



THURBER ENGINEERING LTD.



**FOUNDATION INVESTIGATION REPORT
NEW SALT/SAND STORAGE BUILDING
MTO PATROL YARD – DAWSON SITE
TOWNSHIP OF MCINTYRE, ONTARIO
LAT. 48.488618, LONG. -89.372937
AGREEMENT NO. 6015-E-0023, ASSIGNMENT NO. 5
G.W.P. 6055-16-00**

GEOCRES No. 52A-232

Report to

Ministry of Transportation of Ontario

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1. INTRODUCTION

This report presents the factual findings obtained from a foundation investigation conducted at the site of a proposed salt and sand storage building located at an existing Ministry of Transportation of Ontario (MTO) Patrol Yard in Northwestern Ontario. The patrol yard is located on Mapleward Road, approximately 150 m south of Dawson Road, in the Township of McIntyre, Ontario.

The purpose of the investigation was to explore the subsurface conditions at the site and, based on the data obtained, provide a borehole location plan, record of borehole sheets, a stratigraphic profile, laboratory test results and a written description of the subsurface conditions.

Thurber carried out the investigation as a consultant to the MTO under the Ministry of Transportation Ontario (MTO) Agreement Number 6015-E-0023.

2. SITE DESCRIPTION

The patrol yard is located on Mapleward Road, approximately 150 m south of Dawson Road, in the Township of McIntyre, Ontario.

The site includes an existing sand dome, salt shed, 5 door garage and office, and gravel stockpile. There is an asphalt access road to the site which extends to the existing sand dome and garage and office. The remainder of the site has a gravel surface. The site terrain is generally flat and the area surrounding the site is wooded. Photographs of the site are presented in Appendix C.

Quaternary mapping indicates that the site is located within an area generally characterized by sand to silty sand till overlying granite bedrock.

3. SITE INVESTIGATION AND FIELD TESTING

The site investigation and field testing for this project was carried out between June 14 and 17, 2017, and consisted of drilling and sampling four boreholes (DAW-01A/B to DAW-04) at the corners of the proposed salt and sand storage building. It is noted that while advancing Borehole DAW-1A, refusal was encountered at 2.9 m. The borehole was moved 1 m and advanced again as DAW-1B. For simplicity, these boreholes are collectively referred to as Borehole DAW-01A/1B. All boreholes were terminated in overburden at depths of 9.1 m to 15.8 m (Elev. 328.3 to 321.4 m).

The approximate borehole locations are shown on the Borehole Locations and Soil Strata Drawing in Appendix D. The boreholes were drilled near the corners of the proposed building that were staked out by the MTO prior to commencement of the field investigation. The coordinates and elevations of the boreholes are given on these drawings and on the individual Record of Borehole Sheets in Appendix A.

Prior to commencement of drilling, utility clearances were obtained for all borehole locations.

Hollow stems augers, and N casing with tricone, were used to advance the boreholes through the overburden. Samples were obtained at selected intervals using a 50 mm diameter split spoon sampler in conjunction with the Standard Penetration Test (SPT).

A member of Thurber's engineering staff supervised the drilling and sampling operations on a full time basis. The supervisor logged the boreholes, visually examined the recovered samples, and transported the samples to Thurber's laboratory in Oakville, Ontario, for further examination and laboratory testing.

Groundwater conditions in the open boreholes were observed throughout the drilling operations. A standpipe piezometer consisting of a 25 mm diameter PVC pipe with slotted screen was installed in DAW-1A to permit monitoring of the groundwater level. Details of the piezometer installation and other borehole completion details are on the Record of Borehole Sheets in Appendix A.

The boreholes in which no piezometers were installed were backfilled with bentonite and cuttings to the ground surface in general accordance with MOE Regulation 903. The piezometer in Borehole DRY-01A was abandoned in accordance with Reg. 903 upon completion of the field program.

4. LABORATORY TESTING

All recovered soil and rock samples were subjected to Visual Identification (VI) and moisture content determination. At least 25% of the recovered soil samples were also subjected to grain size distribution analysis (sieve and hydrometer) and Atterberg Limits testing where appropriate. The results of the testing program are shown on the Record of Borehole Sheets in Appendix A and on the Figures contained in Appendix B.

5. SUBSURFACE CONDITIONS

Details of the encountered soil and rock stratigraphy are presented on the Record of Borehole Sheets in Appendix A and the Borehole Locations and Soil Strata Drawing in Appendix D.

The stratigraphic boundaries shown on the borehole sheets and on the interpreted stratigraphic profile and cross-sections are inferred observations of drilling progress and from non-continuous sampling and, therefore, represent transitions between soil types rather than exact planes of geological change. The subsoil conditions will vary between and beyond the borehole locations.

In general, the subsurface conditions at the site consist of a surficial sand layer overlying, in succession, deposits of silty clay, silty sand till, silt and sand till, and sand.

A more detailed description of the subsurface conditions encountered in the boreholes is provided below.

5.1 Sand Fill

A 0.8 to 1.3 m thick layer of brown sand fill with some gravel was encountered in all boreholes from the ground surface between Elev. 337.4 and 336.7 m. The base of the sand fill was encountered between Elev. 336.1 and 335.5 m.

The measured SPT 'N' values within the sand fill ranged from 20 to 33 blows per 0.3 m penetration suggesting a compact to dense relative density. Natural moisture contents measured on samples of the sand fill ranged from 6 to 16%.

The results of grain size analyses conducted on selected samples of the silty clay are provided on the Record of Borehole sheets in Appendix A, and illustrated in Figure B1 of Appendix B. The results of the grain size analysis are also summarized in the table below.

| Soil Particle | % |
|---------------|----------|
| Gravel | 13 to 15 |
| Sand | 74 to 75 |
| Silt + Clay | 11 to 12 |

5.2 Silty Clay

A 0.4 to 0.9 m thick deposit of brown silty clay was encountered underlying the sand fill in boreholes DAW-1A/B, DAW-2, and DAW-4. The upper boundary of the deposit was encountered between Elev. 336.1 and 335.9 m in the boreholes. The base of the deposit was encountered between Elev. 335.5 and 335.2 m. Trace organics were observed within silty clay samples recovered from Boreholes DAW-01A/B and DAW-04.

The measured SPT 'N' values within the silty clay ranged from 6 to 15 blows per 0.3 m penetration indicating a firm to very stiff consistency. The natural moisture content measured on samples of the silty clay ranged from 16 to 35%.

The results of grain size analyses conducted on selected samples silty clay are provided on the Record of Borehole sheets in Appendix B1, and illustrated in Figure B2 of Appendix B. The results of the grain size analysis are also summarized in the table below.

| Soil Particle | % |
|---------------|----------|
| Gravel | 0 to 2 |
| Sand | 3 to 20 |
| Silt | 64 to 77 |
| Clay | 14 to 20 |

Atterberg limits testing was carried out on one sample of the silty clay and measured a plastic limit of 22%, a liquid limit of 32%, and a corresponding plasticity index of 10%. This result, which is plotted on Figure B7 of Appendix B, indicate that the deposit consists of low plasticity silty clay.

5.3 Silty Sand Till

A 0.7 to 2.8 m thick deposit of silty sand till was encountered underlying the silty clay deposit in Boreholes DAW-1A/B, DAW-2, and DAW-4, and below the sand fill in DAW-3. The silty sand till contained trace to some gravel and clay. The till deposit was also noted to contain cobbles and/or boulders. The upper boundary of the deposit was encountered between Elev. 335.5 and 335.2 m in the boreholes. The base of the deposit was encountered between Elev. 334.5 and 332.6 m.

The measured SPT 'N' values within the silty sand till ranged from 37 blows per 0.3 m penetration to 50 blows per 0.025 m of penetration, indicating a dense to very dense relative density. Auger refusal was encountered in this layer at 2.9 m depth in Borehole DAW-1A. The natural moisture content measured on samples of the silty sand till ranged from 13 to 23%.

The results of grain size analyses conducted on samples of the silty sand till are provided on the Record of Borehole sheets in Appendix A, and illustrated in Figure B3 of Appendix B. The results of the grain size analyses are also summarized in the table below.

| Soil Particle | % |
|---------------|----------|
| Gravel | 10 |
| Sand | 55 to 60 |
| Silt | 20 to 26 |
| Clay | 9 to 10 |

5.4 Silt Till

A 1.0 m thick discontinuous grey silt till layer was encountered underlying the silty sand till in Borehole DAW-02. The silt till was described as containing some clay and gravel and cobbles and/or boulders. The upper boundary of the deposit was encountered at Elev. 334.0 m. The base of the deposit was encountered at Elev. 333.0 m.

