

**FOUNDATION INVESTIGATION REPORT  
NOISE BARRIER WALLS  
HIGHWAY 401 WESTBOUND COLLECTOR  
REHABILITATION  
FROM BAYVIEW AVENUE TO JANE STREET  
TORONTO, ONTARIO  
MTO GWP 2074-13-00**

**GEOCRES No. 30M11-259**

**Report to**

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Each of Appendices A to F includes:

- Record of Borehole Sheets
- Laboratory Test Results
- Drawings titled “Borehole Locations”



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**PART 1: FACTUAL INFORMATION**

**1 INTRODUCTION**

This report presents the factual findings obtained from a foundation investigation conducted for the detailed design of noise barrier walls adjacent to the Highway 401 Westbound Collector Lane, from Bayview Avenue to Jane Street in Toronto, Ontario. Seven noise barrier wall segments are proposed along the indicated section of the Highway 401. A substantial length of these proposed walls is to replace existing noise barrier walls as part of the rehabilitation project of Highway 401 Westbound Collector Lanes which involves rehabilitation of westbound collector pavement, structural rehabilitation of bridges and associated retaining walls.

The purpose of this investigation was to explore the subsurface conditions near the alignment of each noise barrier wall and, based on the data obtained, to provide borehole location plans, records of boreholes, laboratory test results and written descriptions of the subsurface conditions.

Thurber was retained by MMM Group Limited (MMM) to carry out the foundation investigation at this site on behalf of the Ministry of Transportation Ontario (MTO) under Purchase Order No. 2013-E-0045.

During the preparation of this report and in addition to the boreholes drilled, reference has been made to information on subsurface conditions contained in previous foundation reports for these sites. The titles of these reports are listed as follows:

- Foundation Investigation for Proposed Extension of Bridge at Black Creek and Highway 401, North York, County of York, District # 6, W.J. 61-F-113, W.P. 85-59-3, GEOCRES No. 30M11-134, dated January 19, 1962. (Reference 1). *Noise barrier wall, Segment 1*
- Foundation Investigation for Proposed Basket Weave Structure at Privet Road and Highway 401, Toronto, District # 6, W.J. 62-F-85, W.P. 105-62, GEOCRES No. 30M11-086, dated August 10, 1962. (Reference 2). *Noise barrier wall, Segment 1*

- D.H.O. Foundation Investigation Spadina Bridge #1, Proposed Retaining Wall, Adjacent to Ramp from Highway 401 to Dufferin Street, South, Highway 401, Toronto By-Pass, District # 6, W.P. 233-62-2-1, W.J. 63-F-24, GEOCREs No. 30M11-081, dated July 9, 1963. (Reference 3). *Noise barrier wall, Segment 2*
- Report to Department of Highways, Ontario on Soil Conditions and Foundations, Proposed Widening Highway 401, Bathurst Street and Avenue Road, W.P. 146-58, District # 6, Downsview, Ontario, GEOCREs No. 30M11-080, dated May 24, 1962. (Reference 4). *Noise barrier wall, Segments 3 and 4*
- Foundation Investigation Report for Proposed Retaining Walls on the North and South Sides of Highway 401 between Yonge Street and Bayview Avenue, Toronto, W.J. 64-F-0, W.P. 252-61-2, District No. 6, GEOCREs 30M14-126, dated July 22, 1964. (Reference 5). *Noise barrier wall, Segments 5 and 6*
- Foundation Investigation Report for Retaining Walls on Highway 401 near Leslie Street, Lots 14 and 15, Cons. II E.Y.S., County of York, Twp. of North York, District No. 6, W.J. 64-F-8, W.P. 252-61-3, GEOCREs 30M14-095, dated March 6, 1964. (Reference 6). *Noise barrier wall, Segment 7*

## 2 PROJECT AND SITE DESCRIPTION

The proposed noise barrier walls are located along the Highway 401 Westbound collector lane, from Bayview Avenue to Jane Street. Seven segments of the noise barrier walls are planned as described below:

Noise Barrier Wall Segment	Location	Approximate Length (m)
1	East of Jane Street	1400
2	West of Dufferin Street	900
3	East of Bathurst Street Off Ramp West of Bathurst Street Off Ramp	300 800
4	West of Avenue Road	350
5 & 6	West of Bayview	1,250
7	East of Bayview	85

The sites are located along the north side of the Highway 401 corridor within areas of residential and commercial developments. The terrain along the wall alignments involves minor undulations.

According to the Physiography of Southern Ontario by L.J. Chapman and D.F. Putnam, 1984, the project sites are located within the physiographic region known as the South Slope. The South

Slope is a smooth and drumlinized till plain that has formed as a result of glacial action and deposition of till materials just south of the Oak Ridges Moraine. The South Slope contains a variety of soils that have been deposited over till. The depth of overburden is generally more than 50 m.

### 3 SITE INVESTIGATION AND FIELD TESTING

Details of the site investigation and field testing for each project component are presented in Table 3.1.

