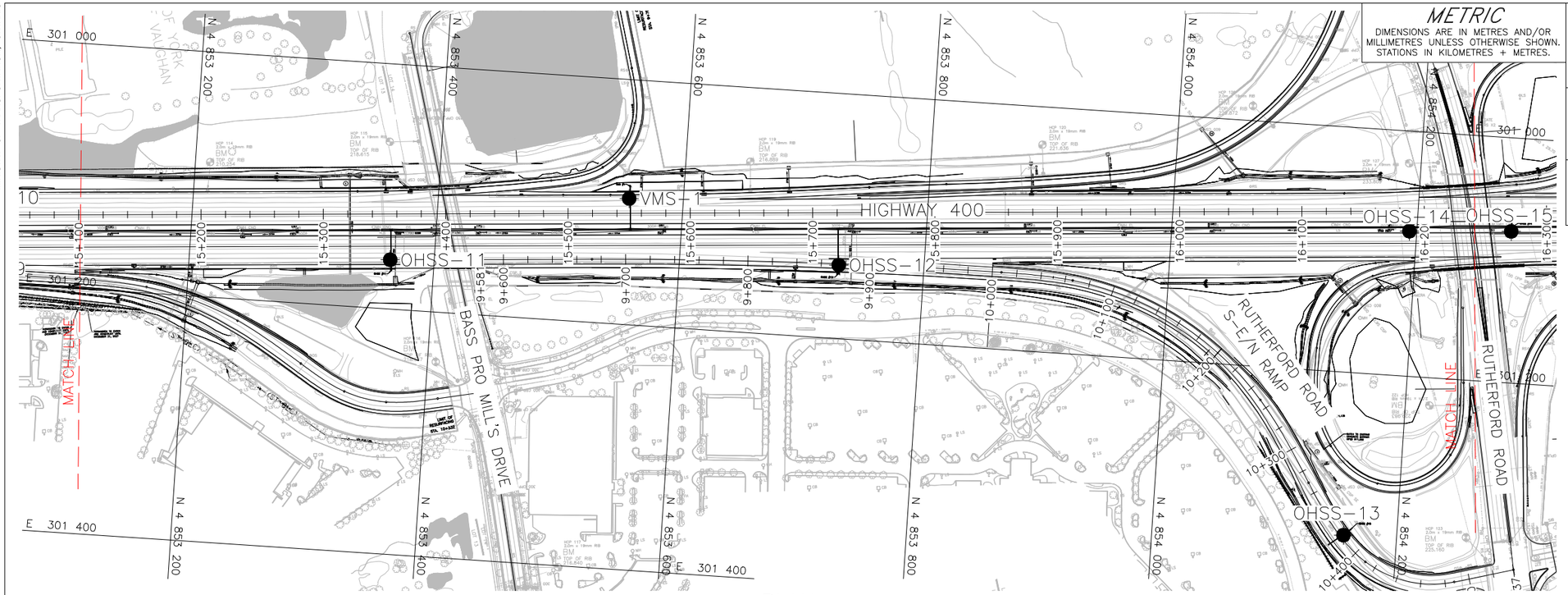

PLAN
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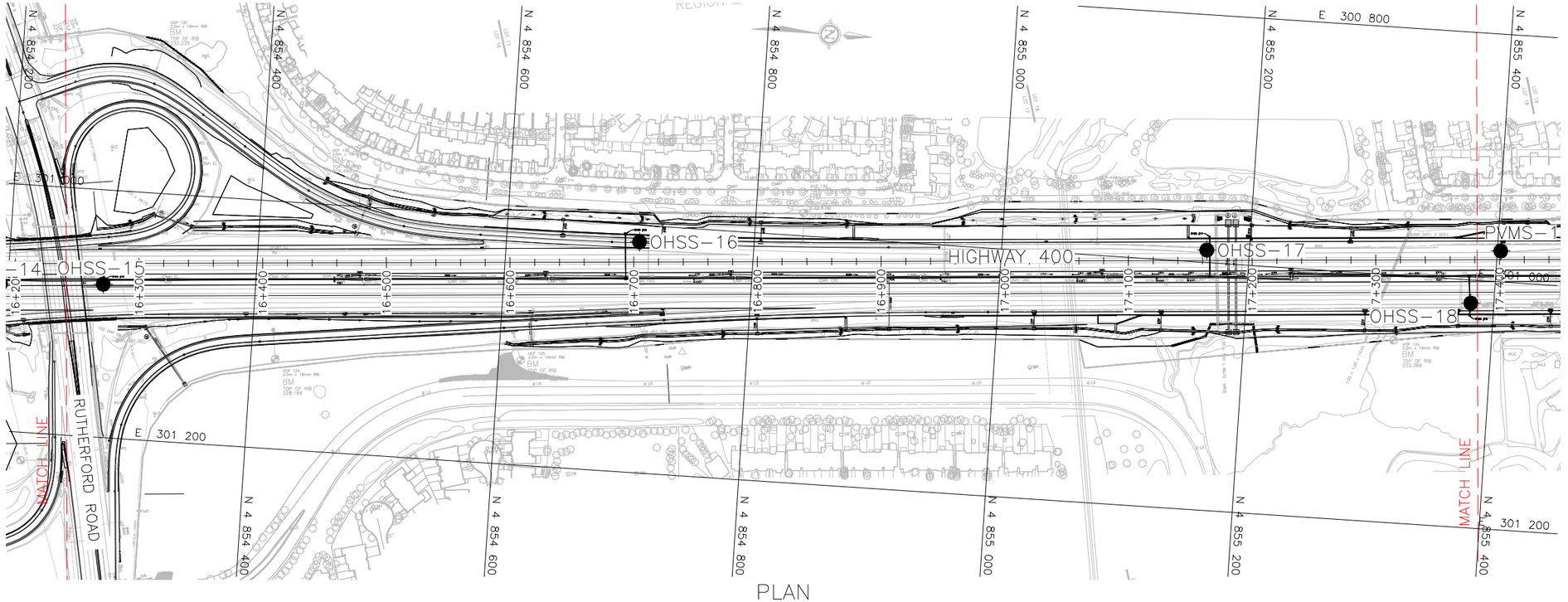

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STATIONS IN KILOMETRES + METRES.

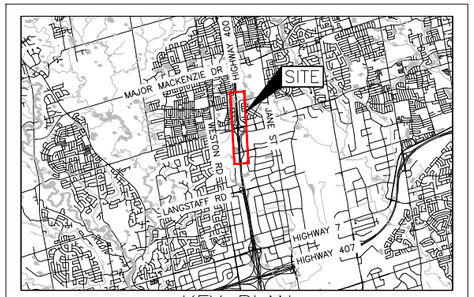
CONT No.
GWP No. 2836-02-00

SHEET

HIGHWAY 400 WIDENING
OVERHEAD SIGNS

BOREHOLE LOCATION PLAN

wsp



KEY PLAN
SCALE
2 0 2 4 km

LEGEND

Borehole – Current Investigation

BOREHOLE CO-ORDINATES

No.	ELEVATION	NORTHING	EASTING
OHSS-11	211.6	4853364.1	301159.8
OHSS-12	218.7	4853730.3	301139.9
OHSS-13	222.8	4854156.6	301332.8
OHSS-14	225.0	4854194.0	301081.6
OHSS-15	225.4	4854277.1	301076.3
OHSS-16	223.7	4854707.5	301013.6
OHSS-17	222.0	4855165.6	300989.9
OHSS-18	223.4	4855381.4	301018.6
PVMS-1	223.7	4855402.8	300975.0
VMS-1	214.7	4853555.8	301097.0

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HWY. 400		PROJECT NO. 21490972	DIST. .
SUBM'D. MH	CHKD. MH	DATE: 11/15/2023	SITE: .
DRAWN: DD	CHKD. MH	APPD. LCC	DWG. 2

PLOT DATE: November 16, 2023
FILENAME: S:\Clients\MTO\Hwy_400_Longstaff_to_Major_Mackenzie\99_PROJ\21490972_Parsons\40_PROD\0004_Overhead_Signs_Relocations\21490972-0004-BG-0002.dwg

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METRIC
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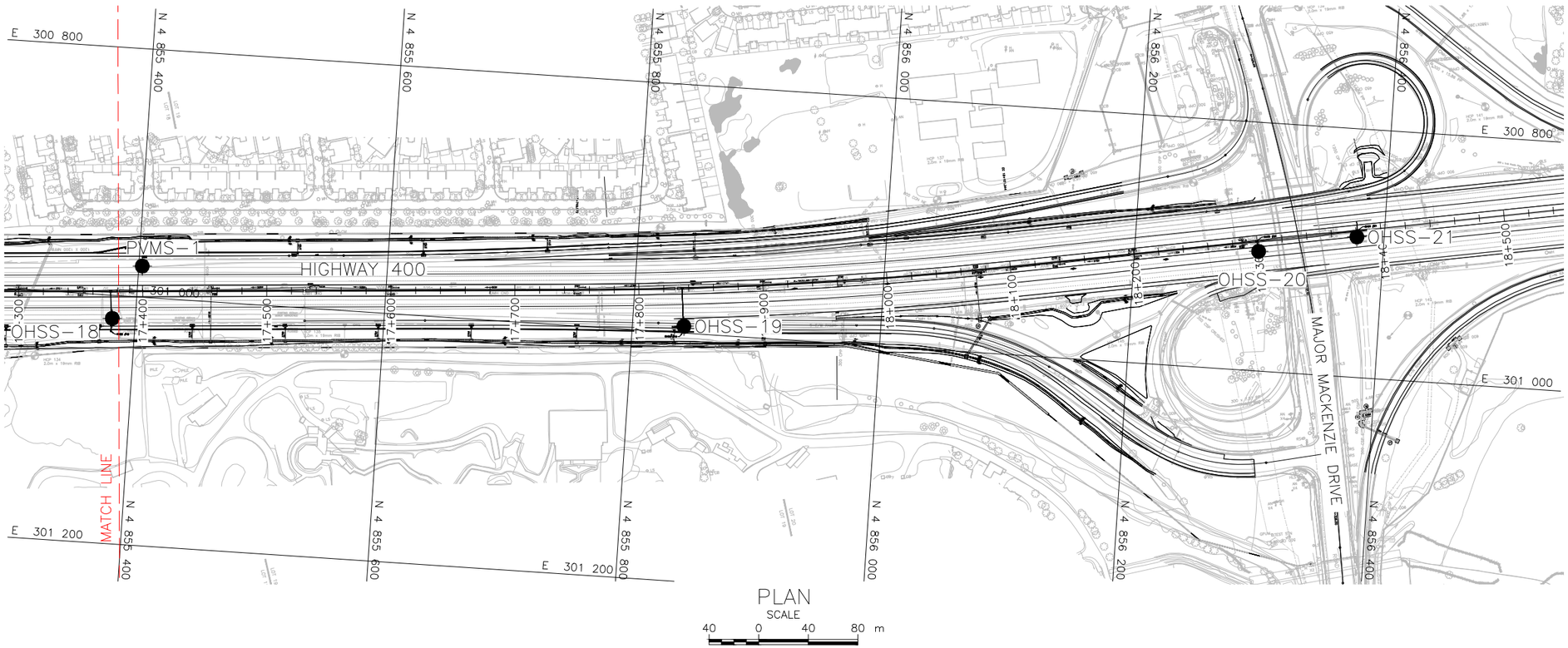
STATIONS IN KILOMETRES + METRES.

CONT No.
GWP No. 2836-02-00

HIGHWAY 400 WIDENING
OVERHEAD SIGNS

BOREHOLE LOCATION PLAN

SHEET



PLAN
SCALE
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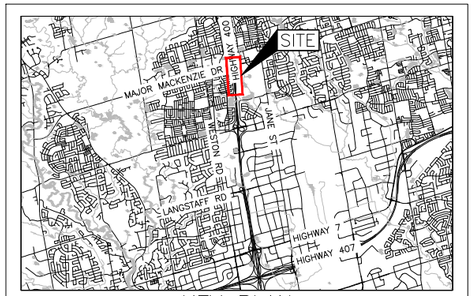

KEY PLAN
SCALE
2 0 2 4 km

LEGEND

● Borehole – Current Investigation

BOREHOLE CO-ORDINATES

No.	ELEVATION	NORTHING	EASTING
OHSS-18	223.4	4855381.4	301018.6
OHSS-19	227.6	4855841.6	300994.5
OHSS-20	229.8	4856299.8	300903.8
OHSS-21	230.7	4856378.1	300887.0
PVMS-1	223.7	4855402.8	300975.0

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NO.	DATE	BY	REVISION
.	.	.	.

Geocres No. 30M13-305

HWY. 400	PROJECT NO. 21490972		DIST. .
SUBM'D. MH	CHKD. MH	DATE: 10/26/2023	SITE: .
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PLOT DATE: November 16, 2023
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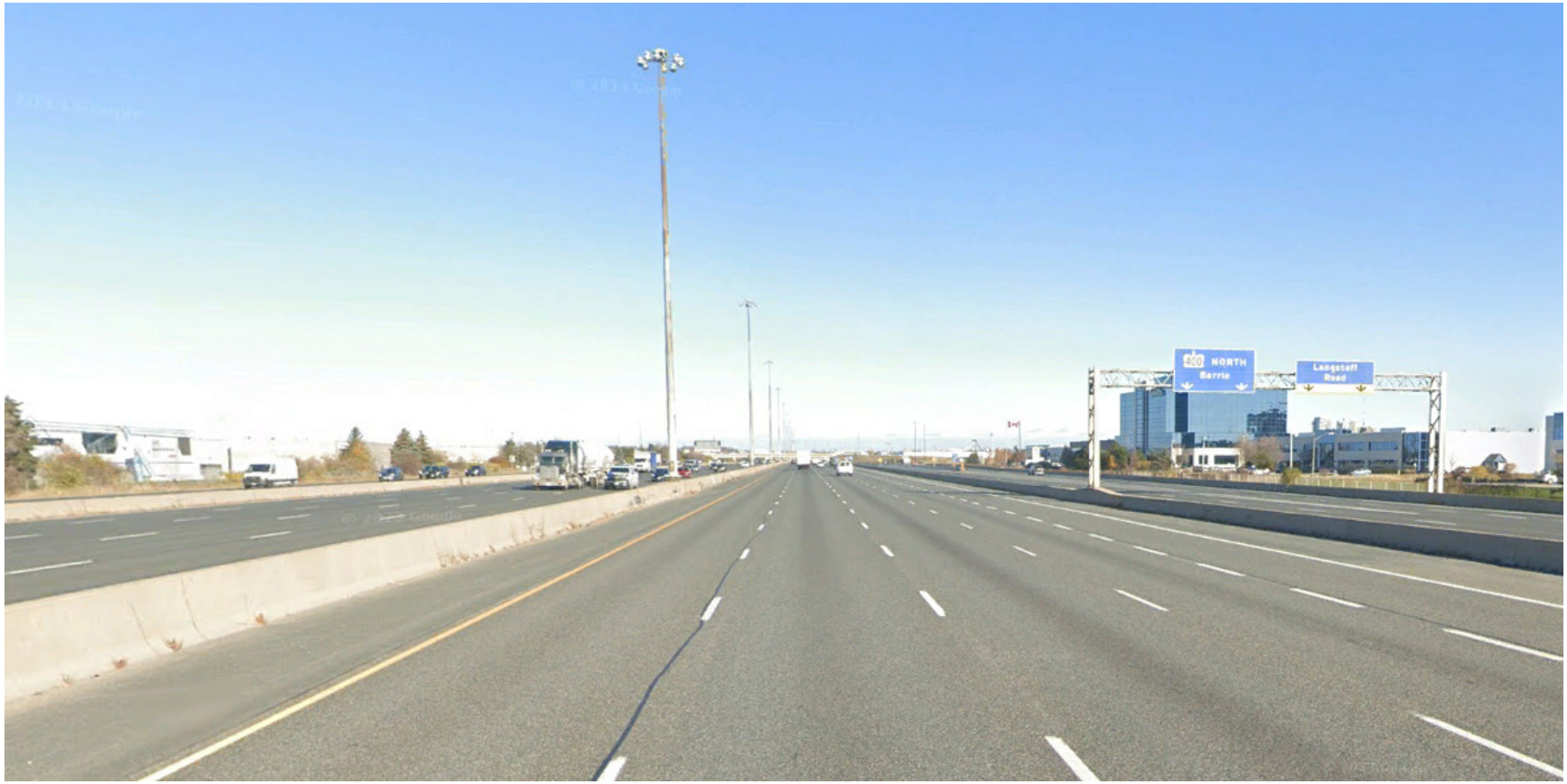
Photograph 1: Looking northbound at proposed location for sign structure OHS-1
Proposed single cantilever, left (median-mounted) footing
Station 12+735



Photograph 2: Looking northbound at proposed location for sign structure OHS-2
Proposed single cantilever sign, left (median-mounted) footing
Station 13+167

Photograph 3: Looking northbound at existing sign structure OHS-3
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 13+240

Photograph 4: Looking northbound at proposed location for sign structure OHS-4
Proposed single cantilever sign, left (median-mounted) footing
Station 13+668

Photograph 5: Looking northbound at proposed location for sign structure OHS-5
Proposed single cantilever sign, left (median-mounted) footing
Station 13+820

Photograph 6: Looking northbound at proposed location for sign structure OHS-6
Proposed single cantilever sign, left (median-mounted) footing
Station 14+226

Photograph 7: Looking northbound at existing sign structure OHS-7
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 14+523

Photograph 8: Looking southbound at existing sign structure OHS-8
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 14+526

Photograph 9: Looking northbound at existing sign structure OHS-9
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 14+985

Photograph 10: Looking southbound at existing sign structure OHS-10
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 14+988

Photograph 11: Looking northbound at existing sign structure OHS-11
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 15+256

Photograph 12: Looking northbound at existing sign structure OHS-12
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 15+719

Photograph 13: Looking north at existing sign structure OHS-13
Existing monotube sign, left (ground-mounted) and right (ground-mounted) footings
Rutherford S-E/W Ramp Station 10+381

Photograph 14: Looking northbound at proposed location for sign structure OHS-14
Proposed single cantilever sign, left (median-mounted) footing
Station 16+186

Photograph 15: Looking northbound at proposed location for sign structure OHS-15
Proposed single cantilever sign, left (median-mounted) footing
Station 16+270

Photograph 16: Looking southbound at existing sign structure OHS-16
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 16+704

Photograph 17: Looking southbound at existing sign structure OHS-17
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 17+165

Photograph 18: Looking northbound at existing sign structure OHS-18
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 17+374

Photograph 19: Looking northbound at existing sign structure OHS-19
Existing tri-chord sign, left (median-mounted) and right (ground-mounted) footings
Station 17+835

Photograph 20: Looking northbound at proposed location for sign structure OHS-20
Proposed single cantilever sign, right (ground mounted) footing
Station 18+300

Photograph 21: Looking southbound at proposed location for sign structure OHS-21
Proposed single cantilever sign, left (median-mounted) footing
Station 18+380

**Photograph 22: Looking southbound at proposed location for sign structure PVMS-1
Proposed portable variable message sign, right (ground-mounted) footing
Station 17+400**

Photograph 23: Looking southbound at proposed location for sign structure VMS-1
Proposed overhead variable message sign, left (median-mounted) and right (ground-mounted) footings
Station 15+550

APPENDIX A

Borehole Records

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS
MINISTRY OF TRANSPORTATION, ONTARIO

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>200	>8
COBBLES	Not Applicable	75 to 200	3 to 8
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
FINES	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY COMPONENTS[1,2]

Percentage by Mass	Modifier
> 35	Use 'and' to combine primary and secondary component (*i.e.,* SAND and gravel)
> 20 to 35	Primary soil name prefixed with "gravelly, sandy" as applicable
> 10 to 20	some (*i.e.,* some sand)
≤ 10	trace (*i.e.,* trace fines)

1. Only applicable to components not described by Primary Group Name.
2. Classification of Primary Group Name based on Unified Soil Classification System (ASTM D2487) for coarse-grained soils; fine-grained soils described per current MTO Soil Classification System.