The measured SPT 'N' values within the silt till ranged from 50 blows per 0.125 m of penetration to 50 blows per 0.075 m of penetration, indicating a very dense relative density. A natural moisture content of 15% was measured on a sample of the silt till.

The result of a grain size analysis conducted on a sample of the silt till is provided on the Record of Borehole sheets in Appendix A, and illustrated in Figure B4 of Appendix B. The results of the grain size analysis are also summarized in the table below.

| Soil Particle | % |
|---------------|----|
| Gravel | 0 |
| Sand | 7 |
| Silt | 78 |
| Clay | 15 |

5.5 Sand and Silt Till

A 2.3 to 3.2 m thick deposit of sand and silt till was encountered underlying the silty sand till in Boreholes DAW-1A/B, DAW-03, and DAW-04, and below the silt till layer in DAW-02. The sand and silt till deposit ranged from being gravelly to having trace gravel and contained trace clay. The till deposit was also noted to contain cobbles and/or boulders. The upper boundary of the deposit was encountered between Elev. 334.5 to 332.6 m. The base of the deposit was encountered between Elev. 331.6 and 330.0 m.

The measured SPT 'N' values within the sand and silt till ranged from 50 blows per 0.15 m of penetration to 50 blows per 0.05 m of penetration, indicating a very dense relative density. The natural moisture content measured on samples of sand and silt till ranged from 6 to 17%.

The results of grain size analyses conducted on samples of the sand and silt till are provided on the Record of Borehole sheets in Appendix A, and illustrated in Figure B5 of Appendix B. The results of the grain size analyses are also summarized in the table below.

| Soil Particle | % |
|---------------|----------|
| Gravel | 5 to 71 |
| Sand | 25 to 43 |
| Silt | 29 to 45 |
| Clay | 7 |
| Silt + Clay | 4 |

5.6 Sand

A deposit of sand, which contained some silt and trace clay, was encountered underlying the silt and sand till deposit in all of the boreholes. The exact thickness of the sand is unknown as the boreholes were terminated within the sand deposit between Elev. 328.3 and 321.4 m. The upper boundary of the deposit was encountered between Elev. 331.6 to 330.0 m.

The measured SPT 'N' values within the sand ranged from 50 blows per 0.15 m of penetration to 100 blows per 0.05 m of penetration, indicating a very dense relative density. The natural moisture content measured on samples of the sand ranged from 3 to 26%.

The results of grain size analyses conducted on samples of the sand are provided on the Record of Borehole sheets in Appendix A, and illustrated in Figure B6 of Appendix B. The results of the grain size analysis are also summarized in the table below.

| Soil Particle | % |
|---------------|----------|
| Gravel | 0 |
| Sand | 79 to 85 |
| Silt + Clay | 15 to 21 |

5.7 Water Levels

Water levels were observed in the boreholes during and upon completion of drilling. A standpipe piezometer was installed in Borehole DAW-1 to monitor the groundwater level at the site. The following table summarizes the water levels measured in the open boreholes and piezometer.

Table 5.1 – Water Level Measurements

| Borehole | Date | Water Level (m) | | Comment |
|----------|---------------|-----------------|-----------|------------------|
| | | Depth | Elevation | |
| DAW-1 | June 14, 2017 | 1.7 | 335.7 | In piezometer |
| | June 15, 2017 | 1.4 | 336.0 | |
| | June 16, 2017 | 1.2 | 336.2 | |
| | June 17, 2017 | 1.2 | 336.2 | |
| DAW-2 | June 14, 2017 | 1.0 | 335.7 | In open borehole |
| DAW-3 | June 15, 2017 | 1.0 | 335.8 | In open borehole |
| DAW-4 | June 15, 2017 | 2.0 | 335.2 | In open borehole |

Based on the above measurements, the groundwater table is expected to be at about Elev. 336 m. However, it is noted that the above values are short-term readings and seasonal fluctuations of the groundwater level are to be expected. In particular, the groundwater level may be at a higher elevation after the spring snowmelt or after periods of heavy rainfall.

6. MISCELLANEOUS

The boreholes locations were surveyed by Deltasurvey Inc. following completion of drilling.

RPM Drilling of Thunder Bay, Ontario supplied and operated the drilling, sampling and in-situ testing equipment for the field investigation. The field investigation was supervised on a full time basis by Mr. Simon Paxton of Thurber. Overall supervision of the field program was provided by Mr. Geoff Lay, P.Eng., of Thurber.

Routine laboratory testing was carried out at Thurber's geotechnical laboratory in Oakville, Ontario. Interpretation of the field data and preparation of this report was carried out by Mr. Geoff Lay, P.Eng. The report was reviewed by Mr. Keli Shi, P.Eng., and Dr. P.K. Chatterji, P.Eng, a Designated Principal Contact for MTO Foundations Projects.

Thurber Engineering Ltd.



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Geotechnical Engineer



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Appendix A

Record of Borehole Sheets

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

| CLASSIFICATION | PARTICLE SIZE | VISUAL IDENTIFICATION |
|----------------|--------------------|---|
| Boulders | Greater than 200mm | same |
| Cobbles | 75 to 200mm | same |
| Gravel | 4.75 to 75mm | 5 to 75mm |
| Sand | 0.075 to 4.75mm | Not visible particles to 5mm |
| Silt | 0.002 to 0.075mm | Non-plastic particles, not visible to the naked eye |
| Clay | Less than 0.002mm | Plastic particles, not visible to the naked eye |

2. COARSE GRAIN SOIL DESCRIPTION (50% greater than 0.075mm)

| TERMINOLOGY | PROPORTION |
|---------------------------------|---------------|
| Trace or Occasional | Less than 10% |
| Some | 10 to 20% |
| Adjective (e.g. silty or sandy) | 20 to 35% |
| And (e.g. sand and gravel) | 35 to 50% |

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

| DESCRIPTIVE TERM | UNDRAINED SHEAR STRENGTH (kPa) | APPROXIMATE SPT ⁽¹⁾ 'N' VALUE |
|------------------|--------------------------------|--|
| Very Soft | 12 or less | Less than 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 | Greater than 200 | Greater than 30 |

NOTE: Hierarchy of Soil Strength Prediction

- 1) Laboratory Triaxial Testing
- 2) Field Insitu Vane Testing
- 3) Laboratory Vane Testing
- 4) SPT value
- 5) Pocket Penetrometer


4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

| DESCRIPTIVE TERM | SPT "N" VALUE |
|------------------|-----------------|
| Very Loose | Less than 4 |
| Loose | 4 to 10 |
| Compact | 10 to 30 |
| Dense | 30 to 50 |
| Very Dense | Greater than 50 |

5. LEGEND FOR RECORDS OF BOREHOLES

| | | | |
|---|---|--|------------------------|
| SYMBOLS AND ABBREVIATIONS FOR SAMPLE TYPE | SS Split Spoon Sample | WS Wash Sample | AS Auger (Grab) Sample |
| | TW Thin Wall Shelby Tube Sample | TP Thin Wall Piston Sample | |
| | PH Sampler Advanced by Hydraulic Pressure | PM Sampler Advanced by Manual Pressure | |
| | WH Sampler Advanced by Self Static Weight | RC Rock Core | SC Soil Core |


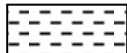



$$\text{Sensitivity} = \frac{\text{Undisturbed Shear Strength}}{\text{Remoulded Shear Strength}}$$

 Water Level

C_{pen} Shear Strength Determination by Pocket Penetrometer

- (1) SPT 'N' Value Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.
- (2) DCPT Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