**Table 3.1 – Borehole Designations and Details**

Noise Barrier Segment	Date	Borehole	Sampled borehole termination depth* (m)	Sampled borehole termination elevation* (m)	Appendix
1	September 14, 21 to 23, 2015	15-01 to 15-08	9.8	123.1 to 145.5	A
2	September 24, 29, 30 and October 1, 2015	15-09 to 15-14	9.8	176.0 to 182.9	B
3	September 15 to 17, 2015	15-15 to 15-19	9.8	174.4 to 180.8	C
4	August 25, 2015	15-20	9.8	170.4	D
5 & 6	August 23 and 24, 2015	15-21 to 15-24	9.8	157.5 to 161.7	E
7	August 25, 2015	15-25	9.8	161.0	F

The approximate locations of the boreholes drilled during the investigation are shown on the attached Borehole Locations Drawings in Appendices A to F. The coordinates and elevations of the boreholes are given on the drawings and on the individual Record of Borehole Sheets in Appendices A to F. Most of the new boreholes were drilled from the shoulder grade of the Highway 401 Westbound Collector. Boreholes drilled during the previous investigations (References 1 to 6) are also shown on the drawings. It is important to note, however, that many of those previous boreholes had been drilled several decades ago, and that substantial changes to the subsurface conditions due to subsequent construction activities could have occurred.

The borehole locations were marked in the field and utility clearances were obtained prior to drilling.

During this investigation, truck mounted D90, CME55 and CME75 drill rigs were used at this site. Solid stem augers were used to advance the boreholes. Soil samples were obtained at selected depth intervals using a split spoon sampler in conjunction with the Standard Penetration Testing (SPT).

The drilling and sampling operations were supervised on a full time basis by a member of Thurber's technical staff. The supervisor logged the boreholes and processed the recovered soil samples for transport to Thurber's laboratory for further examination and testing.

Groundwater conditions were observed in the open boreholes during and upon completion of the drilling operations. Standpipe piezometers consisting of a 19 mm diameter Schedule 40 PVC pipe with a 3.0 m long slotted screen, were installed and embedded in filter sand in selected boreholes to permit longer term groundwater level monitoring. The completion details of the piezometers and boreholes are summarized in Table 3.2.

**Table 3.2 – Piezometer and Borehole Completion Details**

Noise Barrier Wall Segment	Borehole Number	Piezometer Tip Depth / Elevation (m)	Completion Details
1	1	9.1/123.8	Backfilled with filter sand from 9.8 to 4.9 m, bentonite holeplug from 4.9 m to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
	2	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface.
	3	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface.
	4	9.1/131.5	Backfilled with filter sand from 9.8 to 4.9 m, bentonite holeplug from 4.9 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
	5	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface.
	6	9.1/140.6	Backfilled with filter sand from 9.8 m to 4.9 m, bentonite holeplug from 4.9 m to 0.6 m, sand from 0.6 m to 0.3 m, then grout to ground surface.
	7	None installed	Backfilled with holeplug and auger cuttings to 0.3 m, sand from 0.3 m to 0.2 m, then asphalt coldpatch to surface.
	8	9.1/146.2	Backfilled with filter sand from 9.8 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
2	9	9.1/176.7	Backfilled with filter sand from 9.8 to 4.9 m, bentonite holeplug from 4.9 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
	10	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface.
	11	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface

Noise Barrier Wall Segment	Borehole Number	Piezometer Tip Depth / Elevation (m)	Completion Details
2	12	9.1/179.9	Backfilled with filter sand from 9.8 to 4.9 m, bentonite holeplug from 4.9 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
	13	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface.
	14	9.1/183.6	Backfilled with filter sand from 9.8 m to 4.9 m, bentonite holeplug from 4.9 m to 0.6 m, sand from 0.6 m to 0.3 m, then grout to ground surface.
3	15	9.1/181.5	Backfilled with filter sand from 9.8 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
	16	None installed	Backfilled with holeplug and auger cuttings to 0.6 m, sand from 0.6 to 0.3 m, then asphalt coldpatch to surface.
	17	9.1/175.3	Backfilled with filter sand from 9.8 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
	18	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface
	19	9.1/175.2	Backfilled with filter sand from 9.7 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
4	20	9.1/171.1	Backfilled with filter sand from 9.8 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
5 and 6	21	9.1/158.1	Backfilled with filter sand from 9.8 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.
	22	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface
	23	None installed	Backfilled with bentonite holeplug and auger cuttings to ground surface
	24	9.1/160.8	Backfilled with filter sand from 9.8 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.

Noise Barrier Wall Segment	Borehole Number	Piezometer Tip Depth / Elevation (m)	Completion Details
7	25	9.1/161.7	Backfilled with filter sand from 9.8 to 5.5 m, bentonite holeplug from 5.5 to 0.6 m, sand from 0.6 to 0.3 m, then grout to ground surface.

Once groundwater monitoring is completed, all piezometer installations will be decommissioned in general accordance with Ministry of the Environment Regulation 903 and its Amendments (the water well regulation under the OWRA).