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)
An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve friction (f_s) are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC / SC	Rock core / Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample
OD / ID	Outer Diameter / Inner Diameter
HSA / SSA	Hollow-Stem Augers / Solid-Stem Augers

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

COARSE-GRAINED SOILS

Compactness[1]

Term	SPT 'N' (blows/0.3m)[2]
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	> 50

1. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.
2. SPT 'N' in accordance with ASTM D1586, uncorrected for the effects of overburden pressure.

FINE-GRAINED SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	< 12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	> 200	> 30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time
FoS	factor of safety

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ. where $\gamma = \rho \cdot g$ (i.e., mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_L or LL	liquid limit
w_P or PL	plastic limit
I_P or PI	plasticity index = $(w_l - w_p)$
NP	non-plastic
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
$C_{\alpha(e)}$	secondary compression index
C_α	rate of secondary compression
$C_{\alpha(\varepsilon)}$	modified secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
c′	effective cohesion
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q or q'	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$
2 shear strength = (compressive strength)/2

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-1 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4850775.1; E 301526 NAD83 / MTM Zone 10 (LAT. 43.796932; LONG. -79.540685) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:204.1 m DATE Apr 17, 2023 - Apr 18, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL W_p NMC W LL W_l	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined; 20 40 60 80 100	NP Nonplastic; 20 40 60						
0.0	ASPHALT (190 mm)						204								
0.2 / 203.9	SAND (SP-SM), trace gravel, trace silt, trace clay (FILL) Dense Brown Moist		1	SS	42		203		○		2	86	10	2	
202.6															
1.4	Sandy CLAYEY SILT (CL), trace gravel (FILL) Very stiff to hard Brown Moist		2	SS	22		202		⊢⊣		4	32	42	22	
201.1			3	SS	32				○						
3.0	Sandy CLAYEY SILT (CL), trace gravel (TILL) Hard Brown Moist - 3.0 to 3.7 m: cobbles inferred from angular rock fragments		4	SS	69		201								
200.4															
3.7	Sandy SILT (ML), trace clay Very dense Brown; becoming grey at about 5.6 m depth (Elevation 198.5 m) Moist to wet		5	SS	165		200								
			6	SS	100/0.23	▽	199				0	28	68	4	
			7	SS	100/0.26		198		○						
196.9							197								
7.2	Gravelly SAND (SW-SM), some silt, trace clay Grey Moist		8	SS	100/0.14						22	66	11	1	
196.2															
7.9	End of Borehole NOTES: 1. Water measured inside open borehole at a depth of 4.7 m below ground surface (Elevation 199.4 m) upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-2 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4851199.7; E 301453.7 NAD83 / MTM Zone 10 (LAT. 43.800753; LONG. -79.541586) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:205.8 m DATE Apr 20, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES						DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT (%)							
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH (kPa) ⊕ Field Vane, ■ Remoulded, ● Pocket Pen, ○ Quick Triaxial, × Unconfined; 20 40 60 80 100	PL W_p	NMC W	LL W_l	NP Nonplastic; 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0 / 205.4	ASPHALT (330 mm)																	
0.4 / 204.4	SAND (SP-SM), trace gravel, trace silt, trace clay (FILL) Compact Brown Moist		1	SS	24		205			○				6	83	9	2	
1.4 / 203.6	CLAYEY SILT (CL), trace sand, trace gravel, trace organics (FILL) Stiff Dark brown Moist		2	SS	12		204											
2.2 / 201.3	Sandy CLAYEY SILT (CL), trace gravel (TILL) Very stiff to hard Brown (mottled) Moist		3	SS	26		203			⊢⊣				5	34	38	23	
			4	SS	23					○								
			5	SS	45		202											
4.5 / 200.2	Sandy SILT (ML), trace gravel Dense Brown Moist		6	SS	32		201			○								
5.6	Sandy CLAYEY SILT-SILT (CL-ML), trace gravel (TILL) Hard Grey Moist		7	SS	90		200			○⊢				4	31	53	12	
							199											
8.2			8	SS	59		198			○								
197.6	End of Borehole NOTES: 1. Borehole open and dry upon completion of drilling.																	

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-3

Sheet 1 of 1 **METRIC**

G.W.P. 2836-02-00 LOCATION N 4851280.2; E 301486 NAD83 / MTM Zone 10 (LAT. 43.801478; LONG. -79.541186) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:205.8 m DATE Apr 21, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES						DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT (%)							
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE		SHEAR STRENGTH (kPa) ⊕ Field Vane, ■ Remoulded, ● Pocket Pen, ○ Quick Triaxial, × Unconfined; 20 40 60 80 100	PL W_p	NMC W	LL W_l	NP Nonplastic	20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI CL	REMARKS
0.0	ASPHALT (75 mm)																		
205.7	CONCRETE (500 mm)																		
0.1																			
205.3																			
0.5	SAND (SP), trace gravel (FILL) Dark brown to brown Moist																		
204.7			1A	SS	51		205			○									
1.1	CLAYEY SILT-SILT (CL-ML), trace gravel, trace organics (FILL) Very stiff Dark brown Moist		1B																
			2	SS	17		204			⊖						1	28	45 26	
203.7																			
2.1	CLAYEY SILT (CL) trace sand, trace gravel (TLL) Firm to very stiff Brown (mottled); becoming grey at 6.1 m (Elevation 199.7 m) Moist - 2.2 to 4.5 m: Oxidation staining in sample no. 3 to 5		3	SS	25		203			○									
			4	SS	7														
			5	SS	26		202			○									
			6	SS	17	▽	201												
			7	SS	19		200												
199.1																			
6.7	SILT (ML), some sand, trace clay Compact to dense Grey Moist						199												
			8	SS	30		198			○						0	16	78 6	
197.6																			
8.2	End of Borehole																		

NOTES:

1. Borehole caved to a depth of 6.8 m below ground surface (Elevation 199.0 m) upon completion of drilling.

2. Water measured inside open borehole at a depth of 4.6 m below ground surface (Elevation 201.2 m) upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-4 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4851695.3; E 301369.5 NAD83 / MTM Zone 10 (LAT. 43.805214; LONG. -79.542636) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:207.8 m DATE Apr 20, 2023 CHECKED BY M.H.

ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) (Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined) 20 40 60 80 100	WATER CONTENT (%) PL W_p NMC W LL W_l NP Nonplastic 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0 207.4	ASPHALT (355 mm)														
0.4	SAND (SP), trace gravel (FILL) Compact Brown Moist		1	SS	19		207		○						
206.4 1.4	SILTY CLAY (CI), some sand, (FILL) Firm Dark brown to brown Moist		2	SS	7		206		⊢——⊣		0	12	52	36	
205.5 2.3	SANDY CLAYEY SILT-SILT (CL-ML), trace gravel (TILL) Stiff to hard Brown; becoming grey at about 4.4 m (Elevation 203.4 m) Moist		3	SS	13		205		○						
			4	SS	24		204								
			5	SS	47				○						
			6	SS	56		203								
							202								
201.1			7	SS	95				○⊣		2	28	59	11	
6.7	Sandy SILT (ML), trace gravel, trace clay Dense Grey Moist						201								
			8	SS	34		200		○		4	24	60	12	
8.2 199.6	End of Borehole														

NOTES:
1. Borehole open and dry upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

PROJECT 21490972

RECORD OF BOREHOLE No MS-6

SHEET 1 OF 1

METRIC

G.W.P. 2836-02-00 LOCATION N 4851843.9; E 301343.3 MTM NAD 83 ZONE 10 (LAT. 43.806560; LONG. -79.542966) ORIGINATED BY JNS

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 156 mm O.D. Solid Stem Auger COMPILED BY MH

DATUM Surface Elevation:207.5 m DATE June 2, 2022 CHECKED BY DAM

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 × REMOULDED (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
207.5	GROUND SURFACE										
0.0	ASPHALT (260 mm)										
0.5	SAND (SW) and gravel, trace silt (FILL) Brown Moist						207				
206.5			1A 1B	SS	7						
1.0	SAND (SW), trace gravel, trace silt (FILL) Brown Moist										
	Sandy CLAYEY SILT (CL), trace gravel (FILL) Firm to stiff		2	SS	13		206		o		
205.3											
2.2	Brown Moist		3	SS	29		205				
	Sandy CLAYEY SILT (CL), trace gravel (TILL) Stiff to very stiff Brown Moist		4	SS	9	▽			o—o		2 31 43 24
203.8	- Auger grinding between 2.3 m and 2.9 m depth.						204				
3.7	SAND (SP) and silt, trace clay Compact to very dense Brown to grey Wet		5	SS	41						
			6	SS	13		203		o		0 58 39 3
							202				
			7	SS	98						
200.8							201				
6.7	END OF BOREHOLE										

NOTES:

1. Borehole caved to a depth of 3.1 m (Elevation 204.4 m) upon completion of drilling.

2. Borehole dry to the caved depth of 3.1 m below ground surface (Elevation 204.4 m) upon completion of drilling.

$+^3, \times^3$: Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE

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PROJECT 21490972

RECORD OF BOREHOLE No MS-8

SHEET 1 OF 1

METRIC

G.W.P. 2836-02-00 LOCATION N 4852243.5; E 301276.9 MTM NAD 83 ZONE 10 (LAT. 43.810156; LONG. -79.543794) ORIGINATED BY JNS

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 156 mm O.D. Solid Stem Auger COMPILED BY MH

DATUM Surface Elevation:206.9 m DATE June 12, 2022 CHECKED BY DAM

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 × REMOULDED (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
206.9	GROUND SURFACE										
0.0 / 206.5	ASPHALT (380 mm)										
0.7	SAND (SW) and gravel, trace silt (FILL) Brown Moist		1	SS	13		206				
	SAND (SW), trace gravel, trace silt (FILL) Brown Moist		2	SS	9		205				2 26 40 32
203.9	CLAYEY SILT (CL), some sand to Sandy CLAYEY SILT (CL), trace gravel (FILL) Firm to stiff Brown to grey Moist		3	SS	5		204				
3.0 / 203.2	SILTY CLAY (CI), some sand (TILL) Firm Brown to grey (mottled) Moist		4	SS	7		203				
3.7	Sandy SILT (ML), some gravel Compact Brown Moist		5	SS	11		202				
201.3			6	SS	30	▽	201				
5.6	Sandy CLAYEY SILT (CL) (TILL) Very stiff Grey Moist		7	SS	28						0 29 41 30
200.2											
6.7	END OF BOREHOLE										

NOTES:

1. Borehole open upon completion of drilling.

2. Water measured inside open borehole at a depth of 5.6 m below ground surface (Elevation 201.3 m) upon completion of drilling.

+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

GTA-MTO 001 S:\CLIENTS\MTO\HWY_400_LANGSTAFF_TO_MAJOR_MACKENZIE\02_DATA\GINT\HWY_400_LANGSTAFF_TO_MAJOR_MACKENZIE.GPJ GAL-GTA.GDT 11/7/23

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-7 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4852544; E 301245.8 NAD83 / MTM Zone 10 (LAT. 43.812853; LONG. -79.544179) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:208.3 m DATE Apr 25, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) (Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined) 20 40 60 80 100	WATER CONTENT (%) PL W_p NMC W LL W_l NP Nonplastic 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES										
0.0	ASPHALT (180 mm)														
208.1 / 0.2	CONCRETE (305 mm)						208								
207.8 / 0.5	SAND (SP), trace gravel Compact Grey Wet		1	SS	15				○						
206.8							207								
1.5	Sandy SILTY CLAY (CI) (FILL) Firm to stiff Brown to dark brown Moist		2	SS	15				○						
	- 2.2 to 3.0 m: Oxidation staining in sample no. 3		3	SS	4		206		⊢			0	22	34	44
205.3															
3.0	CLAYEY SILT-SILT (CL-ML) and Sand, trace gravel (TILL) Stiff to hard Brown with oxidation staining Moist		4	SS	11	▽	205								
			5	SS	32				○			2	42	49	7
4.6							204								
203.7	SILTY SAND (SM) trace gravel Compact Grey Wet		6	SS	22										
							203								
201.9			7A	SS	36		202								
6.4	SILT (ML) , trace gravel, trace sand, trace to some clay Compact Grey Wet		7B												
200.7							201								
7.6	CIAYEY SILT-SILT (CL-ML) and Sand, trace gravel (TILL) Hard Grey		8A	SS	38				○						
8.2	Moist		8B						⊢			2	36	48	14
200.1	End of Borehole NOTES: 1. Borehole caved to a depth of 4.5 m below ground surface (Elevation 203.8 m) upon completion of drilling. 2. Water measured inside open borehole at a depth of 3.5 m below ground surface (Elevation 204.8 m) upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-8 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4852534.1; E 301192 NAD83 / MTM Zone 10 (LAT. 43.812763; LONG. -79.544848) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:208.2 m DATE Apr 26, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL W_p NMC W LL W_l	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined; 20 40 60 80 100	NP Nonplastic; 20 40 60						
0.0	ASPHALT (180 mm)														
208.0 / 0.2	Gravelly SAND (SP) (FILL) Very dense Brown Moist		1	SS	100/0.09		208								
206.8							207								
1.4	Sandy CLAYEY SILT (CL), trace gravel (FILL) Very stiff to hard Brown to grey Moist		2	SS	30						8	28	43	21	
206.0							206								
2.2	Sandy SILT (ML), trace gravel, trace clay Compact Brown Moist		3	SS	10										
			4	SS	14		205								
			5	SS	12						1	35	56	8	
			6	SS	24		204								
202.6							203								
5.6	SILTY SAND (SM), trace gravel, trace clay Compact Grey Wet		7A	SS	21						1	62	32	5	
201.8			7B				202								
6.4	SILTY CLAY (CI),some sand, trace gravel (TILL) Very stiff Brown Wet														
			8	SS	22		201								
8.2															
200.0	End of Borehole														

NOTES:

1. Borehole caved to a depth of 4.5 m below ground surface (Elevation 203.7 m) upon completion of drilling.

2. Water measured inside open borehole at a depth of 3.5 m below ground surface (Elevation 204.7 m) upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

RECORD OF BOREHOLE No. OHSS-9

Sheet 1 of 1 — METRIC

PROJECT	21490972				
G.W.P.	2836-02-00	LOCATION	N 4852997.7; E 301191 NAD83 / MTM Zone 10 (LAT. 43.816936; LONG. -79.544863)	ORIGINATED BY	T.T
DIST	CENTRAL HWY 400	BOREHOLE TYPE	Power Auger; 168 mm O.D. Hollow Stem Augers	COMPILED BY	M.L.
DATUM	Surface Elevation:209.6 m	DATE	Apr 25, 2023 - Apr 26, 2023	CHECKED BY	M.H.

SOIL PROFILE

ELEV. / DEPTH	DESCRIPTION
0.0	ASPHALT (200 mm)
209.4 / 0.2	SAND (SP) and gravel (FILL) Dense Grey Wet
208.1 / 1.5	CLAYEY SILT (CL), trace sand, trace gravel (FILL) Stiff Brown to dark brown Moist
207.4 / 2.2	SILTY CLAY (CL), trace sand, trace gravel (TILL) Firm to stiff Brown to brownish grey Moist
204.0 / 5.6	Sandy CLAYEY SILT-SILT (CL-ML) to Sandy CLAYEY SILT (CL), trace gravel (TILL) Hard Grey Moist
201.4 / 8.2	End of Borehole

SAMPLES

NUMBER	TYPE	"N" VALUES	GR	SA	SI	CL
1	SS	31				
2	SS	10				
3	SS	9	1	5	49	45
4	SS	6				
5	SS	6				
6	SS	10				
7	SS	51				
8	SS	74	10	24	48	18

Columns: STRATA PLOT; GROUNDWATER CONDITIONS; ELEVATION SCALE (209, 208, 207, 206, 205, 204, 203, 202); DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100); SHEAR STRENGTH (kPa): × Field Vane, ⊕ Remoulded, ■ Pocket Pen, ● Quick Triaxial, ○ Unconfined (20 40 60 80 100); WATER CONTENT (%): PL W_p, NMC W, LL W_l; NP Nonplastic (20 40 60); UNIT WEIGHT γ kN/m³; GR SA SI CL; REMARKS

NOTES:

1. Borehole open upon completion of drilling.
2. Water measured inside open borehole at a depth of 6.7 m below ground surface (Elevation 202.9 m) upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity ○³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-10 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4852995; E 301133.2 NAD83 / MTM Zone 10 (LAT. 43.816912; LONG. -79.545582) ORIGINATED BY S.A.

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 108 mm O.D. Hollow Stem Auger COMPILED BY S.A.