EXPLANATION OF ROCK LOGGING TERMS

| <u>ROCK WEATHERING CLASSIFICATION</u> | | <u>SYMBOLS</u> | |
|---------------------------------------|---|---|-------------------|
| Fresh (FR) | No visible signs of weathering. | | |
| Fresh Jointed (FJ) | Weathering limited to the surface of major discontinuities. |  | CLAYSTONE |
| Slightly Weathered (SW) | Penetrative weathering developed on open discontinuity surfaces, but only slight weathering of rock material. |  | SILTSTONE |
| Moderately Weathered (MW) | Weathering extends throughout the rock mass, but the rock material is not friable. |  | SANDSTONE |
| Highly Weathered (HW) | Weathering extends throughout the rock mass and the rock is partly friable. |  | COAL |
| Completely Weathered (CW) | Rock is wholly decomposed and in a friable condition, but the rock texture and structure are preserved. |  | Bedrock (general) |

| <u>DISCONTINUITY SPACING</u> | | <u>STRENGTH CLASSIFICATION</u> | | | |
|-------------------------------------|--|--------------------------------|---|---------------------|--|
| Bedding | Bedding Plane Spacing | Rock Strength | Approximate Uniaxial Compressive Strength | | Field Estimation of Hardness* |
| | | | (MPa) | (psi) | |
| Very thickly bedded | Greater than 2m | Extremely Strong | Greater than 250 | Greater than 36,000 | Specimen can only be chipped with a geological hammer |
| Thickly bedded | 0.6 to 2m | | | | |
| Medium bedded | 0.2 to 0.6m | Very Strong | 100-250 | 15,000 to 36,000 | Requires many blows of geological hammer to break |
| Thinly bedded | 60mm to 0.2m | Strong | 50-100 | 7,500 to 15,000 | Requires more than one blow of geological hammer to break |
| Very thinly bedded | 20 to 60mm | | | | |
| Laminated | 6 to 20mm | Medium Strong | 25.0 to 50.0 | 3,500 to 7,500 | Breaks under single blow of geological hammer. |
| Thinly Laminated | Less than 6mm | | | | |
| <u>TERMS</u> | | Weak | 5.0 to 25.0 | 750 to 3,500 | Can be peeled by a pocket knife with difficulty |
| Total Core Recovery: (TCR) | Core recovered as a percentage of total core run length. | Very Weak | 1.0 to 5.0 | 150 to 750 | Can be peeled by a pocket knife, crumbles under firm blows of geological pick. |
| Solid Core Recovery: (SCR) | Percent Ratio of solid core of full cylindrical shape recovered. Expressed with respect to the total length of core run. | Extremely Weak (Rock) | 0.25 to 1.0 | 35 to 150 | Indented by thumbnail |
| Rock Quality Designation: (RQD) | Total length of sound core recovered in pieces 0.1m in length or larger as a percentage of total core run length. | | | | |
| Uniaxial Compressive Strength (UCS) | Axial stress required to break the specimen | | | | |
| Fracture Index: (FI) | Frequency of natural fractures per 0.3m of core run. | | | | |

UNIFIED SOILS CLASSIFICATION

| MAJOR DIVISIONS | | GROUP SYMBOL | TYPICAL DESCRIPTION |
|----------------------|---|--------------|---|
| COARSE GRAINED SOILS | GRAVEL AND GRAVELLY SOILS | GW | Well-graded gravels or gravel-sand mixtures, little or no fines. |
| | | GP | Poorly-graded gravels or gravel-sand mixtures, little or no fines. |
| | | GM | Silty gravels, gravel-sand-silt mixtures. |
| | | GC | Clayey gravels, gravel-sand-clay mixtures. |
| | SAND AND SANDY SOILS | SW | Well-graded sands or gravelly sands, little or no fines. |
| | | SP | Poorly-graded sands or gravelly sands, little or no fines. |
| | | SM | Silty sands, sand-silt mixtures. |
| | | SC | Clayey sands, sand-clay mixtures. |
| FINE GRAINED SOILS | SILTS AND CLAYS W _L < 50% | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (W _L < 30%). |
| | | CI | Inorganic clays of medium plasticity, silty clays. (30% < W _L < 50%). |
| | | OL | Organic silts and organic silty-clays of low plasticity. |
| | SILTS AND CLAYS W _L > 50% | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |
| | | CH | Inorganic clays of high plasticity, fat clays. |
| | | OH | Organic clays of medium to high plasticity, organic silts. |
| HIGHLY ORGANIC SOILS | | Pt | Peat and other highly organic soils. |
| CLAY SHALE | | | |
| SANDSTONE | | | |
| SILTSTONE | | | |
| CLAYSTONE | | | |
| COAL | | | |

RECORD OF BOREHOLE No DAW-01A/B 1 OF 2 METRIC

GWP# 6055-16-00 LOCATION SW Building Corner, NAD 83-15 N 5 372 415.2 E 351 119.1 ORIGINATED BY SMP
HWY Mapleward Rd BOREHOLE TYPE Hollow Stem Augers/N Casing with Tricone COMPILED BY AN
DATUM Geodetic DATE 2017.06.14 - 2017.06.17 CHECKED BY GRL

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|--------------|----------------------------|-----------------|---|--|--|--|---|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | |
| 337.4 | GROUND SURFACE | | | | | | | 20 40 60 80 100 | | | | | |
| 0.0 | SAND , some gravel, some silt Compact to Dense Brown Moist (FILL) | | 1 | SS | 23 | | 337 | | | | | | 13 75 12 (SI+CL) |
| | | | 2 | SS | 32 | | | | | | | | |
| 336.1 | | | | | | | | | | | | | |
| 1.3 | Silty CLAY , trace sand, organics Stiff Brown Wet | | 3 | SS | 15 | | 336 | | | | | | 0 3 77 20 |
| 335.2 | | | 4 | SS | 15 | | | | | | | | |
| 2.2 | Silty SAND , containing cobbles or boulders Very Dense Grey Wet (TILL) | | 5 | SS | 50/ 0.125 | | 335 | | | | | | |
| 334.5 | Auger refusal at 2.9m, switch to casing | | 6 | SS | 50/ 0.100 | | | | | | | | |
| 2.9 | SAND and SILT , gravelly, trace clay, containing cobbles or boulders Very Dense Brown to Grey Wet (TILL) | | 7 | SS | 50/ 0.050 | | 334 | | | | | | 71 25 4 (SI+CL) |
| | | | 8 | SS | 50/ 0.125 | | 333 | | | | | | 62 34 4 (SI+CL) |
| | | | | | | | 332 | | | | | | |
| 331.3 | | | 9 | SS | 50/ 0.075 | | 331 | | | | | | |
| 6.1 | SAND , some silt Very Dense Grey Wet | | 10 | SS | 50/ 0.150 | | 330 | | | | | | |
| | | | 2 | GS | | | | | | | | | |
| | | | | | | | 329 | | | | | | |
| 328.3 | | | 11 | SS | 50/ 0.125 | | | | | | | | |
| 9.1 | END OF BOREHOLE AT 9.1m. Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. | | | | | | | | | | | | |

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

2 OF 2

ORIGINATED BY SMP

| | | | | | |
|-----|--------------|---------------|--|-------------|----|
| HWY | Mapleward Rd | BOREHOLE TYPE | Hollow Stem Augers/N Casing with Tricone | COMPILED BY | AN |
|-----|--------------|---------------|--|-------------|----|

| | | | | | |
|-------|----------|------|-------------------------|------------|-----|
| DATUM | Geodetic | DATE | 2017.06.14 - 2017.06.17 | CHECKED BY | GRL |
|-------|----------|------|-------------------------|------------|-----|

| WATER LEVEL READINGS | | |
|----------------------|----------|----------|
| DATE | DEPTH(m) | ELEV.(m) |
| 2017.06.14 | 1.7 | 335.7 |
| 2017.06.15 | 1.4 | 336.0 |
| 2017.06.16 | 1.2 | 336.2 |
| 2017.06.17 | 1.2 | 336.2 |

RECORD OF BOREHOLE No DAW-02

1 OF 2

METRIC


GWP# 6055-16-00 LOCATION NE Building Corner, , NAD 83-15 N 5 372 433.7 E 351 140.5 ORIGINATED BY SMP
 HWY Mapleward Rd BOREHOLE TYPE Hollow Stem Augers/N Casing with Tricone COMPILED BY AN
 DATUM Geodetic DATE 2017.06.14 - 2017.06.14 CHECKED BY GRL