#### 4 LABORATORY TESTING

All recovered soil samples were subjected to visual identification and to natural moisture content determination. At least 25% of the recovered soil samples were subjected to grain size distribution analysis. Atterberg Limits tests were carried out on selected samples of native cohesive soils to determine the plasticity characteristics. The results of the laboratory testing are summarized on the Record of Borehole sheets and are also presented on the figures included in Appendices A to F.

#### 5 DESCRIPTION OF SUBSURFACE CONDITIONS

Reference is made to the Record of Borehole sheets included in Appendices A to F. Details of the encountered soil stratigraphy are presented in these appendices. Approximate borehole locations are shown on "Borehole Locations" plans included in Appendices A to F. An overall description of the stratigraphy for each noise barrier wall segment is given in the following paragraphs. However, the factual data presented in the Record of Borehole Sheets governs any interpretation of the site conditions.

In general, the subsurface stratigraphy at the boreholes consists of pavement structure (asphalt, concrete and granular road base) overlying firm to hard silty clay fill. Native stiff to hard silty clay till were encountered below the pavement fill and silty clay fill. A deposit of firm to stiff silty clay or layers of compact to very dense sands and silts underlie the cohesive till at some locations. The groundwater levels are noted on the records of boreholes.

##### 5.1 Noise Barrier Wall, Segment 1, East of Jane Boreholes 15-01 to 15-08 (Current investigation) Boreholes 2, 5, 7 (Previous investigation)

A total of eight boreholes, numbered 15-01 to 15-08, were drilled along the alignment of Segment 1 of the proposed noise barrier wall. Reference had also been made to Boreholes 2, 5 and 17, drilled during the previous investigation (References 1 and 2). Records of

boreholes sheets, laboratory testing results and a borehole location drawing are included in Appendix A.

#### 5.1.1 Pavement Structure

Boreholes 15-01 to 15-08, were drilled through the paved surface of Highway 401 Westbound Lane (WBL) Collector. The pavement structure revealed in the boreholes consisted of 100 to 275 mm of asphalt over a layer of granular road base, which consisted of sand, gravelly sand, and sand and gravel with some silt and clay. The thickness of the granular road base ranged from 500 to 900 mm. Moisture contents measured in samples of the granular road base ranged from 2% to 7%.

A sample of the sand and gravel fill was subjected to gradation analysis. Grain size distribution results are presented on the Record of Borehole sheets and on Figure A1 of Appendix A. These results are summarized as follows:

Soil Particles	Percentage (%)
Gravel	42
Sand	39
Silt and Clay	19

#### 5.1.2 Silty Clay Fill

Fill was contacted below the pavement structure in all the boreholes. The fill consisted of brown silty clay with sand to trace sand, and trace gravel. Occasional roots and rootlets were encountered within the silty clay fill. The thickness of the silty clay fill ranged from 2.1 to 3.3 m in Boreholes 15-02 to 15-08, and 4.8 m in Borehole 15-01. The depth to the base of the silty clay fill ranged from 2.9 to 4.1 m (Elevations 131.3 to 151.5 m) in Boreholes 15-02 to 15-08 and was at 5.6 m (Elevation 127.3 m) in Borehole 15-01.

SPT 'N' values measured in the silty clay fill typically ranged from 9 to 25 blows per 0.3 m of penetration, indicating a stiff to very stiff consistency. An SPT 'N' value of 52 blows per 0.3 m of penetration, indicating a hard consistency, was measured at shallow depth in Borehole 15-02. Measured moisture contents ranged from 6% to 26%.

Samples of silty clay fill were subjected to gradation analysis. Grain size distribution curves for samples of the silty clay fill are presented on the Record of Borehole sheets and on Figure A2 in Appendix A. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0 to 3
Sand	14 to 33
Silt	44 to 46

Clay	18 to 42
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### 5.1.3 Silty Clay Till

Brown to grey silty clay till with sand to some sand, and trace gravel was contacted below the fill at depths ranging from 2.9 to 4.1 m in Boreholes 15-02 to 15-08 and at 5.6 m (Elevation 127.3 m) in Borehole 15-01. The thickness of the silty clay till ranged from 1.8 to 5.8 m. The depth to the base of the silty clay till varied from 4.8 to 8.8 m (Elevations 124.3 to 146.5 m).

SPT 'N' values measured in the silty clay till ranged from 6 to 44 blows per 0.3 m of penetration, indicating a firm to hard consistency. Measured moisture contents of samples of the silty clay till ranged from 10% to 38%.

Samples of silty clay till were subjected to gradation analysis and Atterberg Limits testing. Grain size distribution curves for samples of silty clay till are presented on the Record of Borehole sheets and on Figures A3 and A4 in Appendix A. Atterberg Limit test results are presented on Figure A7 of Appendix A. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0 to 2
Sand	12 to 36
Silt	34 to 51
Clay	21 to 54

Soil Particles	Percentage (%)
Liquid Limit	23 to 33
Plasticity Index	9 to 15

The results indicate that the silty clay till typically has low plasticity (CL).

Glacial tills inherently contain cobbles and boulders.