DATUM Surface Elevation:210.6 m DATE Jul 25, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL W_p NMC W LL W_l	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined; 20 40 60 80 100	NP Nonplastic; 20 40 60						
0.0	ASPHALT														
0.2															
210.4	SAND (SW) and gravel, (FILL) Dense Grey to brownish grey Moist						210								
			1	SS	41										
							209								
			2	SS	40										
208.4															
2.2	CLAYEY SILT (CL) to Sandy CLAYEY SILT-SILT (CL-ML), trace gravel, contains oxidation stains (TILL) Firm to Stiff Dark Brown Moist						208								
			3	SS	6										
			4	SS	11		207								
206.9											12	31	41	16	
3.7	SILTY SAND (SM), some clay, trace gravel Brown Moist														
206.5			5A	SS	9										
4.1	CLAYEY SILT (CL) to SILTY CLAY (CI), trace gravel, contains oxidation stains (TILL) Firm to stiff Grey Moist		5B				206								
			6	SS	6						0	7	62	31	
							205								
			7	SS	9		204								
			8	SS	7		203								
8.2															
202.4	End of Borehole NOTES: 1. Borehole open and dry upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-11 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4853364.1; E 301159.8 NAD83 / MTM Zone 10 (LAT. 43.820234; LONG. -79.545254) ORIGINATED BY M.I.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:211.6 m DATE May 11, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES															
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL W_p NMC W LL W_l	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0	ASPHALT (200 mm)														
211.4															
0.2	SAND (SP-SM), some gravel, trace silt (FILL) Loose Grey Moist to wet		1	SS	67/0.08		211		NP Nonplastic						
			2	SS	7		210				20	70	10	0	
209.4															
2.2	CLAYEY SILT (CL), trace sand. trace gravel, trace organics (FILL) Firm Grey Moist		3	SS	5		209								
208.6															
3.0	SILTY CLAY (CI), trace sand (FILL) Soft Brown Moist		4	SS	3		208				0	8	56	36	
207.8															
3.8	SILTY CLAY (CI), trace sand (TILL) Soft to firm Grey Moist		5	SS	4										
			6	SS	4		207								
206.0							206								
5.6	SILTY SAND (SM), trace gravel, trace clay Grey Wet														
205.3			7A	SS	5						1	82	13	4	
6.3	CLAYEY SILT (CL) and Sand, trace gravel (TILL) Stiff Grey Moist		7B				205								
			8	SS	11		204				7	36	34	23	
203.4															
8.2	End of Borehole NOTES: 1. Borehole caved to a depth of 1.8 m below ground surface (Elevation 209.8 m) upon completion of drilling. 2. Water measured inside open borehole at a depth of 1.4m below ground surface (Elevation 210.2 m) upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-12 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4853730.3; E 301139.9 NAD83 / MTM Zone 10 (LAT. 43.82353; LONG. -79.545504) ORIGINATED BY M.I.T.

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:218.7 m DATE May 11, 2023 CHECKED BY M.H.

ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) (Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined) 20 40 60 80 100	WATER CONTENT (%) PL W_p NMC W LL W_l NP Nonplastic 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0	ASPHALT (200 mm)														
218.5 / 0.2	Gravelly SAND (SP-SM), some silt, trace clay (FILL) Grey Moist						218								
217.6			1A	SS	14						32	56	11	1	
1.1	CLAYEY SAND (SC), trace gravel FILL) Blackish grey Very loose to compact Moist		1B						○						
			2	SS	26		217								
216.0			3A	SS	2				⊖		7	47	35	11	
2.7	CLAYEY SILT (CL), trace sand (TILL) Firm to very stiff Brown; becoming grey at about 4.6 m depth (Elevation 214.1 m) Moist		3B				216								
			4	SS	17				○						
			5	SS	20	▽	215								
			6	SS	5		214		⊖		0	2	59	39	
							213								
			7	SS	20				○						
							212								
210.5			8	SS	26		211		○						
8.2	End of Borehole														

NOTES:

1. Borehole caved to a depth of 7.3 m below ground surface (Elevation 211.4 m) upon completion of drilling.

2. Water measured inside open borehole at a depth of 4.3 m below ground surface (Elevation 214.4 m) upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

RECORD OF BOREHOLE No. OHSS-13 Sheet 1 of 1 METRIC

PROJECT 21490972

G.W.P. 2836-02-00 LOCATION N 4854156.6; E 301332.8 NAD83 / MTM Zone 10 (LAT. 43.827368; LONG. -79.543108) ORIGINATED BY M.I.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:222.8 m DATE May 11, 2023 CHECKED BY M.H.

ELEV. / DEPTH	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	GR	SA	SI	CL
0.0	ASPHALT (130 mm)								
222.7 / 0.1	SILTY SAND (SM), some gravel (FILL) Compact Brown Moist	1	SS	26					
222.1 / 0.7	Sandy CLAYEY SILT (CL), trace gravel (FILL) Stiff Brown Moist	2	SS	14					
		3	SS	13		2	30	53	15
		4	SS	14					
219.9 / 2.9	SILT (ML), some sand, trace clay Compact Brown Moist	5	SS	25		0	18	77	5
		6	SS	25					
218.5 / 4.3	Sandy CLAYEY SILT-SILT (CL-ML) to CLAYEY SILT (CL), trace gravel (TILL) Stiff to very stiff Grey Moist	7	SS	19	▽ (217.8 m)				
		8	SS	14		2	23	58	17
		9	SS	23					
214.6 / 8.2	End of Borehole								

Elevation scale: 222, 221, 220, 219, 218, 217, 216, 215

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ Unconfined, ● Quick Triaxial, ■ Pocket Pen, ⊕ Remoulded, X Field Vane

WATER CONTENT (%): PL (W_p) NMC (W) LL (W_l); 20 40 60; NP Nonplastic

UNIT WEIGHT γ kN/m³

REMARKS

NOTES:

1. Borehole caved to a depth of 7.2 m below ground surface (Elevation 215.6 m) upon completion of drilling.

2. Water measured inside open borehole at a depth of 5.0 m below ground surface (Elevation 217.8 m) upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-14 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4854194; E 301081.6 NAD83 / MTM Zone 10 (LAT. 43.827704; LONG. -79.546232) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:225.0 m DATE Apr 24, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL NMC LL	UNIT WEIGHT	GR SA SI CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			⊕ Field Vane, ■ Remoulded, ● Pocket Pen, ○ Unconfined; 20 40 60 80 100	W_p W W_l; NP Nonplastic; 20 40 60	γ kN/m³		
0.0 / 224.6	ASPHALT (380 mm)											
0.4 / 223.6	SAND (SP), trace gravel (FILL) Very dense Light brown Moist		1	SS	100		224					
1.4 / 222.8	CLAYEY SILT-SILT (CL-ML), some sand, trace organics (FILL) Firm Brown to dark brown Moist		2	SS	7		223					
2.2 / 220.5	Sandy SILTY CLAY (CI), trace gravel (TILL) Very stiff Brown (mottled) Moist		3	SS	15		222				3 24 39 34	
			4	SS	24							
			5	SS	19		221					
4.5 / 217.8	SILT (ML), trace sand, trace clay Dense Brown; becoming grey at about 6.7 m (Elevation 218.7 m) Moist to wet		6	SS	46		220					
			7	SS	42		219				0 3 96 1	
7.2 / 216.8	CLAYEY SILT-SILT (CL-ML) to SILT (ML), some sand, trace gravel (TILL) Hard Grey Moist		8	SS	62		218				1 11 76 12	
							217					
8.2	End of Borehole NOTES: 1. Borehole open and dry upon completion of drilling.											

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-15 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4854277.1; E 301076.3 NAD83 / MTM Zone 10 (LAT. 43.828452; LONG. -79.546298) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:225.4 m DATE Apr 25, 2023 - Apr 24, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES						DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT (%)							
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH (kPa) ⊕ Field Vane ■ Remoulded ● Pocket Pen ○ Quick Triaxial × Unconfined; 20 40 60 80 100	PL W_p	NMC W	LL W_l	NP Nonplastic; 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0 / 225.1	ASPHALT (305 mm)																	
0.3	SILTY SAND (SM), trace gravel (FILL) Loose Brown Moist		1	SS	9		225			○							
224.0							224											
1.4	Sandy CLAYEY SILT (CL), trace gravel (FILL) Stiff Black to dark brown Moist		2	SS	13					○							
			3	SS	10		223			⊢—⊣				1	27	45	27	
221.7			4	SS	8		222											
3.7	SILTY SAND (SM), some gravel, trace clay Very loose Brown Wet		5	SS	2					H				16	40	37	7	
220.9							221											
4.5	CLAYEY SILT (CL) trace sand, trace gravel (TILL) Very stiff to hard Brown Moist		6	SS	41													
							220											
			7	SS	18	▽	219			○								
218.2																		
7.2	Sandy SILT (ML), trace clay Compact Brown Wet						218											
			8	SS	18					○				0	30	69	1	
217.2																		
8.2	End of Borehole																	

NOTES:

1. Borehole caved to a depth of 7.0 m below ground surface (Elevation 218.4 m) upon completion of drilling.

2. Water measured inside open borehole at a depth of 6.2 m below ground surface (Elevation 219.2 m) upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-16 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4854707.5; E 301013.6 NAD83 / MTM Zone 10 (LAT. 43.832325; LONG. -79.547081) ORIGINATED BY T.T.

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:223.7 m DATE May 08, 2023 CHECKED BY M.H.

ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) (Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined) 20 40 60 80 100	WATER CONTENT (%) PL W_p NMC W LL W_l NP Nonplastic 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0	ASPHALT (75 mm)														
223.5	CONCRETE (75 mm)														
0.2 / 223.5	SAND (SP) and gravel (FILL) Dense Grey Moist to wet		1	SS	33		223								
0.2 / 222.8			2A	SS	6										
0.9	Sandy CLAYEY SILT (CL), some gravel, trace organics (FILL) Blackish brown Firm to stiff Moist		2B												
			3	SS	10		222				18	35	34	13	
			4	SS	7		221								
220.0			5	SS	7										
3.7	SILTY CLAY (CI) to CLAYEY SILT (CL), trace to some sand, trace gravel (TILL) Very soft to stiff Brown to grey Moist		6	SS	11		220								
			7	SS	4		219				1	4	52	43	
			8	SS	3		218				1	12	38	49	
			9	SS	1		217								
215.5							216								
8.2	End of Borehole														

NOTES:
1. Borehole open upon completion of drilling.
2. Water measured inside open borehole at a depth of 6.8 m below ground surface (Elevation 216.9 m) upon completion of drilling.

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-17 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4855165.6; E 300989.9 NAD83 / MTM Zone 10 (LAT. 43.836449; LONG. -79.547379) ORIGINATED BY M.I.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:222.0 m DATE May 08, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES						DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT (%)							
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH (kPa) ⊗ Field Vane, ■ Remoulded, ● Pocket Pen, ○ Quick Triaxial, × Unconfined; 20 40 60 80 100	PL W_p NMC W LL W_l; NP Nonplastic; 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0	ASPHALT (150 mm)																
221.8 0.2	SAND (SP) and Gravel (FILL) Very dense Grey Moist		1	SS	64				○								
221.0			2A	SS	15		221										
1.0	Sandy CLAYEY SILT to SILTY CLAY (CI), trace gravel (FILL) Stiff Brown to blackish brown Moist		2B						○								
			3	SS	9		220		○——		1	28	44	27			
219.8																	
2.2	Sandy CLAYEY SILT (CL) to CLAYEY SILT (CL), some gravel, some sand (TILL) Stiff to hard Brown; becoming grey at about 5.6 m depth (Elevation 216.4 m) Moist		4	SS	18		219										
			5	SS	36				○								
			6	SS	23		218										
			7	SS	19		217		⊕—		16	21	47	16			
			8	SS	33		216		○								
							215										
			9	SS	10		214		⊖—		0	20	44	36			
8.2																	
213.8	End of Borehole NOTES: 1. Borehole open and dry upon completion of drilling. 2. Groundwater measured at a depth of 5.4 m (Elevation 216.6 m) in the standpipe piezometer on October 31, 2023.																

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-18 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4855381.4; E 301018.6 NAD83 / MTM Zone 10 (LAT. 43.838391; LONG. -79.547023) ORIGINATED BY M.I.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:223.4 m DATE May 12, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL W_p NMC W LL W_l	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined; 20 40 60 80 100	NP Nonplastic; 20 40 60						
0.0	ASPHALT (150 mm)														
223.2 0.2	Gravelly SILTY SAND (SM) , trace clay (FILL) Compact Grey Moist		1	SS	21		223		○		23	63	12	2	
222.4			2A	SS	13										
1.0	CLAYEY SILT (CL), trace sand, trace gravel (FILL) Stiff Blackish grey Moist		2B				222								
221.2			3	SS	10				○						
2.2	Sandy CLAYEY SILT-SILT (CL-ML), trace gravel (TILL) Firm to hard Brown; becoming grey at about 4.6 m depth (Elevation 218.8 m) Moist		4	SS	7		221		⊖⊣		3	29	58	10	
			5	SS	25		220								
			6	SS	72				○						
			7	SS	50		219		○						
							218								
			8	SS	38	▽	217		⊖⊣		1	25	54	20	
							216								
215.2			9	SS	15				○						
8.2	End of Borehole NOTES: 1. Borehole caved to a depth of 7.1 m below ground surface (Elevation 216.3 m) upon completion of drilling. 2. Water measured inside open borehole at a depth of 6.5 m below ground surface (Elevation 216.9 m) upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-19 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4855841.6; E 300994.5 NAD83 / MTM Zone 10 (LAT. 43.842533; LONG. -79.547326) ORIGINATED BY M.I.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:227.6 m DATE May 12, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL W_p NMC W LL W_l	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	NP Nonplastic 20 40 60						
0.0	ASPHALT (130 mm)														
227.5 / 0.1	Gravelly SAND (SW-SM), trace silt, trace clay (FILL) Compact Brown Moist		1	SS	24		227								
			2	SS	19						26	63	9	2	
226.2															
1.4	Sandy CLAYEY SILT (CL), trace gravel (FILL) Firm Blackish brown Moist		3	SS	7		226								
			4	SS	6		225				10	35	39	16	
224.4			5A												
3.2	Sandy CLAYEY SILT-SILT (CL-ML) to CLAYEY SILT (CL), trace gravel (TILL) Firm to very stiff Brown to grey Moist		5B	SS	7		224								
			6	SS	17										
			7	SS	11		223				9	23	54	14	
							222								
			8	SS	29		221								
			9	SS	26		220								
219.4															
8.2	End of Borehole NOTES: 1. Borehole caved to a depth of 6.4 m below ground surface (Elevation 221.2 m) upon completion of drilling. 2. Borehole dry upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-20 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4856299.8; E 300903.8 NAD83 / MTM Zone 10 (LAT. 43.846657; LONG. -79.548458) ORIGINATED BY T.T.

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:229.8 m DATE May 03, 2023 - May 04, 2023 CHECKED BY M.H.

ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) (Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined) 20 40 60 80 100	WATER CONTENT (%) PL W_p NMC W LL W_l NP Nonplastic 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0 / 229.5	ASPHALT (305 mm)														
0.3	SAND (SP) and gravel (FILL) Compact Light brown Moist		1	SS	12		229								
228.4															
1.4	Sandy CLAYEY SILT (CL), trace gravel (FILL) Firm Blackish brown Moist		2	SS	5		228		⊢⊣		4	33	40	23	
227.6															
2.2	Sandy CLAYEY SILT (CL), trace gravel (TILL) Stiff to hard Brown; becoming grey at about 5.1 m (Elevation 224.7 m) Moist - 2.3 to 5.2 m: Oxidation staining in sample no. 3 to 6		3	SS	10		227		○						
			4	SS	19				○						
			5	SS	37		226								
			6	SS	28		225		⊢⊣		4	31	44	21	
							224								
			7	SS	30				○						
							223								
			8	SS	32		222		○						
221.6															
8.2	End of Borehole NOTES: 1. Borehole caved to a depth of 6.2 m below ground surface (Elevation 223.6 m) upon completion of drilling. 2. Borehole dry upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. OHSS-21 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4856378.1; E 300887 NAD83 / MTM Zone 10 (LAT. 43.847362; LONG. -79.548667) ORIGINATED BY T.T

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:230.7 m DATE May 05, 2023 CHECKED BY M.H.

SOIL PROFILE			SAMPLES						DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT (%)								
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE		SHEAR STRENGTH (kPa) ⊕ Field Vane ■ Remoulded ● Pocket Pen ○ Quick Triaxial × Unconfined	PL W_p	NMC W	LL W_l	NP Nonplastic	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0 / 230.4	ASPHALT (305 mm)																		
0.3	CONCRETE (180 mm)																		
230.2 / 0.5 / 229.5	SAND (SP) and gravel (FILL) Very dense Brown Moist		1	SS	100/0.10		230												
1.2	Sandy CLAYEY SILT-SILT (CL-ML) to CLAYEY SILT (CL), trace gravel (TILL) Firm to very stiff Brown; becoming grey at about 6.0 m (Elevation 224.7 m) Moist		2	SS	6		229									2	32	50	16
			3	SS	5		228												
			4	SS	12														
			5	SS	19		227												
			6	SS	100/0.05		226									7	28	51	14
			7	SS	100/0.05		225												
			8	SS	100/0.10		224												
222.5							223												
8.2	End of Borehole NOTES: 1. Borehole open and dry upon completion of drilling.																		

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. PVMS-1 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4855402.8; E 300975 NAD83 / MTM Zone 10 (LAT. 43.838584; LONG. -79.547566) ORIGINATED BY T.T.

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:223.7 m DATE Apr 30, 2023 CHECKED BY M.H.

ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES	GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) 20 40 60 80 100	WATER CONTENT (%) PL W_p NMC W LL W_l NP Nonplastic 20 40 60	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
0.0	ASPHALT (180 mm)														
223.5 / 0.2	Gravelly SILTY SAND (SM) (FILL) Dense Light brown Moist to wet						223								
			1	SS	44				○		27	59	12	2	
222.2															
1.4	Gravelly CLAYEY SILT-SILT (CL-ML), some sand (FILL) Hard Dark brown Moist to wet						222								
			2	SS	48				○						
221.5															
2.2	CLAYEY SILT-SILT (CL-ML), trace sand to sandy, trace gravel (TILL) Stiff to hard Brown; becoming grey at about 6.1 m (Elevation 217.6 m) Moist to Wet						221								
			3	SS	12				○						
			4	SS	37		220		⊢		2	24	56	18	
			5	SS	43										
			6	SS	31	▽	219		○						
							218								
			7	SS	25										
							217								
			8	SS	36		216		⊕⊢		1	9	74	16	
215.5															
8.2	End of Borehole NOTES: 1. Borehole open upon completion of drilling. 2. Water measured inside open borehole at a depth of 4.8 m below ground surface (Elevation _ m) upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

Ontario

PROJECT 21490972

RECORD OF BOREHOLE No. VMS-1 Sheet 1 of 1 METRIC

G.W.P. 2836-02-00 LOCATION N 4853555.8; E 301097 NAD83 / MTM Zone 10 (LAT. 43.821959; LONG. -79.546036) ORIGINATED BY T.T.