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
|---------------|---|------------|---------|------|--------------|----------------------------|--------------------|---|--|--|--|--|--|--|---|---|------------|-----------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | WATER CONTENT (%) | | | | | | |
| 336.7 | GROUND SURFACE | | | | | | | 20 40 60 80 100 | | | | | | | | | | |
| 0.0 | SAND , some gravel, some silt Compact Brown Moist (FILL) | | 1 | SS | 20 | ▽ | 336 | | | | | | | | | 2 20 64 14 | | |
| 335.9 | | | | | | | | | | | | | | | | | | |
| 0.8 | Silty CLAY , sandy, trace gravel Firm Brown Moist | | 2 | SS | 6 | | | | | | | | | | | | | |
| 335.5 | | | | | | | | | | | | | | | | | | |
| 1.2 | Silty SAND , some gravel, trace clay, occasional cobbles Dense to Very Dense Brown Wet (TILL) | | 3 | SS | 37 | | 335 | | | | | | | | | | 10 55 26 9 | |
| | | | 4 | SS | 50/ 0.075 | | | | | | | | | | | | | |
| | | | 5 | SS | 50/ 0.125 | | | | | | | | | | | | | |
| 334.0 | | | | | | | 334 | | | | | | | | | | | 0 7 78 15 |
| 2.7 | SILT , some clay, some gravel, containing cobbles and boulders Very Dense Grey Moist (TILL) | | 6 | SS | 50/ 0.125 | | | | | | | | | | | | | |
| 333.0 | | | 7 | SS | 50/ 0.075 | | 333 | | | | | | | | | | | |
| 3.7 | SAND and SILT , trace clay, containing cobbles and boulders Very Dense Grey Wet (TILL) | | 8 | SS | 50/ 0.125 | | 332 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 50/ 0.050 | 331 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 330.0 | | | | | | 330 | | | | | | | | | | | | |
| 6.7 | SAND , some silt Very Dense Grey Wet | | 10 | SS | 50/ 0.125 | 329 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 1 | GS | | 328 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 50/ 0.125 | | | | | | | | | | | | | |
| 326.9 | | | | | | | 327 | | | | | | | | | | | |
| 9.8 | END OF BOREHOLE AT 9.8m. | | | | | | | | | | | | | | | | | |

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
 15
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 (%) STRAIN AT FAILURE

METRIC

| ELEV. DEPTH | SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------|------------------------------|------------|---------|------|------------|----------------------------|---|---|-------------------------------------|---|---------------------------------------|----------------------|--|
| | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | |  | | | | | |
| | | | | | | | | SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | |
| | Continued From Previous Page | | | | | | 20 40 60 80 100 20 40 60 80 100 WATER CONTENT (%) 20 40 60 | | | | kN/m ³ | GR SA SI CL | |

[illegible]

ONTMT4S MTO-18934.GPJ 2017TEMPLATE(MTO).GDT 17/8/3

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No DAW-03

1 OF 2

METRIC

GWP# 6055-16-00 LOCATION NW Building Corner, NAD 83-15 N 5 372 435.7 E 351 126.1 ORIGINATED BY SMP
 HWY Mapleward Rd BOREHOLE TYPE Hollow Stem Augers/N Casing with Tricone COMPILED BY AN
 DATUM Geodetic DATE 2017.06.15 - 2017.06.15 CHECKED BY GRL

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | PLASTIC LIMIT w _P NATURAL MOISTURE CONTENT w LIQUID LIMIT w _L WATER CONTENT (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 336.8 | GROUND SURFACE | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

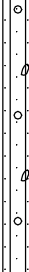
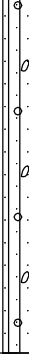
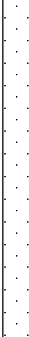
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
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| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | Continued From Previous Page | | 9 | SS | 50/ 0.100 | | | | | | | | | | | | |
| 326.5 10.3 | END OF BOREHOLE AT 10.3m. WATER LEVEL AT 1.0m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE. | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No DAW-04

1 OF 2

METRIC

GWP# 6055-16-00 LOCATION SE Building Corner, NAD 83-15 N 5 372 410.5 E 351 135.5 ORIGINATED BY SMP
 HWY Mapleward Rd BOREHOLE TYPE Hollow Stem Augers/N Casing with Tricone COMPILED BY AN
 DATUM Geodetic DATE 2017.06.15 - 2017.06.16 CHECKED BY GRL

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|--|---|---------|------|---------------|---|-----------------|---|--|----|--|---|---|---------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 337.2 | GROUND SURFACE | | | | | | | <div><div>20406080100</div><div>○ UNCONFINED + FIELD VANE</div><div>● QUICK TRIAXIAL × LAB VANE</div></div> | | | | | | |
| 0.0 | SAND , some gravel, some silt Dense Brown Moist (FILL) |  | 1 | SS | 31 |  | 337 | | | | | | | 15 74 11 (SI+CL) |
| | | | 2 | SS | 33 | | | | | | | | | |
| 335.9 | | | | | | | 336 | | | | | | | |
| 1.3 | Silty CLAY , trace sand and organics Stiff Brown Moist |  | 3 | SS | 13 | | | | | | | | | |
| 335.4 | | | 4 | SS | 50/ 0.100 | | | | | | | | | |
| 1.8 | Silty SAND , trace gravel, containing cobbles or boulders Very Dense Brown Moist (TILL) |  | 5 | SS | 50/ 0.125 | | | | | | | | | |
| | | | 6 | SS | 50/ 0.025 | | | | | | | | | |
| | becoming wet | | 7 | SS | 35/ 0.075 | | | | | | | | | |
| | | | 8 | SS | 50/ 0.075 | | | | | | | | | |
| 332.6 | | | | | | | | | | | | | | |
| 4.6 | SAND and SILT , gravelly to trace gravel, trace clay, containing cobbles or boulders Very Dense Brown Wet (TILL) |  | 9 | SS | 50/ 0.025 | | | | | | | | | |
| | | | 10 | SS | 50/ 0.125 | | | | | | | | | |
| 330.2 | | | 2 | GS | | | | | | | | | | |
| 7.0 | SAND , some silt, trace clay Very Dense Grey Wet |  | 11 | SS | 100/ 0.050 | | | | | | | | | |
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Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
15 10 5 0
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No DAW-04

2 OF 2

METRIC

GWP# 6055-16-00 LOCATION SE Building Corner, NAD 83-15 N 5 372 410.5 E 351 135.5 ORIGINATED BY SMP
 HWY Mapleward Rd BOREHOLE TYPE Hollow Stem Augers/N Casing with Tricone COMPILED BY AN
 DATUM Geodetic DATE 2017.06.15 - 2017.06.16 CHECKED BY GRL

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | | | |
|---------------|--|------------|---------|------|--------------|----------------------------|-----------------|--|----|----|----|---|----|----|---|--|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | WATER CONTENT (%) | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | w _p w w _L | | | | | | | | |
| | Continued From Previous Page | | | | | | | 20 | 40 | 60 | 80 | 100 | 20 | 40 | 60 | | | | | |
| 321.4 | becoming silty at 11.0m | | | | | | 327 | | | | | | | | | | | | | |
| | | | 12 | SS | 50/ 0.150 | | 326 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | GS | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 13 | SS | 25/ 0.025 | | 325 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | GS | | | 324 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 14 | SS | 50/ 0.125 | | 323 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 322 | | | | | | | | | | | | | |
| 15.8 | END OF BOREHOLE AT 15.8m. WATER LEVEL AT 2.0m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE. | | | | | | | | | | | | | | | | | | | |