### 5.1.4 Silty clay

Brown to grey silty clay was contacted below the silty clay till in Boreholes 15-01 to 15-07 at depths ranging from 4.8 to 8.7 m. Boreholes 15-01 to 15-07 were terminated within the silty clay at 9.8 m depth (Elevations 123.1 to 141.9 m).

SPT 'N' values in the silty clay varied between 5 and 14 blows per 0.3 m of penetration, indicating a firm to stiff consistency. SPT 'N' values of 24 and 43 blows per 0.3 m of



penetration were measured in Borehole 15-06 indicating very stiff to hard consistency. Moisture contents measured in the silty clay ranged from 21% to 39%.

Samples of silty clay were subjected to gradation analysis and Atterberg Limits testing. Grain size distribution curves for samples of silty clay are presented on the Record of Borehole sheets and on Figure A5 in Appendix A. Atterberg Limit test results are presented on Figure A8 of Appendix A. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0
Sand	0
Silt	45 to 59
Clay	41 to 55

Soil Particles	Percentage (%)
Liquid Limit	33 to 37
Plasticity Index	14 to 17

The results indicate that one sample of the silty clay has low (CL) to medium (CI) plasticity.

#### 5.1.5 Sand and Silt Till

Grey sand and silt till containing some clay and trace gravel was encountered at 8.8 m depth in Borehole 15-08, which was terminated within the sand and silt till at 9.8 m depth (Elevation 145.5 m).

An SPT 'N' value measured in the sand and silt till was 65 blows per 0.3 m of penetration, indicating a very dense condition. The moisture content in the sand and silt till was 12%.

A sample of the sand and silt till was subjected to gradation analysis. The grain size distribution curve for this sample is presented on the Record of Borehole sheets and on Figure A6 in Appendix A. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	5
Sand	44
Silt	36
Clay	15

### 5.1.6 Groundwater Levels

Free standing water was observed in some open boreholes upon completion of drilling operations. Standpipe piezometers were installed in four boreholes (Boreholes 15-01, 15-04, 15-06 and 15-08) to monitor water levels after completion of drilling. The water levels measured in the open boreholes upon completion of drilling and water levels reported in Boreholes 5 and 7 (previous investigation) are included in Table 5.1. The piezometric levels in Boreholes 15-01, 15-04, 15-06 and 15-08 will be measured in the next round of monitoring and provided in the final report.

**Table 5.1 – Water Level Measurements**

Borehole Number	Date	Water Levels		Comment
		Depth (m)	Elevation (m)	
15-01	September 23, 2015 October 26, 2015	Dry 5.7	- 127.2	Piezometer
15-04	September 22, 2015 October 26, 2015	Dry 6.0	- 134.6	Piezometer
15-06	September 21, 2015 October 26, 2015	Dry 6.5	- 143.2	Piezometer
15-08	September 14, 2015 October 26, 2015	5.1 4.7	150.2 150.6	Piezometer
15-02	September 23, 2015	5.5	128.7	Open borehole
5*	March 13, 1963	3.1	121.2	Open borehole
7*	October 4, 1962	4.9	139.1	Open borehole

\* Previous investigation

All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

## 5.2 Noise Barrier Wall, Segment 2, West of Dufferin Street Boreholes 15-09 to 15-14 (Current investigation) Boreholes 1C, 2A (Previous investigation)

A total of six boreholes, numbered 15-09 to 15-14, were drilled along the alignment of Segment 2 of the proposed noise barrier wall. Reference has also been made to Boreholes 1C and 2A drilled during the previous investigation (Reference 3). Record of boreholes sheets, laboratory testing results and a borehole location drawing are included in Appendix B.

### 5.2.1 Topsoil

Topsoil of 180 mm in thickness was encountered at ground surface in Borehole 2A drilled during the previous investigation (Reference 3).

### 5.2.2 Pavement Structure

Boreholes 15-09 to 15-14 were drilled through the paved surface of the Highway 401 WBL Collector. The pavement structure revealed in the boreholes consisted of 175 to 200 mm of asphalt over a layer of granular road base. Asphalt was not encountered in Borehole 15-14.

The granular road base encountered below the asphalt consisted of sand containing some silt and trace gravel. The thickness of the granular road base ranged from 0.6 to 1.2 m. Moisture contents measured on samples of the granular road base (sand fill) ranged from 3% to 11%.

### 5.2.3 Silty Clay Fill

Fill was contacted below the pavement structure in Boreholes 15-12 to 15-14. The fill consisted of brown silty clay with sand to trace sand, and trace gravel. Occasional cobbles were encountered within the silty clay fill in Borehole 15-14. The thickness of the silty clay fill ranged from 0.7 to 3.3 m. The depth to the base of the silty clay fill ranged from 1.5 to 4.1 m (Elevations 187.5 to 188.7 m).

A 1.4-m thick layer of fill and topsoil was contacted surficially in Borehole 1C, drilled during the previous investigation. The fill was described as brown and black and having a very stiff to hard consistency. The depth to the base of the fill was 1.4 m (Elevation 188.5m).