DIST CENTRAL HWY 400 BOREHOLE TYPE Power Auger; 168 mm O.D. Hollow Stem Augers COMPILED BY M.L.

DATUM Surface Elevation:214.7 m DATE Mar 09, 2023 CHECKED BY M.H.

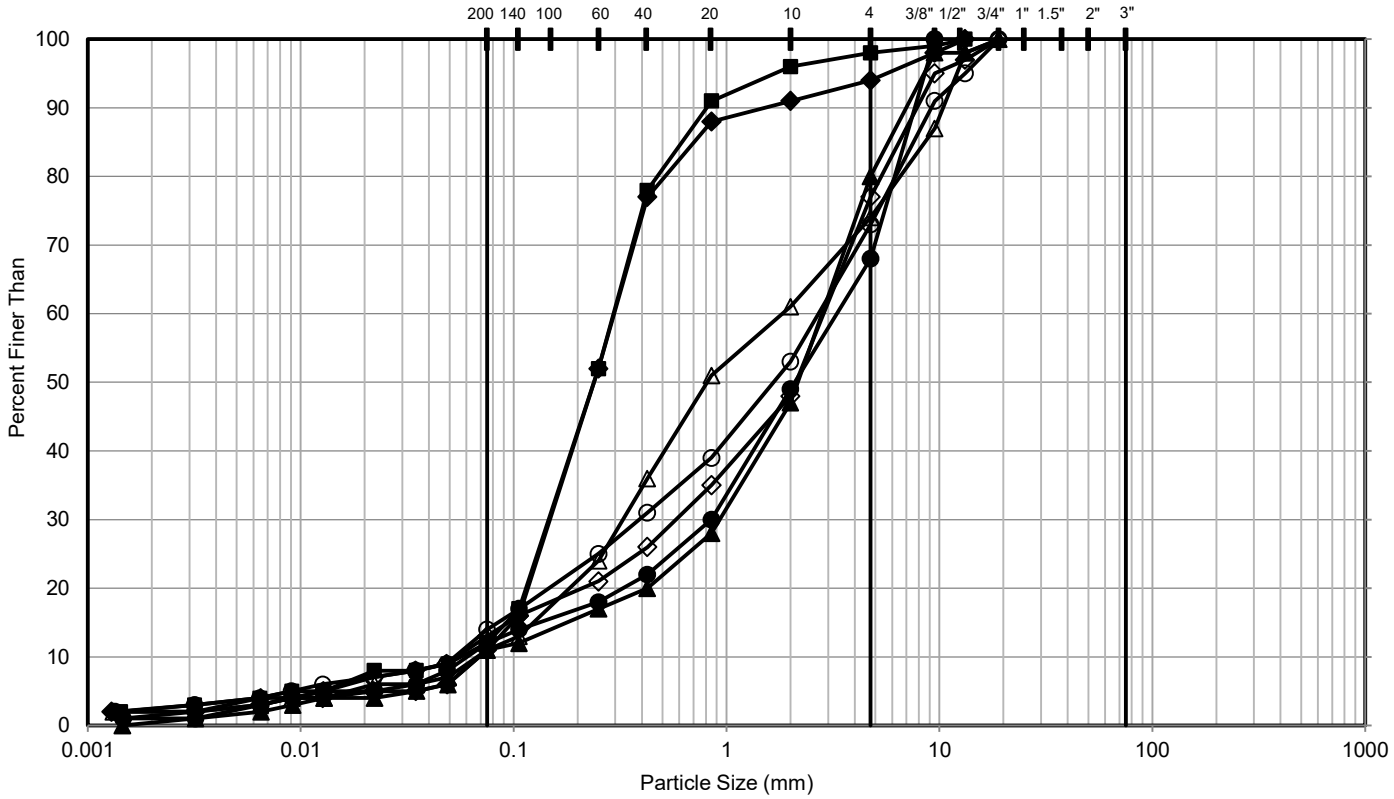
SOIL PROFILE			SAMPLES			GROUNDWATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%) PL W_p NMC W LL W_l	UNIT WEIGHT γ kN/m³	GR	SA	SI	CL	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			Field Vane, Remoulded, Pocket Pen, Quick Triaxial, Unconfined; 20 40 60 80 100	NP Nonplastic; 20 40 60						
0.0	ASPHALT (180 mm)														
214.5 / 0.2	SAND (SP) and gravel (FILL) Compact Light brown Moist to wet		1	SS	100/0.13										
			2	SS	24		214								
213.3															
1.4	Gravelly CLAYEY SAND (SC), trace organics Firm to very stiff Dark brown to brownish grey Moist to wet		3	SS	15		213				28	35	27	10	
			4	SS	6		212								
			5	SS	6	▽	211								
210.6			6	SS	6										
4.1	SILT (ML), trace sand, trace clay Compact to dense Brown; becoming grey at about 6.1 m depth (Elevation 208.5 m) Moist to wet		7	SS	16		210								
			8	SS	20		209			NP	0	4	92	4	
			9	SS	36		208 207								
206.5															
8.2	End of Borehole NOTES: 1. Borehole caved to a depth of 7.2 m below ground surface (Elevation 207.5 m) upon completion of drilling. 2. Water measured inside open borehole at a depth of 3.5 m below ground surface (Elevation. 211.2 m) upon completion of drilling.														

+³, x³ : Numbers refer to Sensitivity o³% STRAIN AT FAILURE

APPENDIX B

Geotechnical Laboratory Test Results

GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-1	1	0.8 - 1.4	203.3 to 202.7
◆	OHSS-2	1	0.8 - 1.4	205.0 to 204.4
▲	OHSS-11	2	1.5 - 2.1	209.3 to 208.7
●	OHSS-12	1A	0.8 - 1.1	217.9 to 217.6
◇	OHSS-18	1	0.2 - 0.8	223.2 to 222.6
△	OHSS-19	2	0.8 - 1.4	226.8 to 226.2
○	PVMS-1	1	0.8 - 1.4	222.9 to 222.3

CLIENT
PARSONS / MINISTRY OF TRANSPORTATION ONTARIO (MTO)

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2023-08-09
DESIGNED	T.T.
PREPARED	T.T.
REVIEWED	M.H.
APPROVED	L.C.C.

PROJECT
VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE
GRAIN SIZE DISTRIBUTION
GRANULAR FILL

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B1

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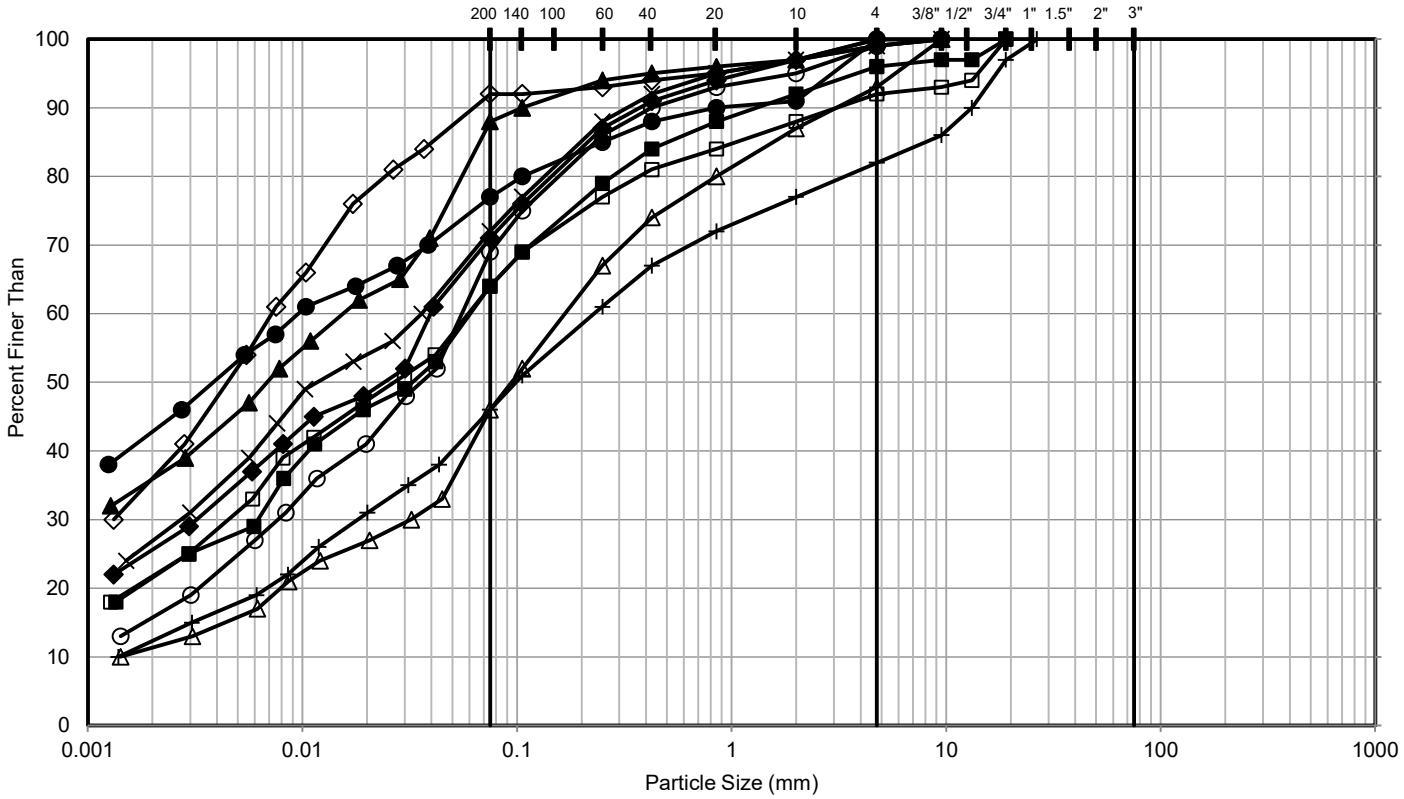
GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-1	2	1.5 - 2.1	202.6 to 202.0
◆	OHSS-3	2	1.5 - 2.1	204.3 to 203.7
▲	OHSS-4	2	1.5 - 2.1	206.3 to 205.7
●	OHSS-7	3	2.3 - 2.9	206.0 to 205.4
□	OHSS-8	2	1.5 - 2.1	206.7 to 206.1
◇	OHSS-11	4	3.0 - 3.7	207.8 to 207.1
△	OHSS-12	3A	2.3 to 2.7	216.4 to 216.0
○	OHSS-13	3	1.5 - 2.1	221.3 to 220.7
×	OHSS-15	3	2.3 - 2.9	223.1 to 222.5
+	OHSS-16	3	1.5 - 2.1	222.2 to 221.6

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PROJECT

VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE

GRAIN SIZE DISTRIBUTION
CLAYEY SILT to SILT (CL-ML) to SILTY CLAY (CI) (FILL)

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B2-A

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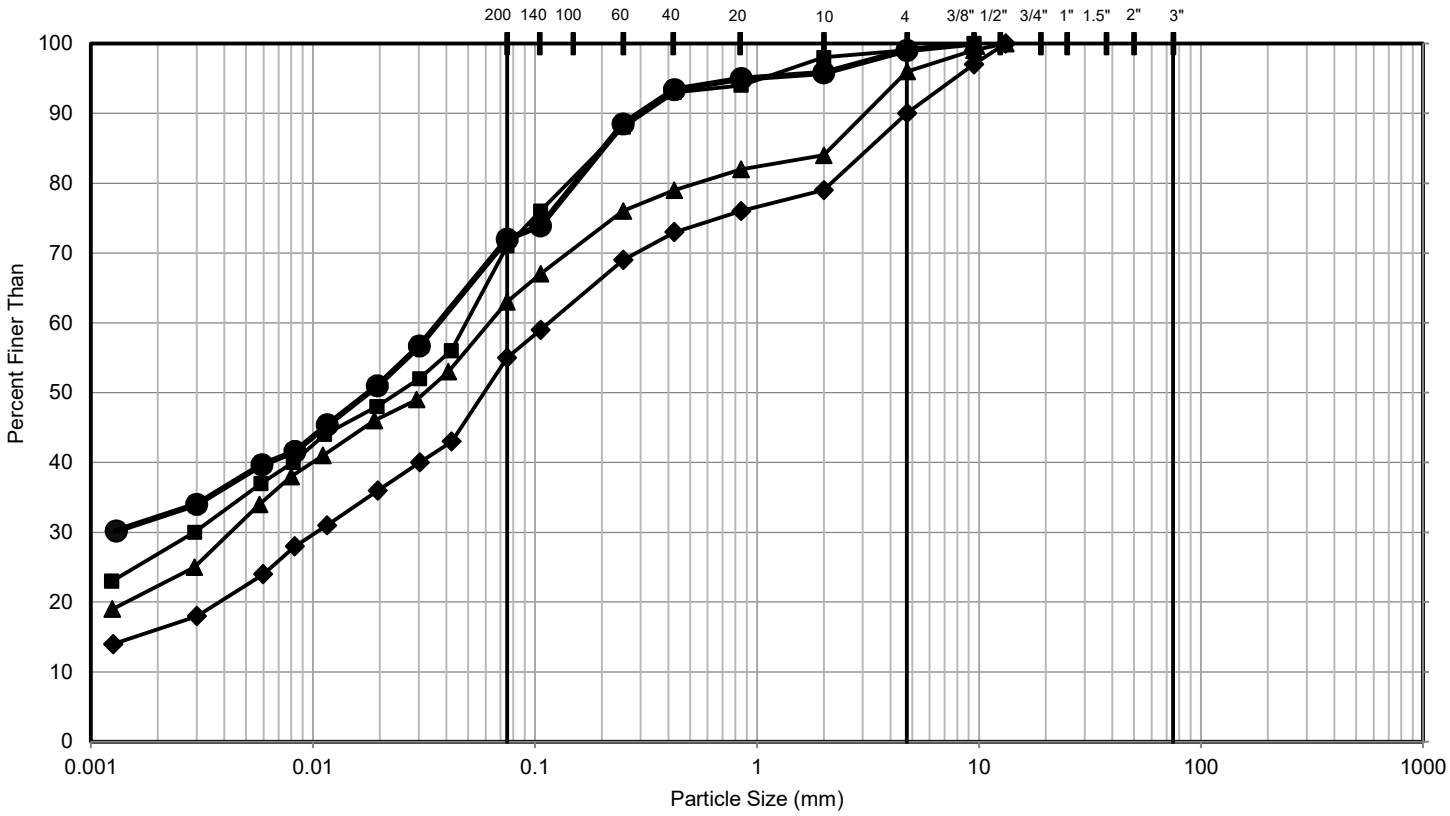
GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-17	3	1.5-2.1	220.5 to 219.9
◆	OHSS-19	4	2.3-2.9	225.3 to 224.7
▲	OHSS-20	2	1.5 - 2.1	228.3 to 227.7
●	MS-8	2	1.5 - 2.1	205.4 to 204.8

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VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

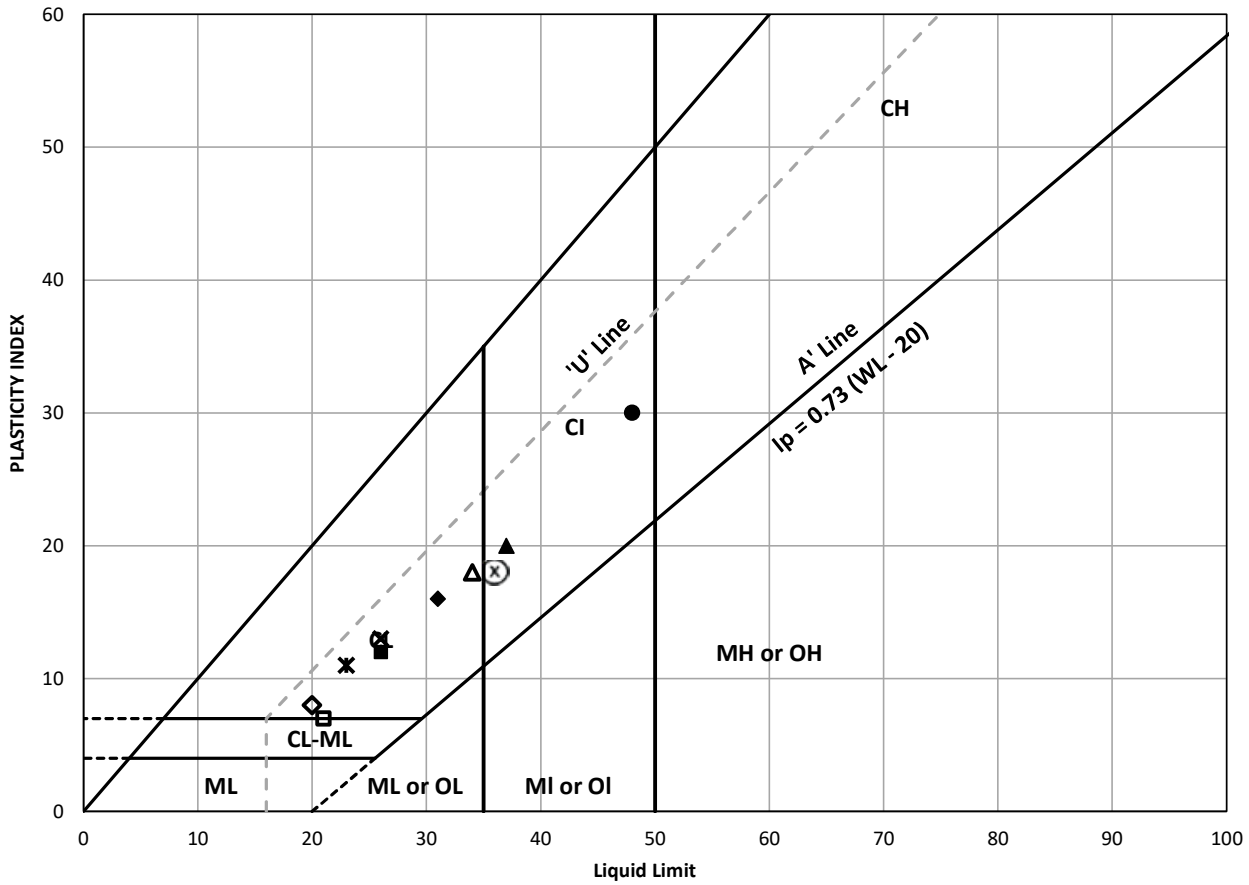
TITLE

GRAIN SIZE DISTRIBUTION
CLAYEY SILT to SILT (CL-ML) to SILTY CLAY (CI) (FILL)