ONTMT4S MTO-18934.GPJ 2017TEMPLATE(MTO).GDT 17/8/9



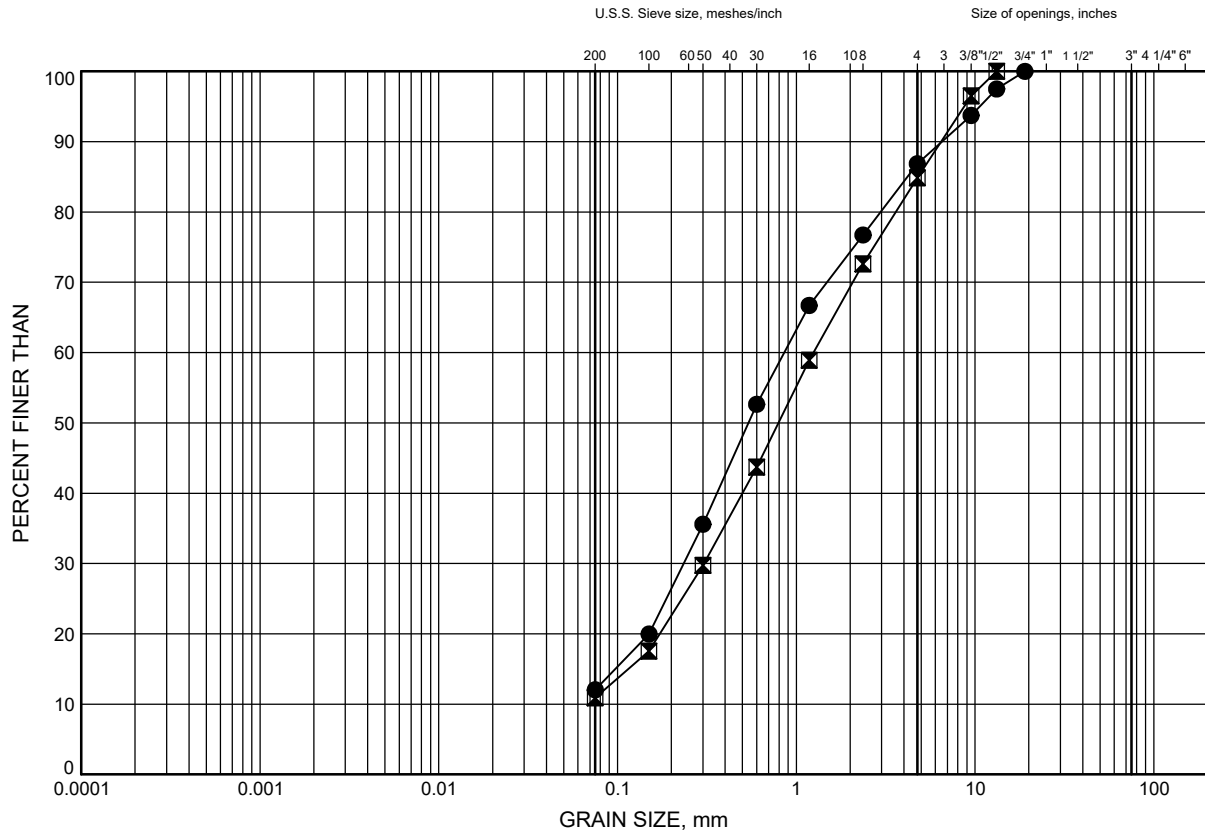
Appendix B

Laboratory Test Results

GRAIN SIZE DISTRIBUTION

FIGURE B1

SAND FILL



| | | | | | | |
|---------------|------|--------|--------|--------|--------|-------------|
| SILT and CLAY | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE SIZE |
| FINE GRAINED | SAND | | | GRAVEL | | |

LEGEND

| SYMBOL | BOREHOLE | DEPTH (m) | ELEV. (m) |
|--------|-----------|-----------|-----------|
| ● | DAW-01A/B | 0.3 | 337.1 |
| ⊠ | DAW-04 | 0.9 | 336.3 |

Date August 2017
GWP# 6055-16-00

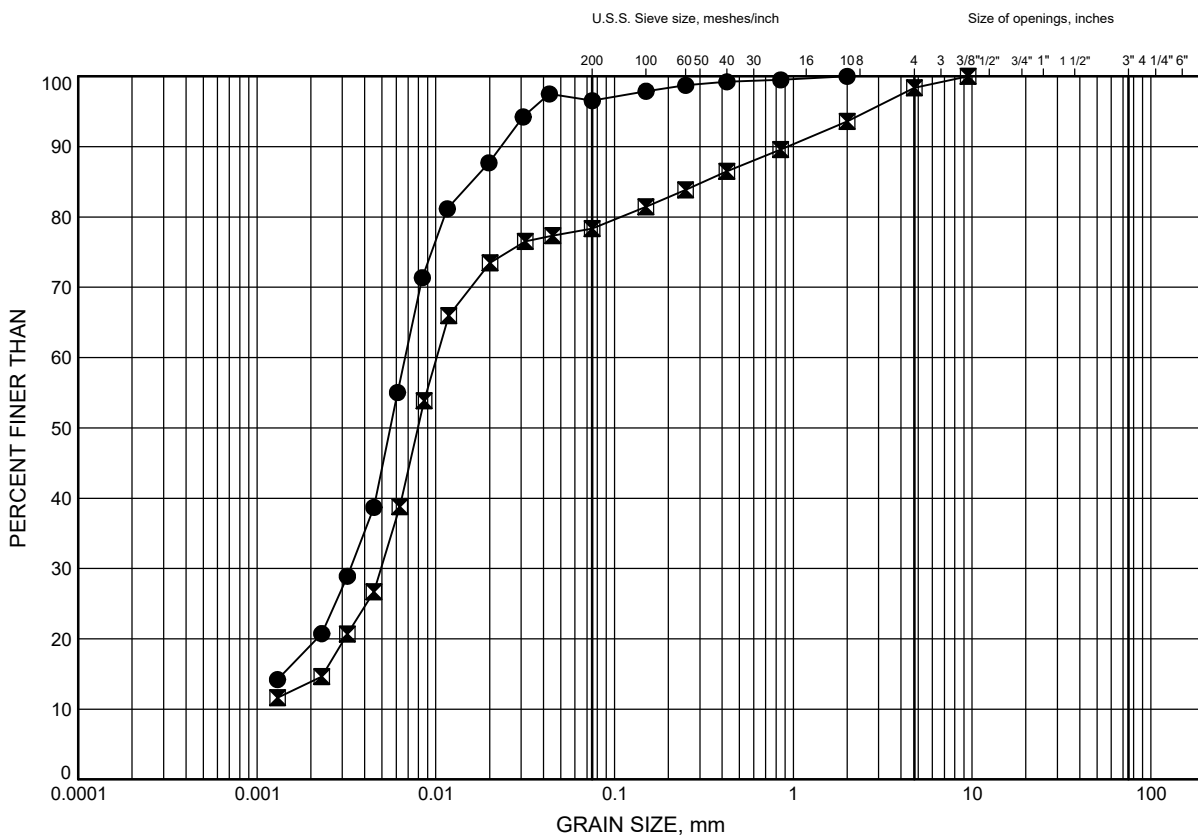


Prep'd AN
Chkd. GRL

GRAIN SIZE DISTRIBUTION

FIGURE B2

Silty CLAY



| | | | | | | |
|---------------|------|--------|--------|--------|--------|-------------|
| SILT and CLAY | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE SIZE |
| FINE GRAINED | SAND | | | GRAVEL | | |

LEGEND

| SYMBOL | BOREHOLE | DEPTH (m) | ELEV. (m) |
|--------|-----------|-----------|-----------|
| ● | DAW-01A/B | 1.5 | 335.9 |
| ⊠ | DAW-02 | 1.0 | 335.7 |