SPT 'N' values measured in the silty clay fill typically ranged from 20 to 34 blows per 0.3 m of penetration, indicating a very stiff to hard consistency. An SPT 'N' value of 9 blows per 0.3 m of penetration, indicating stiff consistency, was measured at approximate Elevation 189.5 m in Borehole 15-14. The moisture content ranged from 7% to 16%.

A sample of silty clay fill was subjected to gradation analysis. The grain size distribution curve for this sample is presented on the Record of Borehole sheets and on Figure B1 in Appendix B. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	3
Sand	34
Silt	43
Clay	20

### 5.2.4 Silty Clay Till

Brown to grey silty clay till with sand, and trace gravel was contacted below the sand fill and silty clay fill at depths ranging from 0.8 to 4.1 m (Elevations 184.4 to 188.7 m) in

Boreholes 15-09 to 15-14, which were terminated within the silty clay till at 9.8 m depth (Elevations 176.0 to 182.9 m).

In Boreholes 1C and 2A, silty clay / clayey silt till, trace to some sand and gravel was contacted below the topsoil and fill. Boreholes 1C and 2A were terminated within these tills at 6.5 and 9.6 m depth (Elevations 183.3 and 180.6 m), respectively.

SPT 'N' values measured in the silty clay till ranged from 15 to 86 blows per 0.3 m of penetration indicating a very stiff to hard consistency. The measured moisture contents of samples of the silty clay till ranged from 9% to 17%.

Samples of silty clay till were subjected to gradation analysis and Atterberg Limits testing. Grain size distribution curves for these tests are presented on the Record of Borehole sheets and on Figures B2 and B3 in Appendix B. Atterberg Limit test results are presented on Figure B4 of Appendix B. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0 to 4
Sand	25 to 37
Silt	40 to 47
Clay	20 to 30

Soil Particles	Percentage (%)
Liquid Limit	20 to 27
Plasticity Index	8 to 13

The results indicate that the silty clay till typically has low plasticity (CL).

Glacial tills inherently contain cobbles and boulders.

### 5.2.5 Groundwater Levels

Free standing water was observed in some open boreholes upon completion of drilling operations. Standpipe piezometers were installed in three boreholes (Boreholes 15-09, 15-12 and 15-14) to monitor water levels after completion of drilling. The water levels measured in the open boreholes upon completion of drilling and water levels reported in Boreholes 1C and 2A (previous investigation) are included in Table 5.2. The piezometric levels in Boreholes 15-09, 15-12 and 15-14 will be measured in the next round of monitoring and provided in the final report.

**Table 5.2 – Water Level Measurements**

Borehole Number	Date	Water Levels		Comment
		Depth (m)	Elevation (m)	

15-09	October 1, 2015 October 26, 2015	Dry 7.5	- 178.3	Piezometer
15-12	September 29, 2015 October 26, 2015	Dry 7.0	- 182.0	Piezometer
15-14	September 24, 2015 October 26, 2015	8.6 4.5	184.1 188.2	Piezometer
15-13	September 29, 2015	4.3	186.7	Open borehole
1C*	March 25, 1963	5.5	184.4	Open borehole
2A*	March 14, 1963	2.7	187.5	Open borehole

\* Previous investigation

All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

### 5.3 Noise Barrier Wall, Segment 3, East of Bathurst Street off Ramp and West of Bathurst Street off Ramp Boreholes 15-15 to 15-19 (Current investigation) Boreholes 16, 17, 18 (Previous investigation)

A total of five boreholes, numbered 15-15 to 15-19, were drilled along the alignment of Segment 3 of the proposed noise barrier wall. Boreholes 16 to 17, drilled during the previous investigation (Reference 4) have also been included. Records of borehole sheets, laboratory testing results and a borehole location drawing are included in Appendix C.

#### 5.3.1 Topsoil

Topsoil was encountered at ground surface in Boreholes 17 and 18, drilled during the previous investigation (Reference 4). The topsoil thickness was 300 and 400 mm.

#### 5.3.2 Pavement Structure

Boreholes 15-15 to 15-19, were drilled through the paved surface of the Highway 401 Westbound Lane (WBL) Collector. The pavement structure revealed in the boreholes consisted of 100 to 200 mm of asphalt over a layer of granular road base. A layer of concrete was encountered below the asphalt in Boreholes 15-15, 15-18 and 15-19. The concrete is 200 to 250 mm thick and is typical of a composite pavement.

The granular road base consisted of gravelly sand to sand with some silt and clay. The thickness of the granular road base was 300 to 600 mm. Moisture content measured in the granular road base (gravelly sand and sand) ranged from 3% to 7%.

Samples of granular road base were subjected to gradation analysis. Grain size distribution results are presented on the Record of Borehole sheets and on Figure C1 of Appendix C. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	3 to 22
Sand	57 to 81
Silt and Clay	14 to 21

### 5.3.3 Silty Clay Fill

Fill was contacted below the pavement structure in Boreholes 15-15 to 15-19. The fill consisted of brown silty clay with sand to trace sand, and trace gravel. The thickness of the silty clay fill ranged from 0.6 m to 1.5 m in Boreholes 15-15 to 15-19, respectively, and 5.0 m in Borehole 15-15. The depth to the base of the silty clay fill was 1.4 to 2.3 m (Elevations 182.2 to 183.7 m) in Boreholes 15-15 to 15-19, and 5.8 m (Elevation 184.8 m) in Borehole 15-15.