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B2-B

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\PSD | FILE NAME: 21490972 OHSS PSD Cohesive Fill.xlsm

PLASTICITY CHART



	Sample Location	Sample / Specimen Number	Elevation (m)	Natural Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
■	OHSS-1	2	202.58 to 201.97	-	26	14	12
◆	OHSS-3	2	204.28 to 203.67	14.2	31	15	16
▲	OHSS-4	2	206.28 to 205.67	-	37	17	20
●	OHSS-7	3	206.01 to 205.40	-	48	18	30
✳	OHSS-8	2	206.68 to 206.07	10.0	23	12	11
⊗	OHSS-11	4	207.75 to 207.14	30.5	36	18	18
□	OHSS-12	3A	216.41 to 216.02	13.6	21	14	7
◇	OHSS-13	3	221.28 to 220.67	12.9	20	12	8
△	OHSS-15	3	223.11 to 222.50	-	34	16	18
×	OHSS-16	3	222.18 to 221.57	12.9	26	13	13

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PROJECT

VARIOUS OVERHEAD SIGNS

HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE

PLASTICITY CHART

CLAYEY SILT - SILT (CL-ML) to SILTY CLAY (CI) (FILL)

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B3-A

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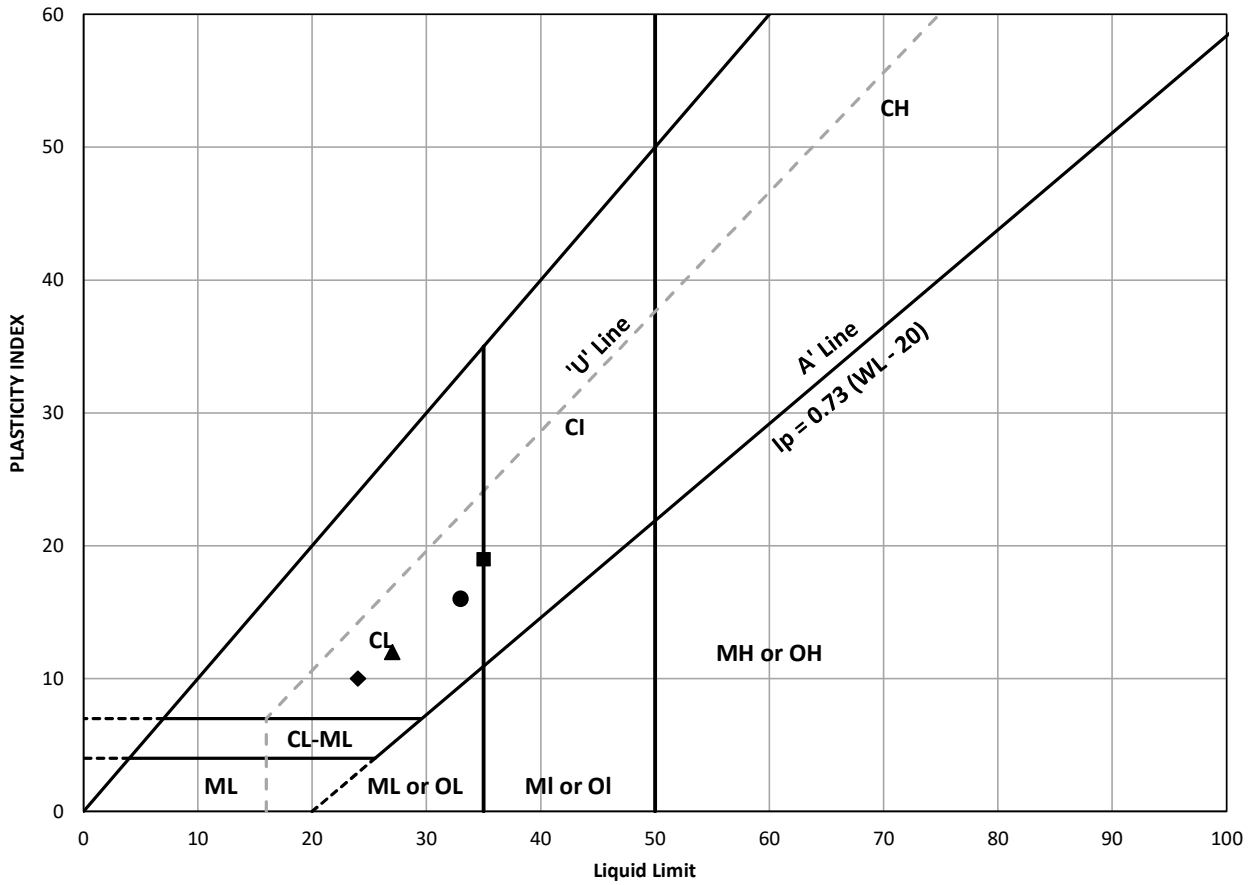
PLASTICITY CHART



	Sample Location	Sample / Specimen Number	Elevation (m)	Natural Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
■	OHSS-17	3	220.48 to 219.87	14.2	35	16	19
◆	OHSS-19	4	225.31 to 224.70	13.6	24	14	10
▲	OHSS-20	2	228.28 to 227.67	-	27	15	12
●	MS-8	2	205.38 to 204.77	18.3	33	17	16

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PROJECT
VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE
PLASTICITY CHART
CLAYEY SILT - SILT (CL-ML) to SILTY CLAY (CI) (FILL)

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B3-B

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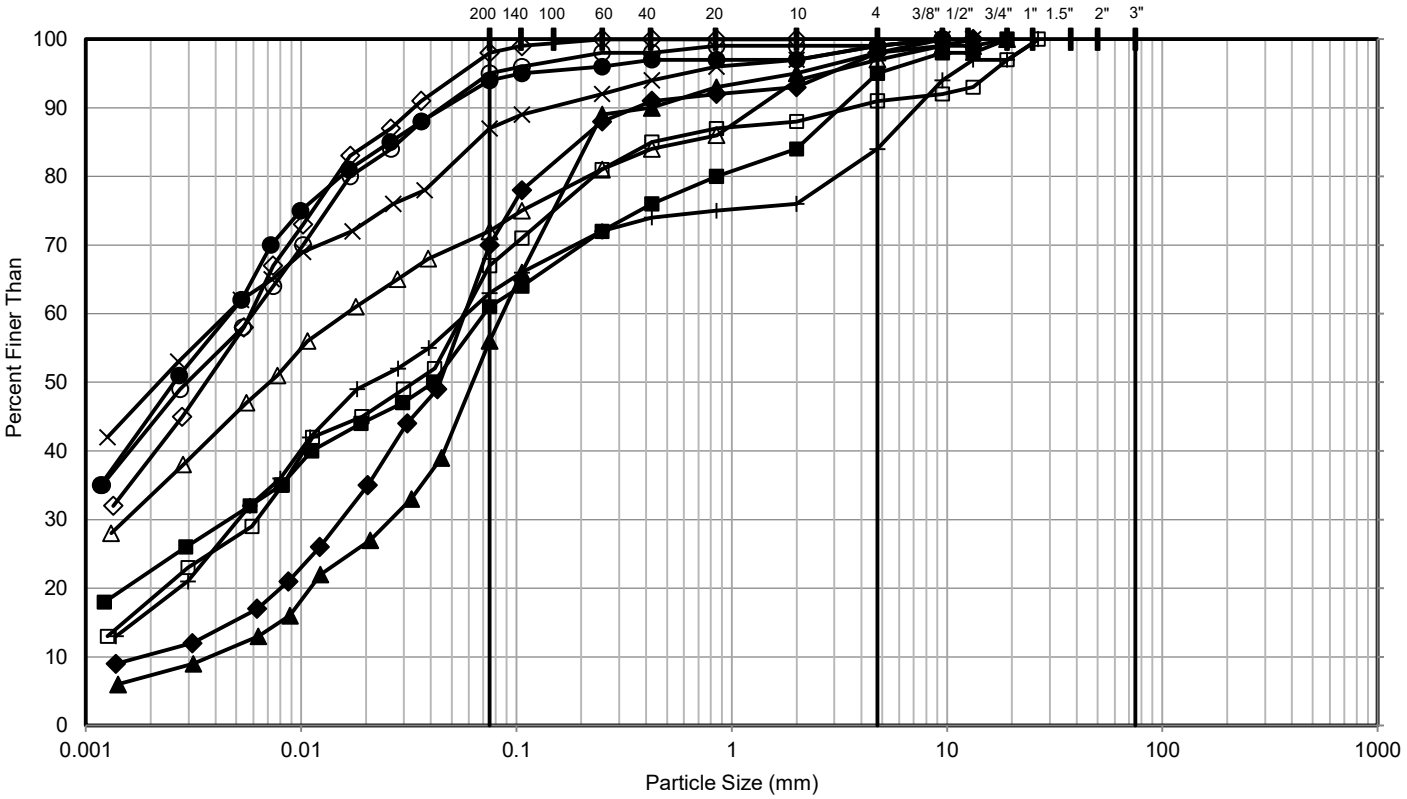
GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-2	3	2.3 - 2.9	203.5 to 202.9
◆	OHSS-4	7	6.1 - 6.7	201.7 to 201.1
▲	OHSS-7	5	3.8 - 4.4	204.5 to 203.9
●	OHSS-9	3	2.3 - 2.9	207.3 to 206.7
□	OHSS-9	8	7.6 - 8.2	202.0 to 201.4
◇	OHSS-12	6	4.6 - 5.2	214.1 to 213.5
△	OHSS-14	3	2.3 - 2.9	222.7 to 222.1
○	OHSS-16	7	4.6 - 5.2	219.1 to 218.5
×	OHSS-16	8	6.1 - 6.7	217.6 to 217.0
+	OHSS-17	7	4.6 - 5.2	217.4 to 216.8

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VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE

GRAIN SIZE DISTRIBUTION - Sandy CLAYEY SILT - SILT (CL-ML) to SILTY CLAY (CI) (TILL) - UPPER DEPOSIT

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B4-A

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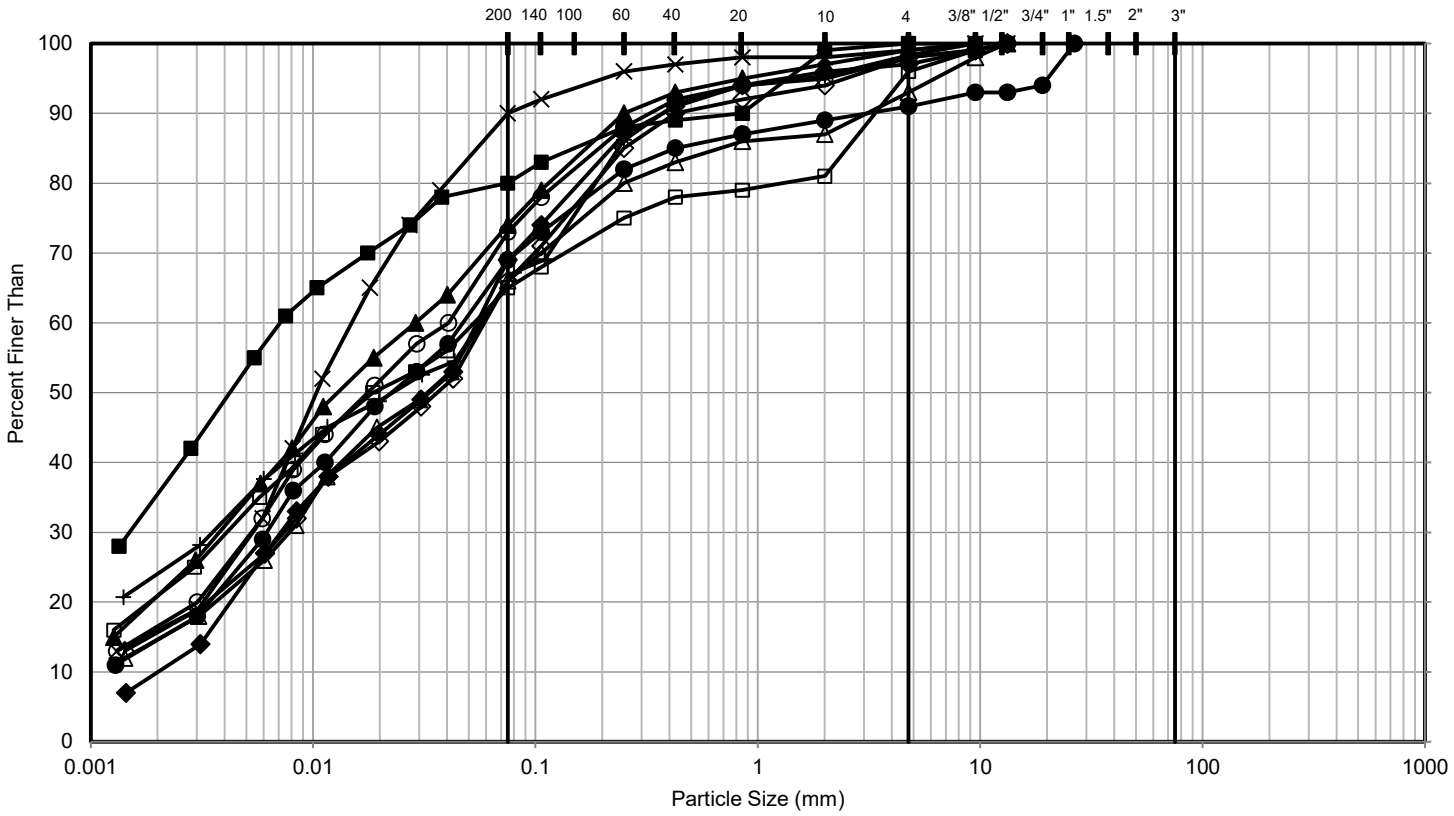
GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-17	9	7.6 - 8.2	214.4 to 213.8
◆	OHSS-18	4	2.3 - 2.9	221.1 to 220.5
▲	OHSS-18	8	6.1 - 6.7	217.3 to 216.7
●	OHSS-19	7	4.6 - 5.2	223.0 to 222.4
□	OHSS-20	6	4.6 - 5.2	225.2 to 224.6
◇	OHSS-21	2	1.5 - 2.1	229.2 to 228.6
△	OHSS-21	6	4.6 - 4.8	226.1 to 225.9
○	PVMS-1	4	3.0 - 3.7	220.7 to 220.1
×	PVMS-1	8	7.6 - 8.2	216.1 to 215.5
+	MS-6	4	2.3 - 2.9	205.2 to 204.6

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PROJECT

VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

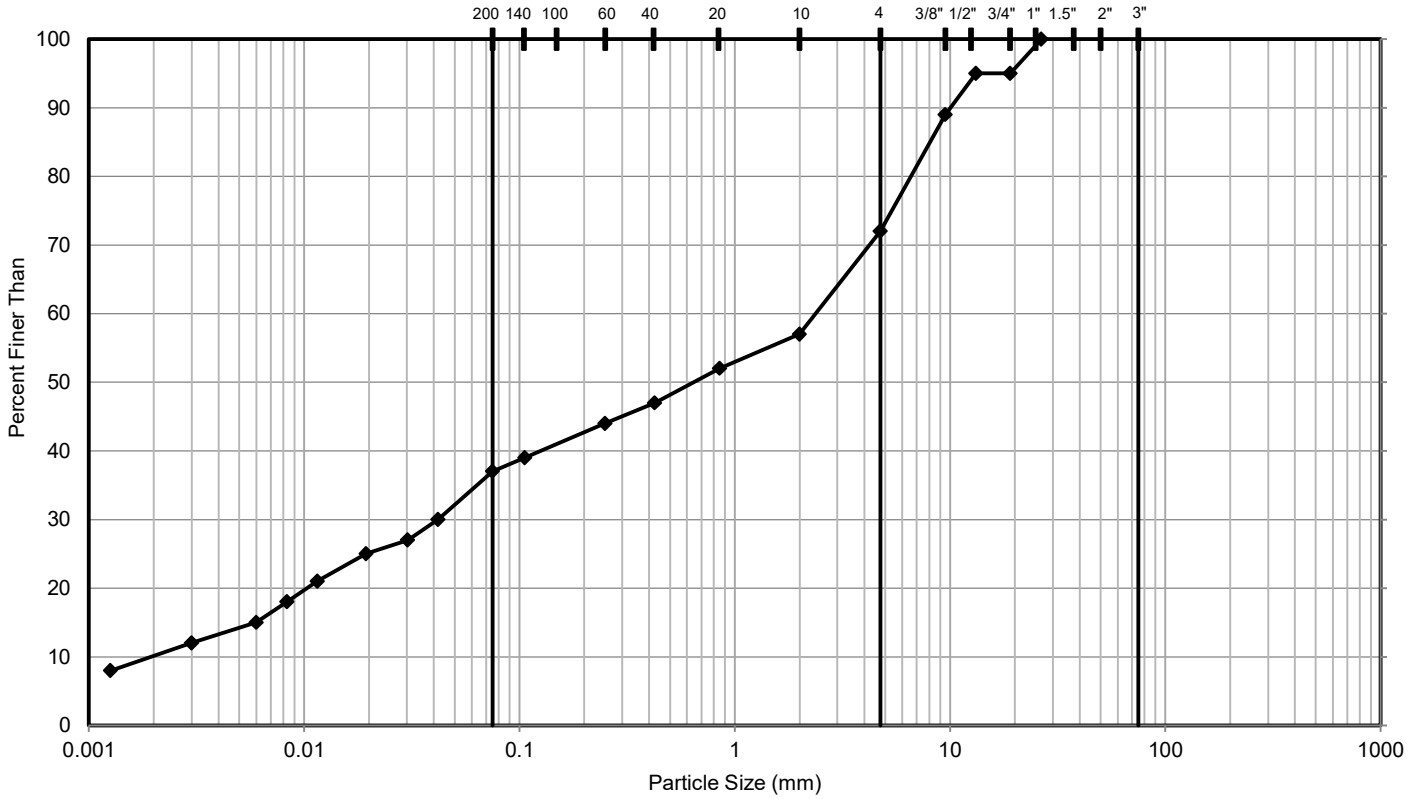
TITLE

GRAIN SIZE DISTRIBUTION - Sandy CLAYEY SILT - SILT (CL-ML) to SILTY CLAY (CI) (TILL) - UPPER DEPOSIT

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B4-B

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\PSD | FILE NAME: 21490972 OHSS PSD Upper Cohesive Deposit.xlsm

GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
◆	VMS-1	3	1.5 - 2.1	213.2 to 212.6

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PROJECT

VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

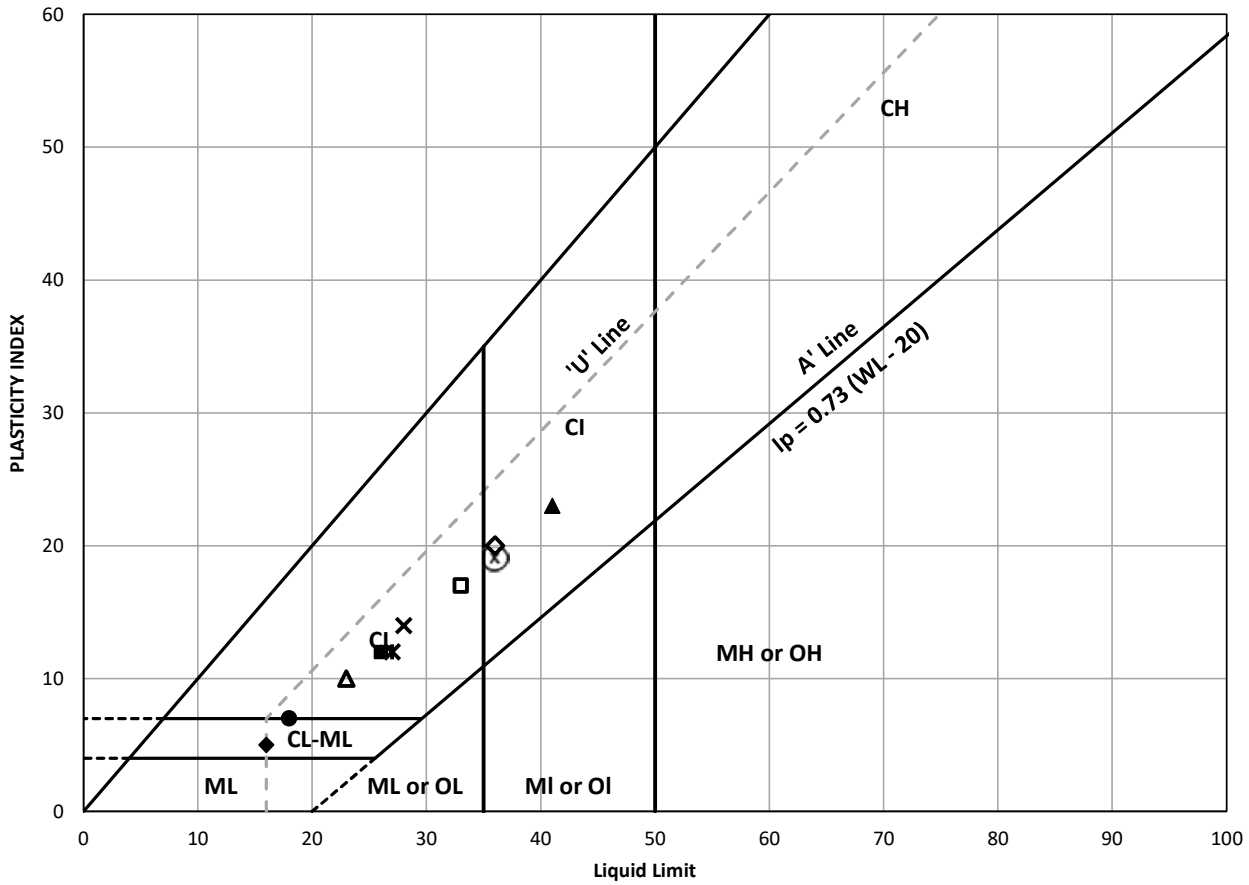
TITLE

GRAIN SIZE DISTRIBUTION - Sandy CLAYEY SILT - SILT (CL-ML) to SILTY CLAY (CI) (TILL) - UPPER DEPOSIT

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B4-C

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\PSD | FILE NAME: 21490972 OHSS PSD Upper Cohesive Deposit.xlsm

PLASTICITY CHART



	Sample Location	Sample / Specimen Number	Elevation (m)	Natural Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
■	OHSS-2	3	203.51 to 202.90	-	26	14	12
◆	OHSS-4	7	201.70 to 201.09	8.7	16	11	5
▲	OHSS-9	3	207.31 to 206.70	-	41	18	23
●	OHSS-9	8	201.98 to 201.37	-	18	11	7
✳	OHSS-12	6	214.13 to 213.52	19.1	27	15	12
⊗	OHSS-14	3	222.71 to 222.10	18.3	36	17	19
□	OHSS-16	7	219.13 to 218.52	21.8	33	16	17
◇	OHSS-16	8	217.60 to 216.99	29.6	36	16	20
△	OHSS-17	7	217.43 to 216.82	12.9	23	13	10
×	OHSS-17	9	214.38 to 213.77	17.9	28	14	14

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PROJECT

VARIOUS OVERHEAD SIGNS

HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE

PLASTICITY CHART

Sandy CLAYEY SILT -SILT (CL-ML) to SILTY CLAY (CI) (TILL) - UPPER DEPOSIT

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B5-A

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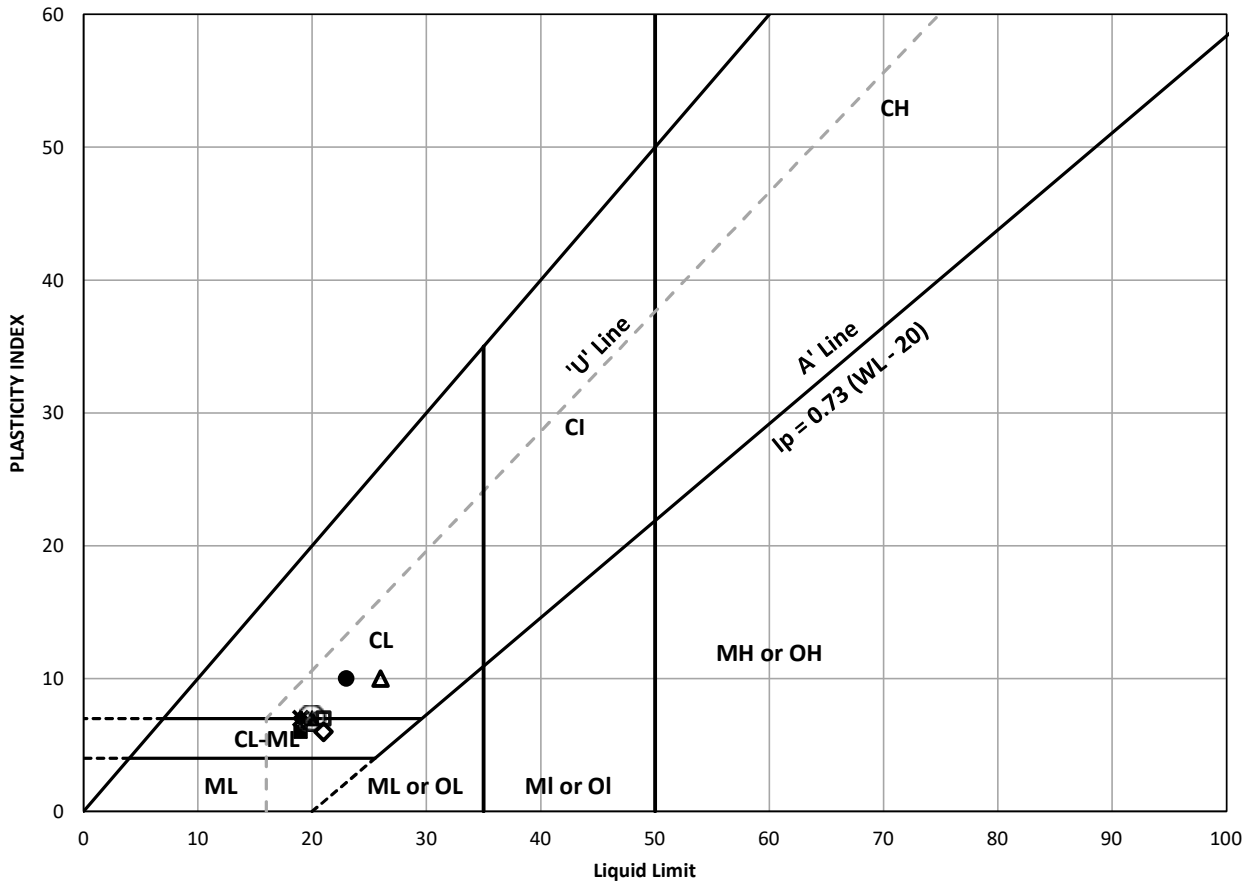
PLASTICITY CHART



	Sample Location	Sample / Specimen Number	Elevation (m)	Natural Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
■	OHSS-18	4	221.11 to 220.50	13.0	19	13	6
◆	OHSS-18	8	217.30 to 216.69	11.1	19	12	7
▲	OHSS-19	7	223.03 to 222.42	13.4	20	13	7
●	OHSS-20	6	225.23 to 224.62	-	23	13	10
✳	OHSS-21	2	229.18 to 228.57	-	19	12	7
⊗	OHSS-21	6	226.13 to 225.92	-	20	13	7
□	PVMS-1	4	220.66 to 220.05	-	21	14	7
◇	PVMS-1	8	216.09 to 215.48	14.9	21	15	6
△	VMS-1	3	213.18 to 212.57	-	26	16	10
×	MS-6	4	205.22 to 204.62	15.0	21	13	8

CLIENT

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PROJECT

VARIOUS OVERHEAD SIGNS

HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE

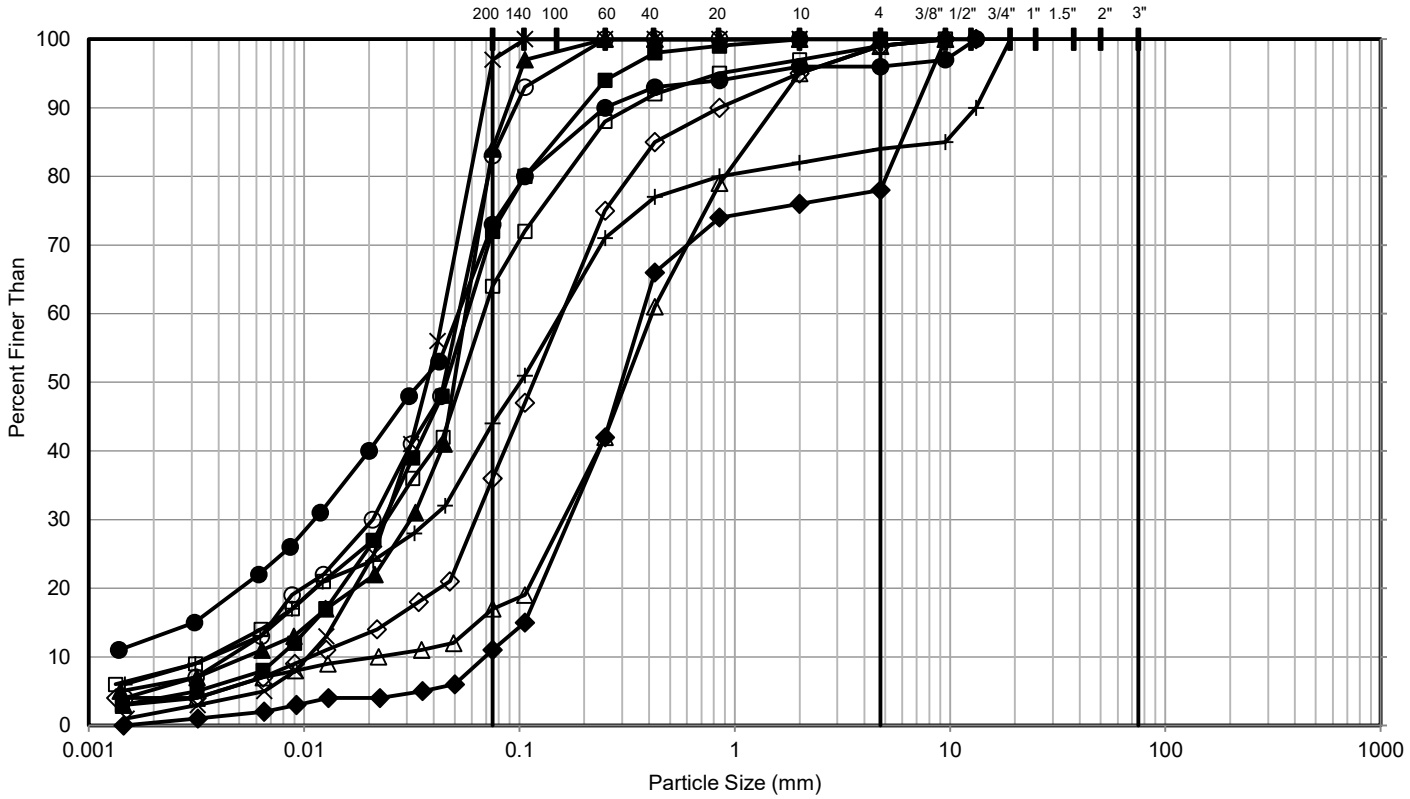
PLASTICITY CHART

Sandy CLAYEY SILT -SILT (CL-ML) to SILTY CLAY (CI) (TILL) - UPPER DEPOSIT

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B5-B

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\Limits | FILE NAME: 21490972 OHSS Limits Upper Cohesive Deposit.xlsm

GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-1	6	4.6 - 5.0	199.5 to 199.1
◆	OHSS-1	8	7.6 - 7.9	196.5 to 196.2
▲	OHSS-3	8	7.6 - 8.2	198.2 to 197.6
●	OHSS-4	8	7.6 - 8.2	200.2 to 199.6
□	OHSS-8	5	3.8 - 4.4	204.4 to 203.8
◇	OHSS-8	7A	6.1 - 6.4	202.1 to 201.8
△	OHSS-11	7A	6.1 - 6.3	204.7 to 204.5
○	OHSS-13	5	3.0 - 3.7	219.8 to 219.1
×	OHSS-14	7	6.1 - 6.7	218.9 to 218.3
+	OHSS-15	5	3.8 - 4.4	221.6 to 221.0

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REVIEWED	M.H.
APPROVED	L.C.C.

PROJECT

VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

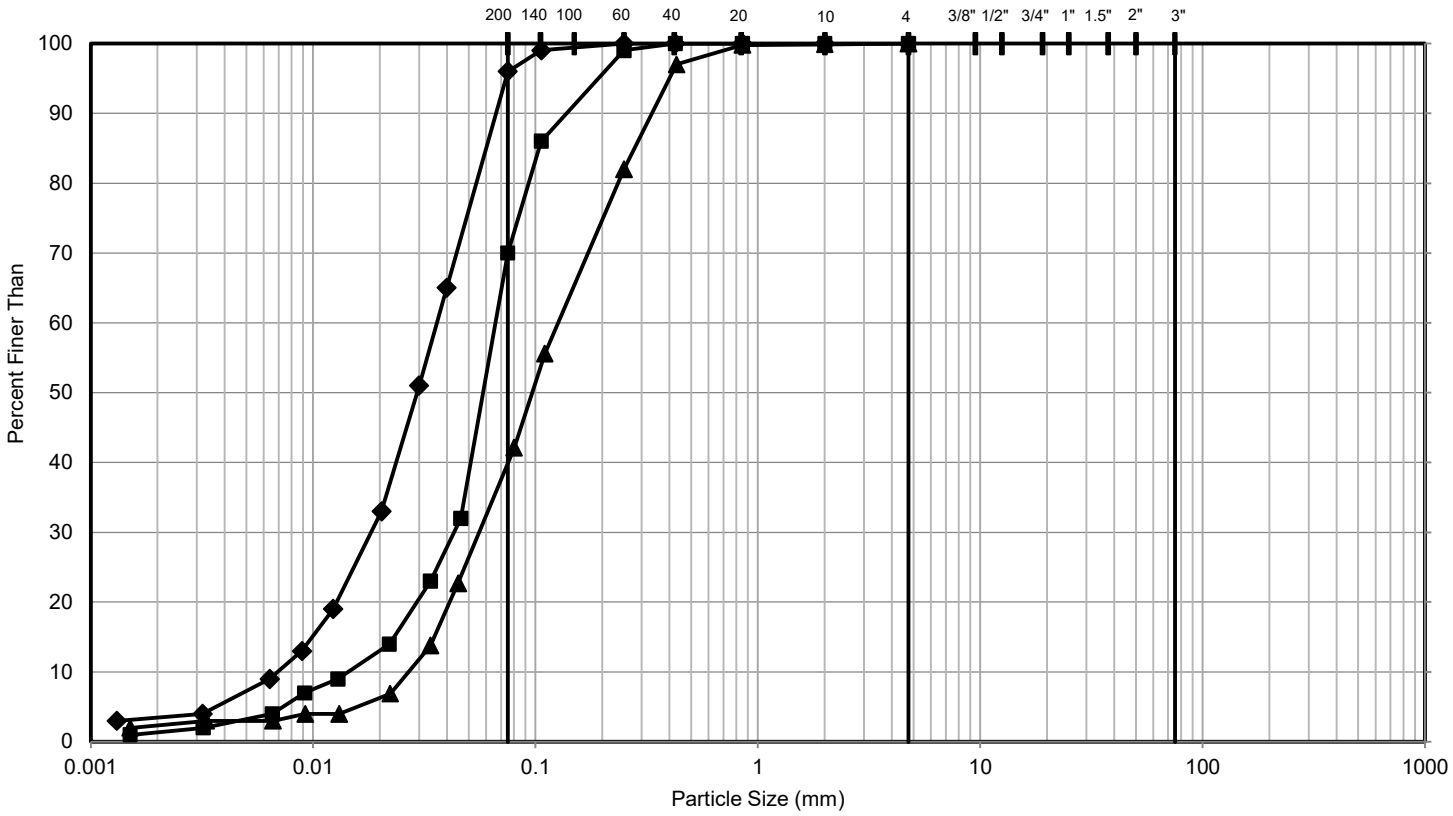
TITLE

GRAIN SIZE DISTRIBUTION
SILT (ML), SILTY SAND (SW-SM) and GRAVELLY SAND (SW)

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B6-A

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\PSD | FILE NAME: 21490972 OHSS PSD Sands and Silts.xlsm

GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-15	8	7.6 - 8.2	217.8 to 217.2
◆	VMS-1	8	6.1 - 6.7	208.6 to 208.0
▲	MS-6	6	4.6 - 4.8	202.9 to 202.7

CLIENT

PARSONS / MINISTRY OF TRANSPORTATION ONTARIO (MTO)

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2023-08-09
DESIGNED	T.T.
PREPARED	T.T.
REVIEWED	M.H.
APPROVED	L.C.C.