Date August 2017

GWP# 6055-16-00



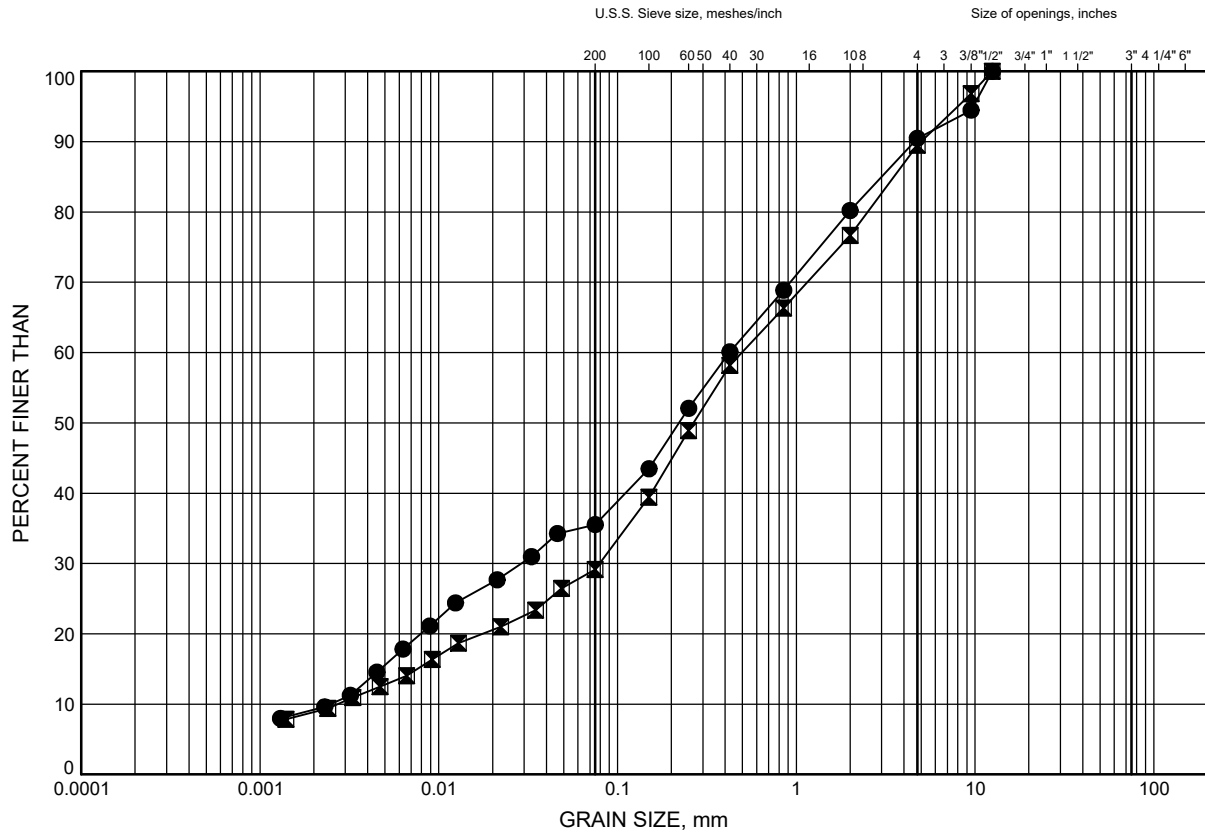
Prep'd AN

Chkd. GRL

GRAIN SIZE DISTRIBUTION

FIGURE B3

Silty SAND TILL



| | | | | | | |
|---------------|------|--------|--------|--------|--------|-------------|
| SILT and CLAY | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE SIZE |
| FINE GRAINED | SAND | | | GRAVEL | | |

LEGEND

| SYMBOL | BOREHOLE | DEPTH (m) | ELEV. (m) |
|--------|----------|-----------|-----------|
| ● | DAW-02 | 2.1 | 334.6 |
| ◻ | DAW-03 | 2.1 | 334.7 |

Date August 2017
GWP# 6055-16-00

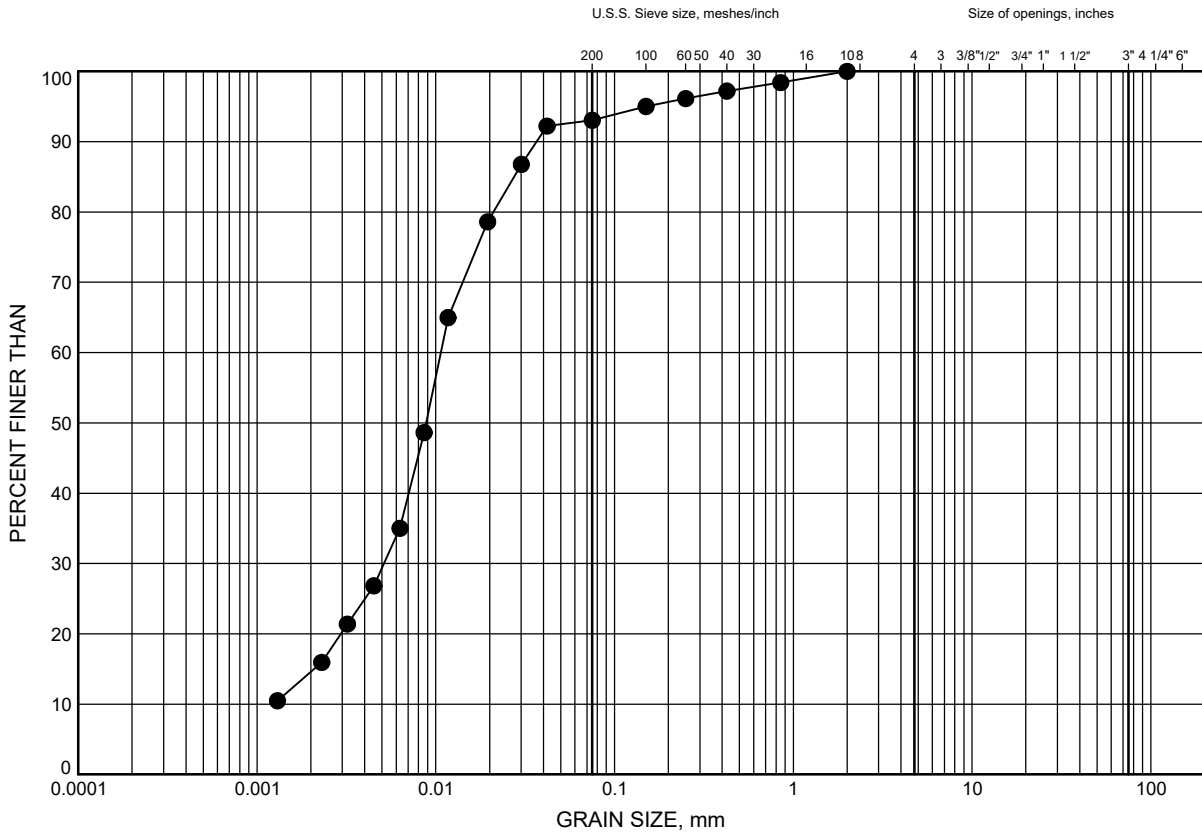


Prep'd AN
Chkd. GRL

GRAIN SIZE DISTRIBUTION

FIGURE B4

SILT TILL



| | | | | | | |
|---------------|------|--------|--------|--------|--------|-------------|
| SILT and CLAY | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE SIZE |
| FINE GRAINED | SAND | | | GRAVEL | | |

LEGEND

| SYMBOL | BOREHOLE | DEPTH (m) | ELEV. (m) |
|--------|----------|-----------|-----------|
| ● | DAW-02 | 3.1 | 333.6 |

Date August 2017
GWP# 6055-16-00

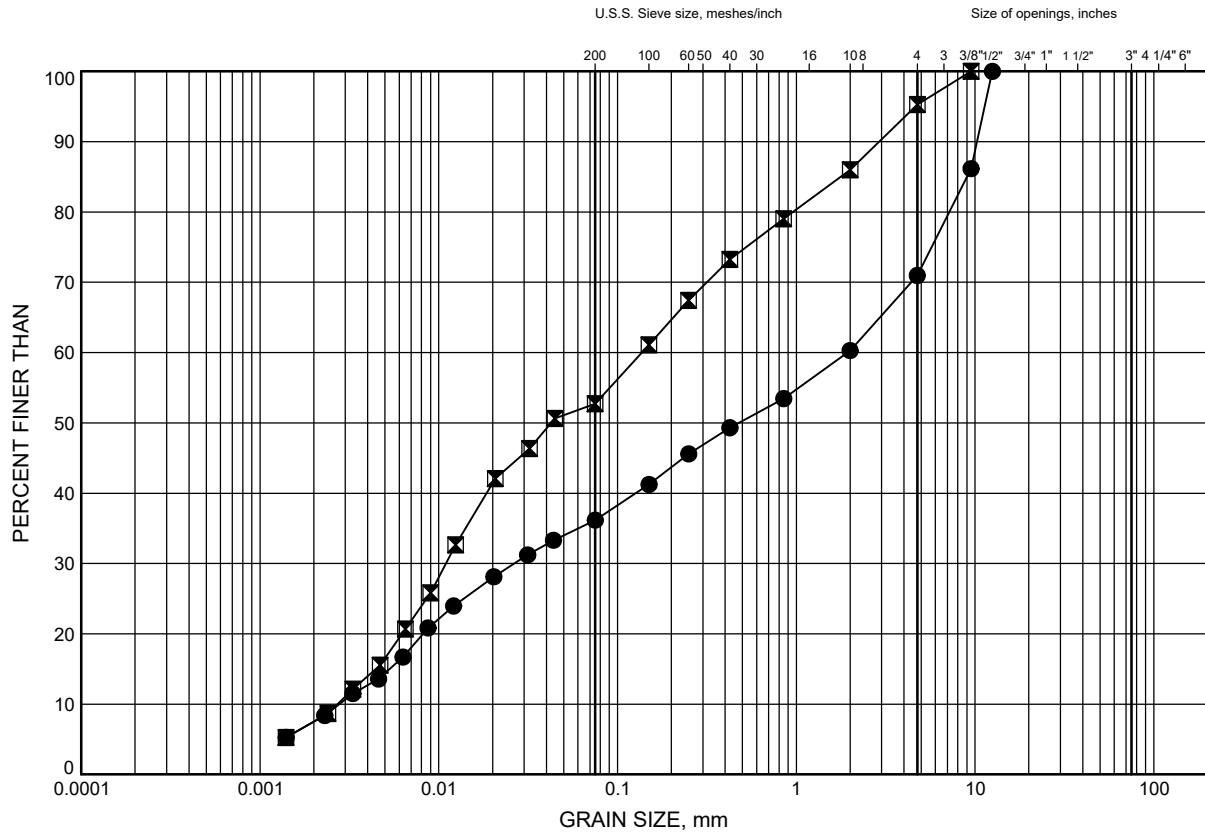


Prep'd AN
Chkd. GRL

GRAIN SIZE DISTRIBUTION

FIGURE B5

SAND & SILT TILL



| | | | | | | |
|---------------|------|--------|--------|--------|--------|-------------|
| SILT and CLAY | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE SIZE |
| FINE GRAINED | SAND | | | GRAVEL | | |