SPT 'N' values measured in the silty clay fill ranged from 8 to 21 blows per 0.3 m of penetration indicating a stiff to very stiff consistency. The moisture content ranged from 10% to 19%.

In Boreholes 16 to 18 drilled during the previous investigation, a layer of brown silty till fill was contacted below the topsoil. The thickness of this fill ranged from 0.6 to 1.8 m. The silty till fill was described as loose to dense.

Samples of silty clay fill were subjected to gradation analysis and Atterberg Limits testing. Grain size distribution curves for samples of silty clay fill are presented on the Record of Borehole sheets and on Figure C2 in Appendix C. Atterberg Limit test results are presented on Figure C6 of Appendix C. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0
Sand	32 to 36
Silt	42
Clay	22 to 26

Soil Particles	Percentage (%)
Liquid Limit	25
Plasticity Index	11

The results indicate that the silty clay fill typically has low plasticity (CL).

#### 5.3.4 Silty clay

A 1.4-m thick layer of native grey silty clay was contacted below the fill at 5.8 m depth in Borehole 15-15. The depth to the base of the silty clay was at 7.2 m (Elevation 183.4 m).

An SPT 'N' value measured in the silty clay in Borehole 15-15 was 14 blows per 0.3 m of penetration, indicating a stiff consistency. The moisture content measured in the silty clay was 18%.

Borehole 16, drilled during the previous investigation, revealed a layer of grey silty clay at 8.2 m depth (Elevation 174.9 m). The silty clay was described as hard in consistency. Borehole 16 was terminated within the silty clay at 9.1 m depth (Elevation 173.9).

A sample of the silty clay was subjected to gradation analysis. The grain size distribution curve for this test is presented on the Record of Borehole sheets and on Figure C3 in Appendix C. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0
Sand	31
Silt	42
Clay	27

#### 5.3.5 Silty Clay Till

Brown to grey silty clay till with sand and trace gravel was contacted below the fill at depths ranging from 1.4 to 2.3 m in Boreholes 15-16 to 15-19 and below the silty clay at 7.2 m in Borehole 15-15. Occasional boulder fragments were encountered within the silty clay till in Boreholes 15-16 and 15-17. Boreholes 15-15 to 15-19 were terminated within the silty clay till at 9.8 m depth (Elevations 174.4 to 180.8 m).

Where measured, SPT 'N' values generally ranged from 20 to 95 blows per 0.3 m of penetration indicating a very stiff to hard consistency. An SPT 'N' value of 50 blows for less than 0.3 m of penetration was measured in Borehole 15-17 near Elevation 179.8 m due to boulder fragments. 'N' values of greater than 100 blows for less than 0.3 m of penetration were measured in Boreholes 15-18 and 15-19 indicating occasional hard zones. Measured moisture contents of samples of the silty clay till ranged from 6% to 16%.

Samples of silty clay till were subjected to gradation analysis and Atterberg Limits testing. Grain size distribution curves for samples of silty clay till are presented on the Record of Borehole sheets and on Figures C4 and C5 in Appendix C. Atterberg Limit test results are presented on Figure C7 of Appendix C. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0 to 3
Sand	34 to 40
Silt	40 to 44
Clay	17 to 21

Soil Particles	Percentage (%)
Liquid Limit	18 to 23
Plasticity Index	7 to 10

The results indicate that the silty clay till has typically low plasticity (CL).

Glacial tills inherently contain cobbles and boulders.

### 5.3.6 Silty Till

In Boreholes 16 to 18 drilled during a previous investigation, a layer of brown to grey silty till was contacted below the fill at depths ranging from 0.9 to 1.8 m. The thickness of the silty till was 6.4 m in Borehole 16. Boreholes 17 and 18 were terminated within the silty till at 6.2 and 4.7 m depth, (Elevations 177.1 and 178.6 m), respectively. The silty till had a compact to very dense condition.

### 5.3.7 Groundwater Levels

Free standing water was not observed in the open boreholes upon completion of drilling operations. Standpipe piezometers were installed in three boreholes (Boreholes 15-15, 15-17 and 15-19) to monitor water levels after completion of drilling. The water levels measured in the open boreholes upon completion of drilling and water levels reported in Boreholes 16, 17 and 18 (previous investigation) are included in Table 5.3. The piezometric levels in Boreholes 15-15, 15-17 and 15-19 will be measured in the next round of monitoring and provided in the final report.