PROJECT

VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

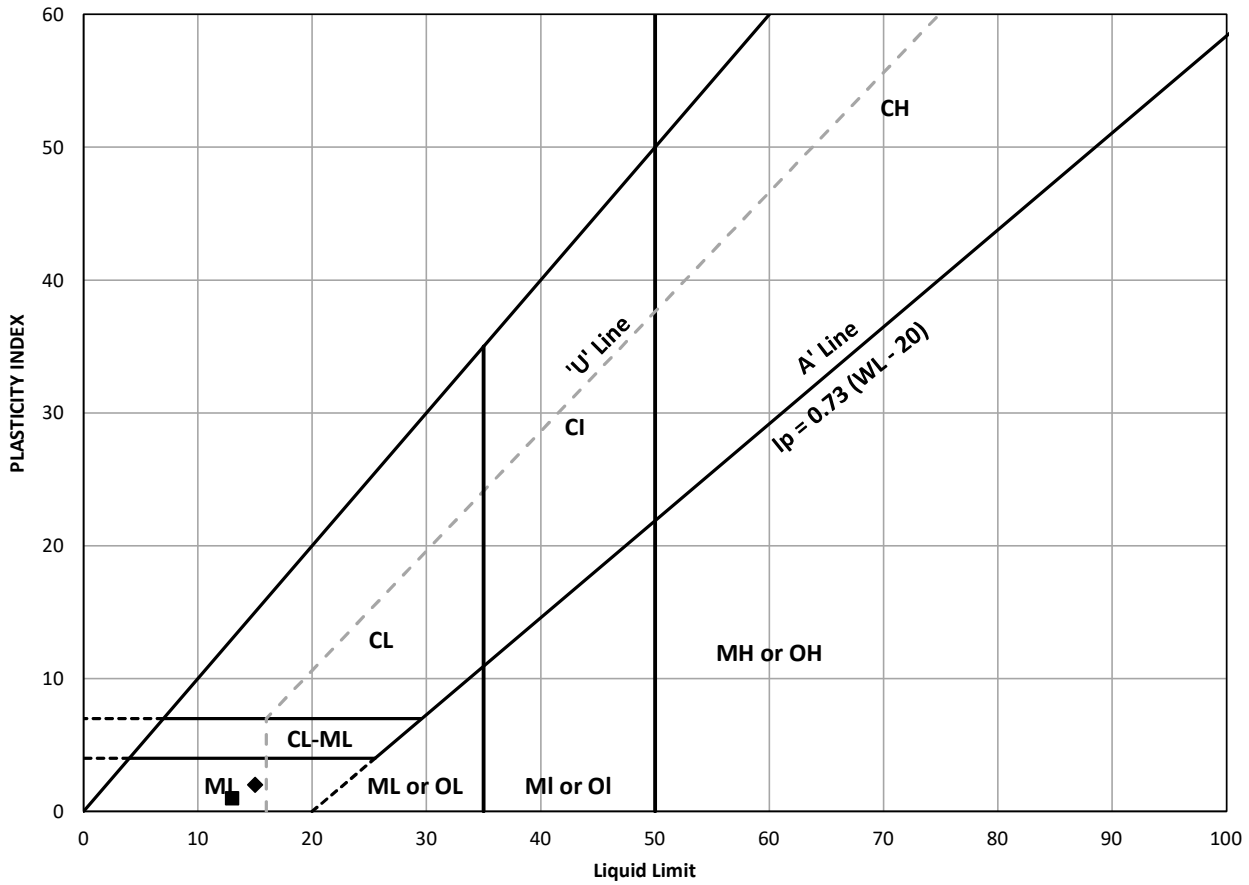
TITLE

GRAIN SIZE DISTRIBUTION
SILT (ML), SILTY SAND (SW-SM) and GRAVELLY SAND (SW)

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B6-B

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\PSD | FILE NAME: 21490972 OHSS PSD Sands and Silts.xlsm

PLASTICITY CHART



	Sample Location	Sample / Specimen Number	Elevation (m)	Natural Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
■	OHSS-8	5	204.39 to 203.78	-	13	12	1
◆	OHSS-15	5	221.59 to 220.98	-	15	13	2

CLIENT
PARSONS / MINISTRY OF TRANSPORTATION ONTARIO (MTO)

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2023-02-08
DESIGNED	NA
PREPARED	T.T
REVIEWED	M.L.
APPROVED	0

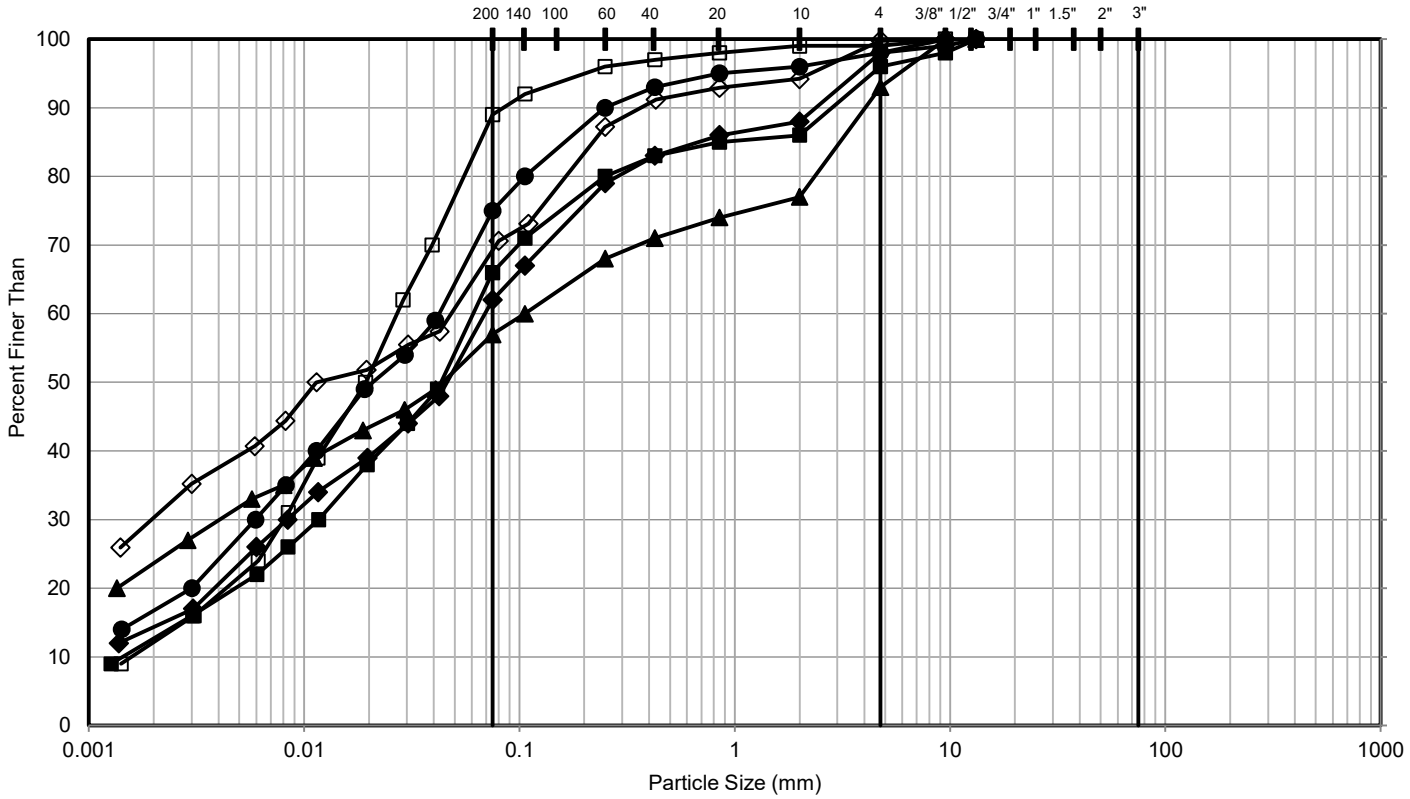
PROJECT
VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE
PLASTICITY CHART
SILT (ML) and SILTY SAND (SW-SM)

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B7

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\Limits | FILE NAME: 21490972 OHSS Limits Sands and Silts.xlsm

GRAIN SIZE DISTRIBUTION



FINES (Silt, Clay)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Symbol	Sample Location	Sample Number	Depth (m)	Elevation (m)
■	OHSS-2	7	6.1 - 6.7	199.7 to 199.1
◆	OHSS-7	8B	7.9 - 8.2	200.4 to 200.1
▲	OHSS-11	8	7.6 - 8.2	203.2 to 202.6
●	OHSS-13	8	6.1 - 6.7	216.7 to 216.1
□	OHSS-14	8	7.6 - 8.2	217.4 to 216.8
◇	MS-8	7	6.1 - 6.7	200.8 to 200.2

CLIENT

PARSONS / MINISTRY OF TRANSPORTATION ONTARIO (MTO)

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2023-08-09
DESIGNED	T.T.
PREPARED	T.T.
REVIEWED	M.H.
APPROVED	L.C.C.

PROJECT

VARIOUS OVERHEAD SIGNS
HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

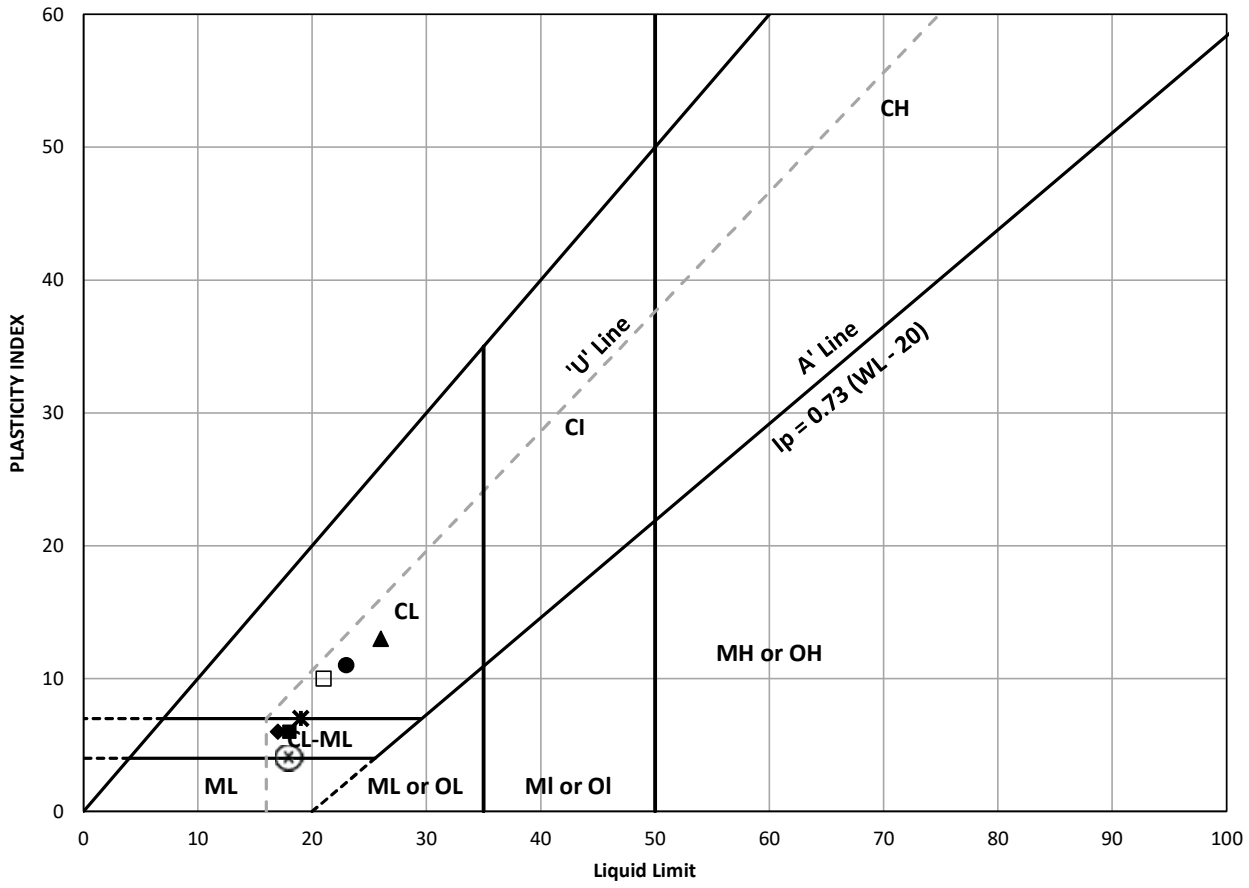
TITLE

GRAIN SIZE DISTRIBUTION - Sandy CLAYEY SILT - SILT (CL-ML) to SILTY CLAY (CI) (TILL) - LOWER DEPOSIT

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B8

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSS\PSD | FILE NAME: 21490972 OHSS PSD Lower Cohesive Deposit.xlsm

PLASTICITY CHART



	Sample Location	Sample / Specimen Number	Elevation (m)	Natural Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
■	OHSS-2	7	199.70 to 199.09	7.3	18	12	6
◆	OHSS-7	8B	200.38 to 200.07	12.1	17	11	6
▲	OHSS-8	8	200.58 to 199.97	16.9	26	13	13
●	OHSS-11	8	203.18 to 202.57	14.3	23	12	11
✳	OHSS-13	8	216.70 to 216.09	10.3	19	12	7
⊗	OHSS-14	8	217.38 to 216.77	13.8	18	14	4
□	MS-8	7	200.83 to 200.23	13.8	21	11	10

CLIENT

PARSONS / MINISTRY OF TRANSPORTATION ONTARIO (MTO)

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2023-08-09
DESIGNED	T.T.
PREPARED	T.T.
REVIEWED	M.H.
APPROVED	L.C.C.

PROJECT

VARIOUS OVERHEAD SIGNS

HIGHWAY 400 WIDENING LANGSTAFF ROAD TO MAJOR MACKENZIE DRIVE

TITLE

PLASTICITY CHART

Sandy CLAYEY SILT -SILT (CL-ML) to SILTY CLAY (CI) (TILL) - LOWER DEPOSIT

PROJECT NO.	CONTROL	REV.	FIGURE
21490972	0	0	B9

PATH: C:\Users\CATT079249\Desktop\MTO Highway 400 Report Figures\Lab Figures\OHSSLimits | FILE NAME: 21490972 OHSS Limits Lower Cohesive Deposit.xlsm

APPENDIX C

Analytical Laboratory Test Results

Your Project #: 21490972
Your C.O.C. #: 933554-05-01

Attention: Maor Levy

WSP Canada Inc.
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2023/06/20
Report #: R7679493
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3G6036
Received: 2023/06/07, 18:00

Sample Matrix: Soil
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Chloride (20:1 extract)	20	2023/06/13	2023/06/14	CAM SOP-00463	MOE E3013 m
Conductivity	20	2023/06/14	2023/06/14	CAM SOP-00414	OMOE E3530 v1 m
Moisture (Subcontracted) (1, 2)	20	N/A	2023/06/15	AB SOP-00002	CCME PHC-CWS m
Sulphide in Soil (1)	20	N/A	2023/06/15	AB SOP-00080	EPA9030B/SM4500S2-DF
pH CaCl2 EXTRACT	20	2023/06/13	2023/06/13	CAM SOP-00413	EPA 9045 D m
Redox Potential (3)	20	2023/06/13	2023/06/14	CAM SOP-00421	SM 2580 B
Resistivity of Soil	20	2023/06/09	2023/06/14	CAM SOP-00414	SM 23 2510 m
Sulphate (20:1 Extract)	20	2023/06/13	2023/06/14	CAM SOP-00464	MOE E3013 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary (19th), 4000 19th Street NE , Calgary, AB, T2E 6P8
(2) Offsite analysis requires that subcontracted moisture be reported.

Your Project #: 21490972
Your C.O.C. #: 933554-05-01

Attention: Maor Levy

WSP Canada Inc.
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2023/06/20
Report #: R7679493
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3G6036

Received: 2023/06/07, 18:00

(3) Oxidation-Reduction Potential (ORP) values are determined using a Ag/AgCl reference electrode. The test is therefore, not SCC accredited for this matrix.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ankita Bhalla, Project Manager
Email: Ankita.Bhalla@bureauveritas.com
Phone# (905) 817-5700

==========

This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

SOIL CORROSIVITY PACKAGE (SOIL)

Bureau Veritas ID		WAV862			WAV862			WAV863		
Sampling Date		2023/04/18			2023/04/18			2023/04/21		
COC Number		933554-05-01			933554-05-01			933554-05-01		
	UNITS	OHSS-1 SS5	RDL	QC Batch	OHSS-1 SS5 Lab-Dup	RDL	QC Batch	OHSS-2 SS6	RDL	QC Batch
Calculated Parameters										
Resistivity	ohm-cm	850		8715119				590		8715119
CONVENTIONALS										
Redox Potential	mV	200	N/A	8721783				210	N/A	8721783
Inorganics										
Soluble (20:1) Chloride (Cl-)	ug/g	700	20	8722176				1000	40	8722176
Conductivity	umho/cm	1180	2	8725252				1700	2	8725252
Available (CaCl2) pH	pH	8.15		8721892				8.08		8721892
Soluble (20:1) Sulphate (SO4)	ug/g	72	20	8722166				67	40	8722166
Sulphide	mg/kg	1.7 (1)	0.5	8737796	1.7	0.5	8737796	2.6 (2)	0.5	8737796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.
(2) Extracted past method specified hold time

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

SOIL CORROSIVITY PACKAGE (SOIL)

Bureau Veritas ID		WAV864			WAV864		WAV865		
Sampling Date		2023/04/20			2023/04/20		2023/04/21		
COC Number		933554-05-01			933554-05-01		933554-05-01		
	UNITS	OHSS-3 SS7	RDL	QC Batch	OHSS-3 SS7 Lab-Dup	QC Batch	OHSS-4 SS6	RDL	QC Batch
Calculated Parameters									
Resistivity	ohm-cm	890		8715119			570		8715119
CONVENTIONALS									
Redox Potential	mV	390	N/A	8721783	360	8721783	350	N/A	8721783
Inorganics									
Soluble (20:1) Chloride (Cl-)	ug/g	380	20	8722176			680	20	8722176
Conductivity	umho/cm	1120	2	8725252			1740	2	8725252
Available (CaCl2) pH	pH	7.93		8722342	8.00	8722342	7.86		8722342
Soluble (20:1) Sulphate (SO4)	ug/g	230	20	8722166			300	20	8722166
Sulphide	mg/kg	1.1 (1)	0.5	8737796			2.9 (2)	0.5	8737796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Extracted past method specified hold time
(2) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.