LEGEND

| SYMBOL | BOREHOLE | DEPTH (m) | ELEV. (m) |
|--------|----------|-----------|-----------|
| ● | DAW-03 | 4.9 | 331.9 |
| ◻ | DAW-04 | 6.1 | 331.1 |

Date August 2017
GWP# 6055-16-00

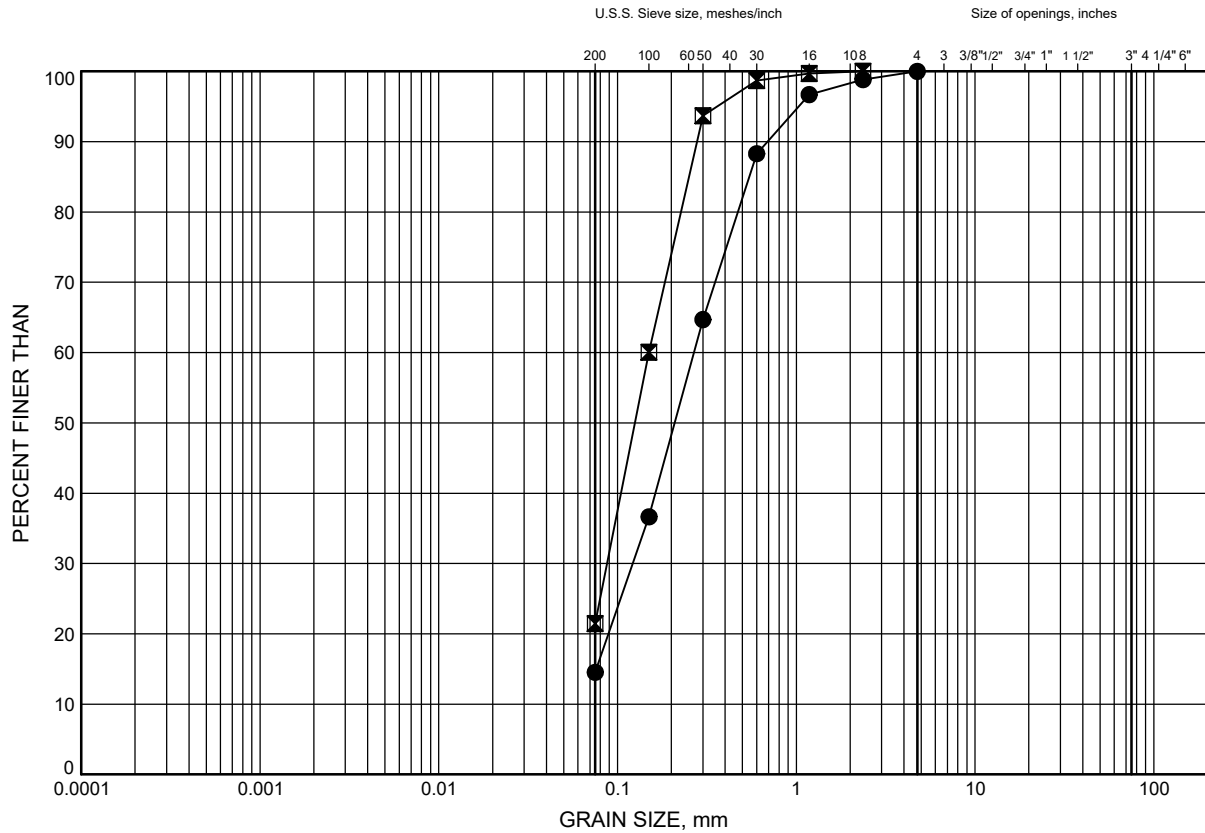


Prep'd AN
Chkd. GRL

GRAIN SIZE DISTRIBUTION

FIGURE B6

SAND



| | | | | | | |
|---------------|------|--------|--------|--------|--------|-------------|
| SILT and CLAY | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE SIZE |
| FINE GRAINED | SAND | | | GRAVEL | | |

LEGEND

| SYMBOL | BOREHOLE | DEPTH (m) | ELEV. (m) |
|--------|----------|-----------|-----------|
| ● | DAW-03 | 6.1 | 330.7 |
| ⊠ | DAW-04 | 8.2 | 329.0 |

Date August 2017
GWP# 6055-16-00

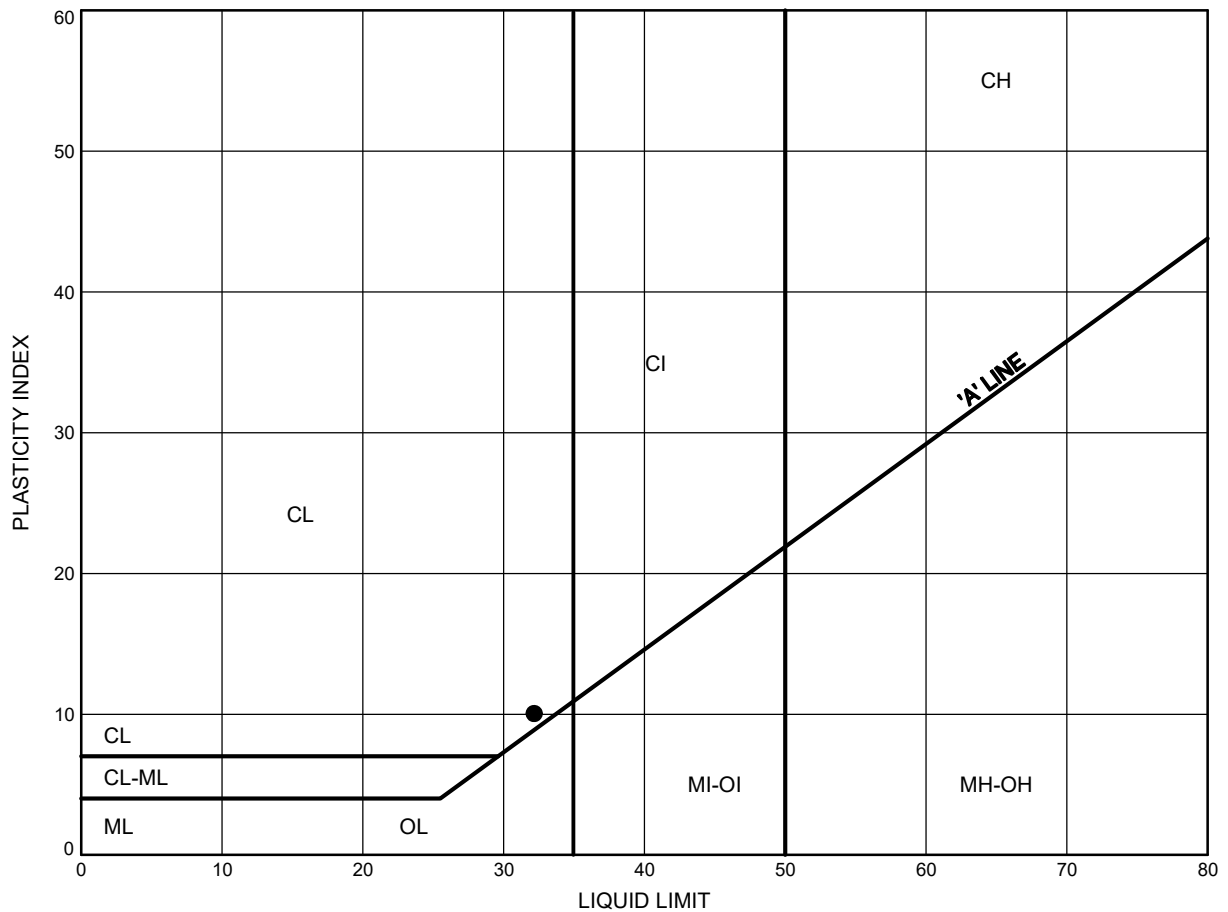


Prep'd AN
Chkd. GRL

ATTERBERG LIMITS TEST RESULTS

FIGURE B7

Silty CLAY



LEGEND

| SYMBOL | BOREHOLE | DEPTH (m) | ELEV. (m) |
|--------|-----------|-----------|-----------|
| ● | DAW-01A/B | 1.5 | 335.9 |