**Table 5.3 – Water Level Measurements**

Borehole Number	Date	Water Levels		Comment
		Depth (m)	Elevation (m)	
15-15	September 17, 2015 October 26, 2015	Dry 6.9	- 183.7	Piezometer
15-17	September 17, 2015 October 26, 2015	Dry 2.7	- 181.7	Piezometer
15-19	September 15, 2015 October 26, 2015	Dry 6.9	- 177.4	Piezometer
15-16	September 16, 2015	Dry	-	Open borehole
15-18	September 15, 2015	Dry	-	Open borehole



16*	May 5, 1962	7.3	175.8	Open borehole
17*	May 5, 1962	1.3	182.1	Open borehole
18*	May 5, 1962	1.0	182.3	Open borehole

\* Previous investigation

All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

#### **5.4 Noise Barrier Wall, Segment 4, West of Avenue Road**

##### **Borehole 15-20 (Current investigation)**

##### **Boreholes 11 to 14 (Previous investigation)**

Borehole 15-20 was drilled near the alignment of Segment 4 of the noise barrier wall. Boreholes 11 to 14 drilled during the previous investigation (Reference 4) have been included in the report to address the subsurface conditions at this wall segment. Records of boreholes sheets, laboratory testing results and borehole location drawing are included in Appendix D.

##### **5.4.1 Topsoil**

Topsoil of 150 mm in thickness was encountered at ground surface in Boreholes 11 to 13 at the time of the previous investigation (Reference 4).

##### **5.4.2 Pavement Structure**

Borehole 15-20 was drilled through the paved surface of Highway 401 WBL Collector. The pavement structure consisted of 175 mm of asphalt over granular road base.

The granular road base contacted below the asphalt consisted of sand containing trace silt and gravel. The thickness of the granular road base was 500 mm. A moisture content measured in the sand fill was 3%.

##### **5.4.3 Silty Fill**

A layer of brown “silty till” fill was encountered in Boreholes 11 to 14 drilled during the previous investigation. The silty fill thickness ranged from 0.5 to 2.1 m. The depth to the base of the silty fill ranged from 0.6 to 2.1 m (Elevations 179.7 to 180.8 m). The silty fill was in a very loose to loose state.

##### **5.4.4 Silty Clay Till**

In Borehole 15-20, native brown to grey silty clay till with sand and trace gravel was contacted below the fill. Boulder fragments were encountered within the silty clay till near Elevation 174 m. The thickness of the silty clay till was 6.6 m. The depth to the base of the silty clay till was 7.3 m (Elevation 172.9 m).

In Boreholes 11 to 14 drilled during the previous investigation, a layer of brown silty till was contacted below the fill at depths ranging from 0.6 to 2.1 m. The thickness of the silty till ranged from 4.3 to 4.6 m. The depth to the base of the silty till ranged from 5.5 to 6.7m (Elevations 175.3 to 176.3 m) in Boreholes 11, 13 and 14. Borehole 12 was terminated within the silty till at 4.7 m depth (Elevation 176.4 m). This silty till was described as compact to very dense with SPT ‘N’ values varying from 23 to 96 blows per 0.3 m penetration. Based on the stratigraphy depicted in Borehole 15-20 and for consistency in descriptions, this soil is described as a very stiff to hard silty clay till.

In Borehole 15-20, SPT ‘N’ values in the silty clay till generally ranged from 14 to 25 blows per 0.3 m of penetration, indicating a stiff to very stiff consistency. An SPT ‘N’ value of 100 blows for less than 0.3 m of penetration was measured near Elevation 174 m, where boulder fragments were encountered. The moisture content of the silty clay till ranged from 6% to 11%.

Two samples of the silty clay tills were subjected to gradation analysis and Atterberg Limits testing. Grain size distribution curves for samples of silty clay till are presented on the Record of Borehole sheets and on Figure D1 in Appendix D. Atterberg Limit test results are presented on Figure D3 of Appendix D. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	4 to 7
Sand	37 to 42
Silt	34 to 39
Clay	15 to 22

Soil Particles	Percentage (%)
Liquid Limit	21
Plasticity Index	8

The results indicate that the silty clay till has a low plasticity (CL).

Glacial tills inherently contain cobbles and boulders.

#### 5.4.5 Silty clay

In Borehole 15-20, a 1.4-m thick layer of native grey silty clay was contacted below the silty clay till at 7.3 m depth. The depth to the base of the silty clay was at 8.7 m (Elevation 171.5 m).

Grey silty clay was contacted in Boreholes 11 and 13 at 5.5 to 5.8 m depths. Both boreholes were terminated within the silty clay at 7.6 and 6.2 m (Elevations 173.9 and 174.8 m), respectively.

SPT 'N' values measured in the silty clay ranged from 46 to 82 blows per 0.3 m of penetration indicating a hard consistency. A moisture content measured in the silty clay was 19%.

A sample of silty clay was subjected to gradation analysis and Atterberg Limits testing. The grain size distribution curve for this sample is presented on the Record of Borehole sheets and on Figure D2 in Appendix D. Atterberg Limit test results are presented on Figure D4 of Appendix D. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0
Sand	0
Silt	26
Clay	74

Soil Particles	Percentage (%)
Liquid Limit	41
Plasticity Index	21

The results indicate that the silty clay has medium plasticity (CI).