Bureau Veritas ID		WAV866		WAV867			WAV868		
Sampling Date		2023/04/25		2023/04/26			2023/04/25		
COC Number		933554-05-01		933554-05-01			933554-05-01		
	UNITS	OHSS-7 SS7B	QC Batch	OHSS-8 SS7B	RDL	QC Batch	OHSS-9 SS5	RDL	QC Batch
Calculated Parameters									
Resistivity	ohm-cm	670	8715119	2400		8715119	410		8715119
CONVENTIONALS									
Redox Potential	mV	240	8721769	230	N/A	8721783	260	N/A	8721783
Inorganics									
Soluble (20:1) Chloride (Cl-)	ug/g	620	8722176	91	20	8722176	1400	100	8722176
Conductivity	umho/cm	1490	8725252	414	2	8725252	2440	2	8725252
Available (CaCl2) pH	pH	8.07	8721947	7.92		8721892	7.89		8721947
Soluble (20:1) Sulphate (SO4)	ug/g	150	8722166	84	20	8722166	160	20	8722166
Sulphide	mg/kg	0.8 (1)	8737796	0.5 (1)	0.5	8737796	3.8 (1)	0.5	8737796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.

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SOIL CORROSIVITY PACKAGE (SOIL)

Bureau Veritas ID		WAV869	WAV870	WAV871			WAV871		
Sampling Date		2023/05/11	2023/05/11	2023/05/11			2023/05/11		
COC Number		933554-05-01	933554-05-01	933554-05-01			933554-05-01		
	UNITS	OHSS-11 SS7B	OHSS-12 SS5	OHSS-13 SS6	RDL	QC Batch	OHSS-13 SS6 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Resistivity	ohm-cm	720	580	940		8715119			
CONVENTIONALS									
Redox Potential	mV	160	320	240	N/A	8721783			
Inorganics									
Soluble (20:1) Chloride (Cl-)	ug/g	700	940	480	20	8722176			
Conductivity	umho/cm	1400	1710	1060	2	8725252	1040	2	8725252
Available (CaCl2) pH	pH	7.85	7.91	7.79		8721892			
Soluble (20:1) Sulphate (SO4)	ug/g	54	79	80	20	8722166			
Sulphide	mg/kg	3.1 (1)	3.1 (2)	1.6 (3)	0.5	8737796			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.
(2) Extracted past method specified hold time
(3) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.

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SOIL CORROSIVITY PACKAGE (SOIL)

Bureau Veritas ID		WAV872			WAV872			WAV873	WAV874		
Sampling Date		2023/04/24			2023/04/24			2023/04/25	2023/05/08		
COC Number		933554-05-01			933554-05-01			933554-05-01	933554-05-01		
	UNITS	OHSS-14 SS6	RDL	QC Batch	OHSS-14 SS6 Lab-Dup	RDL	QC Batch	OHSS-15 SS6	OHSS-16 SS6	RDL	QC Batch
Calculated Parameters											
Resistivity	ohm-cm	450		8715119				680	670		8715119
CONVENTIONALS											
Redox Potential	mV	200	N/A	8721783				350	150	N/A	8721783
Inorganics											
Soluble (20:1) Chloride (Cl-)	ug/g	1200	100	8722176	1000	100	8722176	730	740	20	8722176
Conductivity	umho/cm	2210	2	8725252				1470	1480	2	8725252
Available (CaCl2) pH	pH	8.04		8721892				8.08	7.88		8722342
Soluble (20:1) Sulphate (SO4)	ug/g	42	20	8722166	36	20	8722166	47	59	20	8722166
Sulphide	mg/kg	2.6 (1)	0.5	8737796				2.7 (1)	4.5 (2)	0.5	8737796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.
(2) Extracted past method specified hold time

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SOIL CORROSIVITY PACKAGE (SOIL)

Bureau Veritas ID		WAV875		WAV876		WAV877	WAV878		
Sampling Date		2023/05/08		2023/05/12		2023/05/12	2023/04/05		
COC Number		933554-05-01		933554-05-01		933554-05-01	933554-05-01		
	UNITS	OHSS-17 SS6	QC Batch	OHSS-18 SS5	QC Batch	OHSS-19 SS6	OHSS-20 SS5	RDL	QC Batch
Calculated Parameters									
Resistivity	ohm-cm	550	8715119	620	8715119	710	700		8715119
CONVENTIONALS									
Redox Potential	mV	250	8721769	190	8721783	220	230	N/A	8721783
Inorganics									
Soluble (20:1) Chloride (Cl-)	ug/g	910	8722176	730	8722176	710	750	20	8722176
Conductivity	umho/cm	1830	8725252	1600	8725252	1400	1430	2	8725252
Available (CaCl2) pH	pH	7.86	8721947	7.94	8721947	7.90	7.89		8721892
Soluble (20:1) Sulphate (SO4)	ug/g	190	8722166	66	8722166	22	23	20	8722166
Sulphide	mg/kg	3.1 (1)	8737796	3.1 (1)	8737796	2.3 (1)	3.7 (2)	0.5	8737796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Extracted past method specified hold time
(2) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.

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SOIL CORROSIVITY PACKAGE (SOIL)

Bureau Veritas ID		WAV879			WAV879		WAV880		WAV881		
Sampling Date		2023/05/05			2023/05/05		2023/05/01		2023/05/04		
COC Number		933554-05-01			933554-05-01		933554-05-01		933554-05-01		
	UNITS	OHSS-21 SS5	RDL	QC Batch	OHSS-21 SS5 Lab-Dup	QC Batch	PVMS-1 SS5	RDL	VMS-1 SS6	RDL	QC Batch
Calculated Parameters											
Resistivity	ohm-cm	520		8715119			800		400		8715119
CONVENTIONALS											
Redox Potential	mV	220	N/A	8721783			300	N/A	130	N/A	8721783
Inorganics											
Soluble (20:1) Chloride (Cl-)	ug/g	980	20	8722176			610	20	1500	100	8722176
Conductivity	umho/cm	1920	2	8725252			1250	2	2480	2	8725252
Available (CaCl2) pH	pH	7.95		8721947	7.96	8721947	7.83		7.91		8721892
Soluble (20:1) Sulphate (SO4)	ug/g	58	20	8722166			41	20	96	20	8722166
Sulphide	mg/kg	3.4 (1)	0.5	8737796			2.6 (2)	0.5	2.5 (2)	0.5	8737796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Extracted past method specified hold time
Sample contained greater than 10% headspace at time of extraction.
(2) Extracted past method specified hold time

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		WAV862	WAV863	WAV863	WAV864	WAV865	WAV866		
Sampling Date		2023/04/18	2023/04/21	2023/04/21	2023/04/20	2023/04/21	2023/04/25		
COC Number		933554-05-01	933554-05-01	933554-05-01	933554-05-01	933554-05-01	933554-05-01		
	UNITS	OHSS-1 SS5	OHSS-2 SS6	OHSS-2 SS6 Lab-Dup	OHSS-3 SS7	OHSS-4 SS6	OHSS-7 SS7B	RDL	QC Batch
Physical Testing									
Moisture-Subcontracted	%	12	9.4	9.4	9.9	10	15	0.30	8737797

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		WAV867	WAV868	WAV869	WAV870	WAV871	WAV872		
Sampling Date		2023/04/26	2023/04/25	2023/05/11	2023/05/11	2023/05/11	2023/04/24		
COC Number		933554-05-01	933554-05-01	933554-05-01	933554-05-01	933554-05-01	933554-05-01		
	UNITS	OHSS-8 SS7B	OHSS-9 SS5	OHSS-11 SS7B	OHSS-12 SS5	OHSS-13 SS6	OHSS-14 SS6	RDL	QC Batch
Physical Testing									
Moisture-Subcontracted	%	10	19	17	16	18	18	0.30	8737797

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		WAV873	WAV874	WAV875	WAV876	WAV877	WAV878		
Sampling Date		2023/04/25	2023/05/08	2023/05/08	2023/05/12	2023/05/12	2023/04/05		
COC Number		933554-05-01	933554-05-01	933554-05-01	933554-05-01	933554-05-01	933554-05-01		
	UNITS	OHSS-15 SS6	OHSS-16 SS6	OHSS-17 SS6	OHSS-18 SS5	OHSS-19 SS6	OHSS-20 SS5	RDL	QC Batch
Physical Testing									
Moisture-Subcontracted	%	12	20	11	11	11	20	0.30	8737797

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		WAV879	WAV880	WAV881		
Sampling Date		2023/05/05	2023/05/01	2023/05/04		
COC Number		933554-05-01	933554-05-01	933554-05-01		
	UNITS	OHSS-21 SS5	PVMS-1 SS5	VMS-1 SS6	RDL	QC Batch
Physical Testing						
Moisture-Subcontracted	%	10	11	17	0.30	8737797

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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TEST SUMMARY

Bureau Veritas ID: WAV862 **Collected:** 2023/04/18
Sample ID: OHSS-1 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV862 Dup **Collected:** 2023/04/18
Sample ID: OHSS-1 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez

Bureau Veritas ID: WAV863 **Collected:** 2023/04/21
Sample ID: OHSS-2 SS6 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV863 Dup **Collected:** 2023/04/21
Sample ID: OHSS-2 SS6 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera

Bureau Veritas ID: WAV864 **Collected:** 2023/04/20
Sample ID: OHSS-3 SS7 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez

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TEST SUMMARY

Bureau Veritas ID: WAV864
Sample ID: OHSS-3 SS7
Matrix: Soil

Collected: 2023/04/20
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	8722342	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV864 Dup
Sample ID: OHSS-3 SS7
Matrix: Soil

Collected: 2023/04/20
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	8722342	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR

Bureau Veritas ID: WAV865
Sample ID: OHSS-4 SS6
Matrix: Soil

Collected: 2023/04/21
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8722342	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV866
Sample ID: OHSS-7 SS7B
Matrix: Soil

Collected: 2023/04/25
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721947	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721769	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

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TEST SUMMARY

Bureau Veritas ID: WAV867 **Collected:** 2023/04/26
Sample ID: OHSS-8 SS7B **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV868 **Collected:** 2023/04/25
Sample ID: OHSS-9 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721947	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV869 **Collected:** 2023/05/11
Sample ID: OHSS-11 SS7B **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV870 **Collected:** 2023/05/11
Sample ID: OHSS-12 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera

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TEST SUMMARY

Bureau Veritas ID: WAV870 **Collected:** 2023/05/11
Sample ID: OHSS-12 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV871 **Collected:** 2023/05/11
Sample ID: OHSS-13 SS6 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV871 Dup **Collected:** 2023/05/11
Sample ID: OHSS-13 SS6 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR

Bureau Veritas ID: WAV872 **Collected:** 2023/04/24
Sample ID: OHSS-14 SS6 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

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TEST SUMMARY

Bureau Veritas ID: WAV872 Dup
Sample ID: OHSS-14 SS6
Matrix: Soil
Collected: 2023/04/24
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV873
Sample ID: OHSS-15 SS6
Matrix: Soil
Collected: 2023/04/25
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8722342	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV874
Sample ID: OHSS-16 SS6
Matrix: Soil
Collected: 2023/05/08
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8722342	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV875
Sample ID: OHSS-17 SS6
Matrix: Soil
Collected: 2023/05/08
Shipped:
Received: 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721947	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721769	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

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TEST SUMMARY

Bureau Veritas ID: WAV876 **Collected:** 2023/05/12
Sample ID: OHSS-18 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721947	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV877 **Collected:** 2023/05/12
Sample ID: OHSS-19 SS6 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV878 **Collected:** 2023/04/05
Sample ID: OHSS-20 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV879 **Collected:** 2023/05/05
Sample ID: OHSS-21 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera

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TEST SUMMARY

Bureau Veritas ID: WAV879 **Collected:** 2023/05/05
Sample ID: OHSS-21 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721947	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV879 Dup **Collected:** 2023/05/05
Sample ID: OHSS-21 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	8721947	2023/06/13	2023/06/13	Surinder Rai

Bureau Veritas ID: WAV880 **Collected:** 2023/05/01
Sample ID: PVMS-1 SS5 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

Bureau Veritas ID: WAV881 **Collected:** 2023/05/04
Sample ID: VMS-1 SS6 **Shipped:**
Matrix: Soil **Received:** 2023/06/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	8722176	2023/06/13	2023/06/14	Massarat Jan
Conductivity	AT	8725252	2023/06/14	2023/06/14	Gurparteek KAUR
Moisture (Subcontracted)	BAL	8737797	N/A	2023/06/15	Margarita Aguilera
Sulphide in Soil	SPEC	8737796	N/A	2023/06/15	Princess Nicole Hernaez
pH CaCl2 EXTRACT	AT	8721892	2023/06/13	2023/06/13	Surinder Rai
Redox Potential	COND	8721783	2023/06/13	2023/06/14	Gurparteek KAUR
Resistivity of Soil		8715119	2023/06/14	2023/06/14	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	8722166	2023/06/13	2023/06/14	Massarat Jan

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8721769	Redox Potential	2023/06/14			102	95 - 105			5.0	35
8721783	Redox Potential	2023/06/14			102	95 - 105			11	35
8721892	Available (CaCl2) pH	2023/06/13			100	97 - 103			0.60	N/A
8721947	Available (CaCl2) pH	2023/06/13			100	97 - 103			0.083	N/A
8722166	Soluble (20:1) Sulphate (SO4)	2023/06/14	NC	70 - 130	86	70 - 130	<20	ug/g	17	35
8722176	Soluble (20:1) Chloride (Cl-)	2023/06/14	NC	70 - 130	93	70 - 130	<20	ug/g	14	35
8722342	Available (CaCl2) pH	2023/06/13			100	97 - 103			0.82	N/A
8725252	Conductivity	2023/06/14			105	90 - 110	<2	umho/cm	1.6	10
8737796	Sulphide	2023/06/15	96	75 - 125	80	75 - 125	<0.5	mg/kg	2.7	30
8737797	Moisture-Subcontracted	2023/06/15					<0.30	%	0	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere, Senior Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

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CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#1326 WSP Canada Inc.	Company Name:	WSP Canada Inc	Quotation #:	C31027	Bureau Veritas Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:	Maor Levy	P.O. #:			933554
Address:	6925 Century Ave Suite 100 Mississauga ON L5N 7K2	Address:		Project:	21490972	COC #:	Project Manager:
Tel:	(905) 567-4444 Fax: (905) 567-6561	Tel:	Fax:	Project Name:		C#933554-02-01	Ankita Bhalla
Email:	capayablesinquiry@wsp.com	Email:	maor.levy@wsp.com	Site #:			
				Sampled By:			

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table ___

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☐ PWQO ☐ Reg 406 Table ___
☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Field Filtered (please circle): Metals / Hg / Cr VI

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ✓
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Soil Corrosivity Package	# of Bottles	Comments
1		OHSS-14 SS6	23/04/24	AM	Soil	✓	2	
2		OHSS-15 SS6	23/04/25	AM		✓	2	
3		OHSS-16 SS6	23/05/08	AM		✓	2	
4		OHSS-17 SS6	23/05/08	AM		✓	2	
5		OHSS-18 SS5	23/05/12	AM		✓	2	
6		OHSS-19 SS6	23/05/12	AM		✓	2	
7		OHSS-20 SS5	23/04/05	AM		✓	2	
8		OHSS-21 SS5	23/05/05	AM		✓	2	
9		PVMS-1 SS5	23/05/01	AM		✓	2	
10		VMS-1 SS6	23/05/04	AM		✓	2	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Maor Levy	23/06/07	18:00	See Page 1			

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
		Present		
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

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Mont-06-080

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Use Only:
Company Name:	#1326 WSP Canada Inc.	Company Name:	WSP Canada Inc	Quotation #:	C31027	Bottle Order #: 933554
Attention:	Accounts Payable	Attention:	Maor Levy	P.O. #:		
Address:	6925 Century Ave Suite 100 Mississauga ON L5N 7K2	Address:		Project:	21490972	Project Manager: Ankita Bhalla
Tel:	(905) 567-4444 Fax: (905) 567-6561	Tel:	Fax:	Project Name:		
Email:	capayablesinquiry@wsp.com	Email:	maor.levy@wsp.com	Site #:		
				Sampled By:		C#933554-05-01

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☐ Other ___

Special Instructions

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2		OHSS-2 SS6	23/04/21	AM			✓	2	
3		OHSS-3 SS7	23/04/20	AM			✓	2	
4		OHSS-4 SS6	23/04/21	AM			✓	2	
5		OHSS-7 SS7B	23/04/05	AM			✓	2	
6		OHSS-8 SS7B	23/04/26	AM			✓	2	
7		OHSS-9 SS5	23/04/25	AM			✓	2	
8		OHSS-11 SS7B	23/05/11	AM			✓	2	
9		OHSS-12 SS5	23/05/11	AM			✓	2	
10		OHSS-13 SS6	23/05/11	AM			✓	2	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Maor Levy	23/06/07	18:00	[illegible]	2023/06/07	18:00	

Laboratory Use Only
Time Sensitive
Temperature (°C) on Recei: 5/4/4
Custody Seal: Present ☑ Intact ☑ — Yes ☑ — No ☐

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