Date August 2017
GWP# 6055-16-00



Prep'd AN
Chkd. GRL



Appendix C

Site Photographs



Photograph 1 – Existing salt shed, sand dome, garage and office, looking west from site entrance

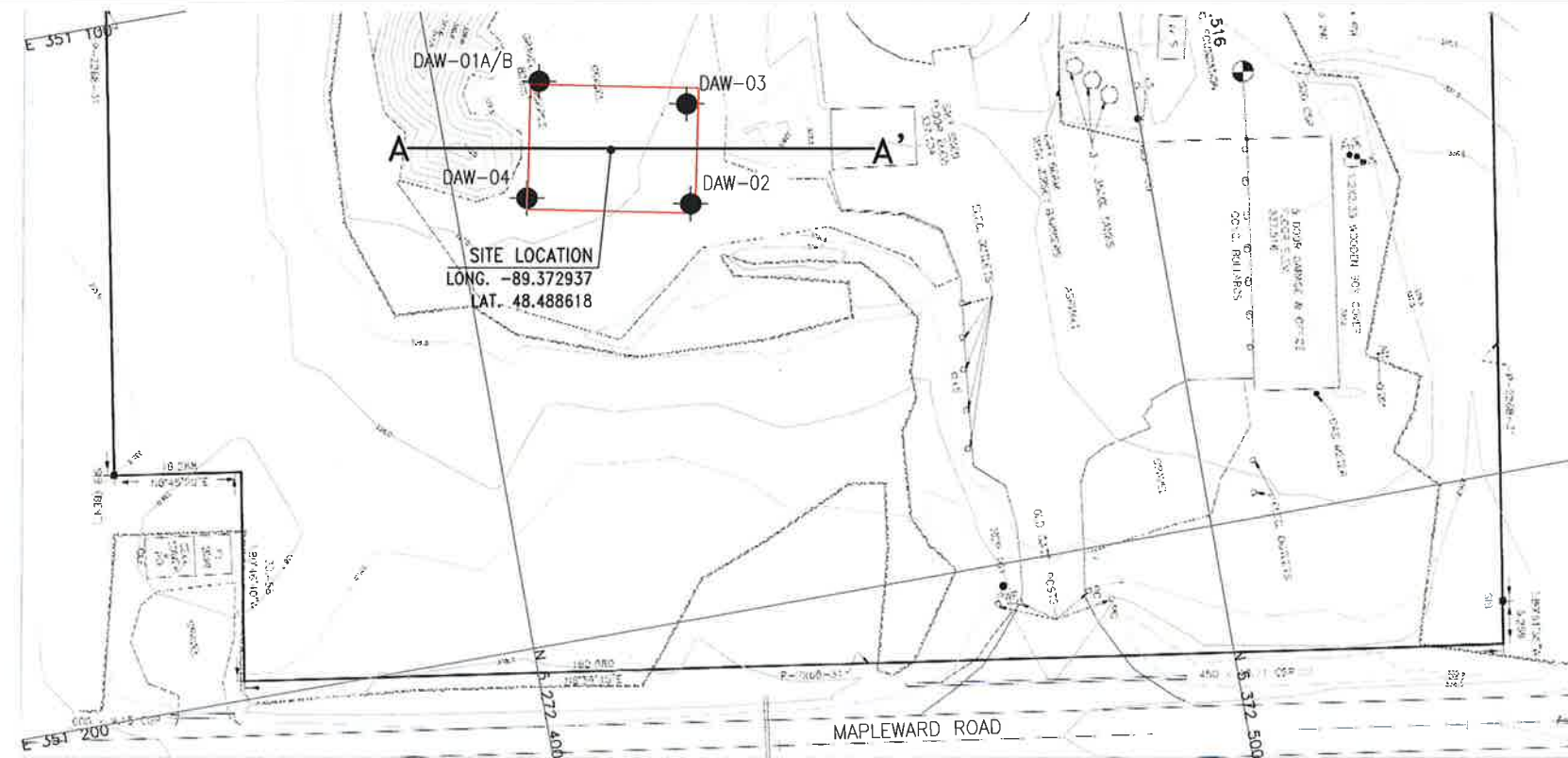


Photograph 2 – Proposed building area showing borehole locations, looking northeast

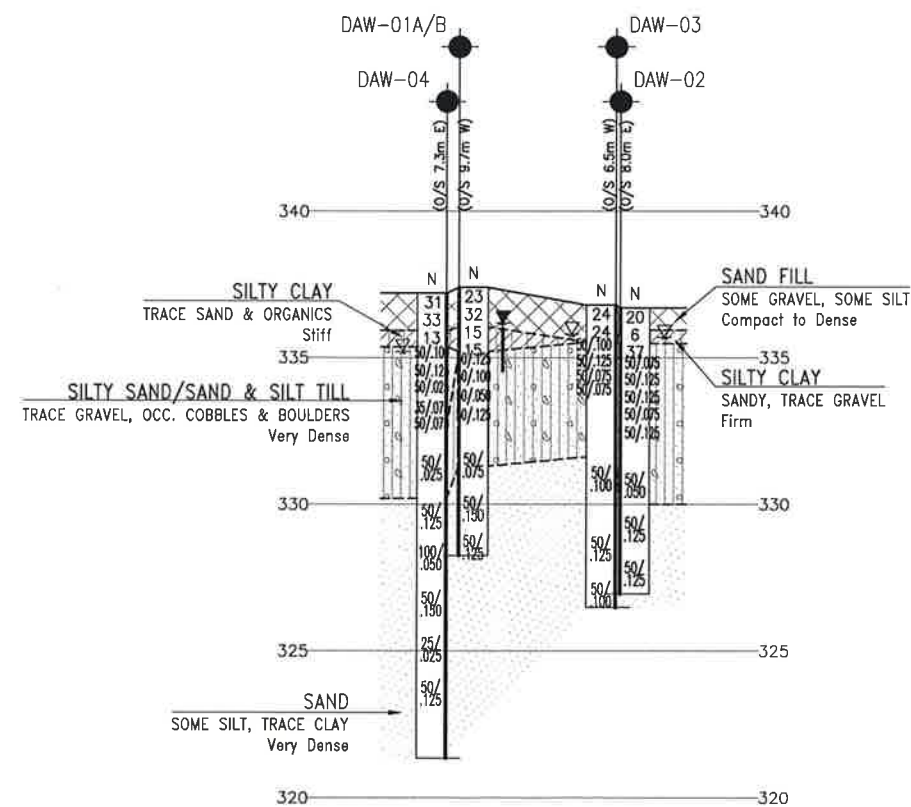


Appendix D

Borehole Locations and Soil Strata Drawing



PLAN



SECTION A-A'

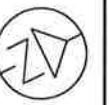


H 1:1000

V 1:250

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

| | |
|------------------------------------|------------|
| CONT No | |
| GWP No | 6055-16-00 |
| NEW SALT/SAND STORAGE BUILDING | |
| MTO PATROL YARD-DAWSON | |
| HIGHWAY 102 | |
| BOREHOLE LOCATIONS AND SOIL STRATA | |



SHEET








THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

| | |
|---|---------------------------------------|
|  | Borehole |
|  | Borehole and Cone |
| N | Blows /0.3m (Std Pen Test, 475J/blow) |
| CONE | Blows /0.3m (60° Cone, 475J/blow) |
| PH | Pressure, Hydraulic |
|  | Water Level |
|  | Head Artesian Water |
|  | Piezometer |
| 90% | Rock Quality Designation (RQD) |
| A/R | Auger Refusal |

| NO | ELEVATION | NORTHING | EASTING |
|-----------|-----------|-------------|-----------|
| DAW-01A/B | 337.4 | 5 372 415.2 | 351 119.1 |
| DAW-02 | 336.7 | 5 372 433.7 | 351 140.5 |
| DAW-03 | 336.8 | 5 372 435.7 | 351 126.1 |
| DAW-04 | 337.2 | 5 372 410.5 | 351 135.5 |

-NOTES-

- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.
- 3) Borehole locations are shown in MTM NAD-83 Zone 15 coordinates.

GEOCRES No. 52A-232

[illegible]