#### 5.4.6 Silty Sand Till

Grey silty sand till containing trace clay and gravel was contacted below the silty clay at 8.7 m depth in Borehole 15-20, which was terminated within this till at 9.8 m depth (Elevation 170.4 m).

An SPT 'N' value measured in the silty sand till was 45 blows per 0.3 m of penetration, indicating a dense state. The moisture content in the silty sand till was 14%.

Glacial tills inherently contain cobbles and boulders.

#### 5.4.7 Sand

A layer of coarse sand was contacted below the silty till at 6.7 m depth in Borehole 14, which was terminated within the sand layer at 7.7 m depth (Elevation 175.3 m).

A SPT 'N' value measured in the sand layer was 88 blows per 0.3 m of penetration, indicating a very dense condition.

#### 5.4.8 Groundwater Levels

Free standing water was not observed in the open boreholes upon completion of drilling operations. A standpipe piezometer was installed in Borehole 15-20 to monitor water levels after completion of drilling. The water level measured in the piezometer upon completion of drilling and water levels reported in Boreholes 11 to 14 (previous investigation) are included in Table 5.4. The piezometric level in Borehole 15-20 will be measured again in the next round of monitoring and provided in the final report.

**Table 5.4 – Water Level Measurements**

Borehole Number	Date	Water Levels		Comment
		Depth (m)	Elevation (m)	
15-20	August 25, 2015	3.1	177.1	Piezometer
	October 26, 2015	2.0	178.2	
11*	May 5, 1962	1.7	179.9	Open borehole
12*	May 5, 1962	2.0	179.0	Open borehole
13*	May 5, 1962	1.2	179.9	Open borehole
14*	May 5, 1962	4.4	178.6	Open borehole

\* Previous investigation

All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

#### 5.5 Noise Barrier Wall, Segments 5 & 6, West of Bayview Boreholes 15-21 to 15-24 (Current investigation) Boreholes 17, 18, 23 to 26 (Previous investigation)

Boreholes 15-21 to 15-24 were drilled near the alignments of Segments 5 and 6 of the noise barrier walls. Boreholes 17, 18 and 23 to 26, drilled during the previous investigation (Reference 5) have been included in this report to address the subsurface conditions along this wall segment. Records of boreholes sheets, laboratory testing results and a borehole location drawing are included in Appendix E.

##### 5.5.1 Topsoil

A 150 mm thick layer of topsoil was contacted superficially in Borehole 17 at the time of the previous investigation.

##### 5.5.2 Pavement Structure

Boreholes 15-21 to 15-24 were drilled through the paved surface of Highway 401 WBL Collector. The pavement structure revealed in the boreholes consisted of 100 to 150 mm of asphalt. A layer of concrete was encountered below the asphalt in Boreholes 15-21, 15-23 and 15-24. The concrete was 150 to 200 mm in thickness.

The granular road base contacted below the asphalt or the concrete consisted of sand containing trace to some silt, clay and gravel. The thickness of the granular road base ranged from 0.4 to 1.1 m.

An SPT 'N' value measured in the sand fill was 18 blows per 0.3 m of penetration, indicating a compact state. Moisture content measured in the sand fill were 7% and 13%.

A sample of the sand fill was subjected to gradation analysis. The grain size distribution results are presented on the Record of Borehole sheets and on Figure E1 of Appendix E. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	10
Sand	67
Silt	17
Clay	6

#### 5.5.3 Silty Clay Fill

A layer of brown to grey silty clay fill, containing trace to some sand, trace gravel and occasional roots and rootlets, was contacted below the granular road base in Boreholes 15-21 to 15-23 at depths ranging from 0.7 to 1.4 m. The thickness of the silty clay fill ranged from 0.7 to 2.4 m. The depth to the base of the silty clay fill varied from 1.4 to 3.8m (Elevations 165.4 to 167.7 m).

SPT 'N' values in the silty clay fill ranged from 8 to 20 blows per 0.3 m of penetration, indicating a stiff to very stiff consistency. The moisture content in the silty clay fill ranged from 8% to 18%.

#### 5.5.4 Silty Clay Till

Native brown to grey silty clay till with sand, trace gravel and thin sand seams was contacted below the fill in all the boreholes at depths ranging from 0.7 to 3.8 m. The thickness of the silty clay till was 2.1 and 2.9 m in Boreholes 15-22 and 15-23, respectively. The depth to the base of the silty clay till was at 4.3 and 6.7 m (Elevations 163.3 and 164.8 m) in Boreholes 15-22 and 15-23, respectively. Boreholes 15-21 and 15-24 were terminated within the silty clay till at 9.8 m depth (Elevations 157.5 and 160.1 m).

SPT 'N' values in the silty clay till ranged from 18 to 60 blows per 0.3 m of penetration, indicating a very stiff to hard consistency. SPT 'N' values of 91 blows per 0.25 m of penetration and 60 blows per 0.1 m of penetration, indicating hard consistency, were measured in Borehole 15-21 between Elevation 162.8 to 160.8. An SPT 'N' value of 91 blows per 0.225 m of penetration was measured in Borehole 15-23 near Elevation 165.3.

High SPT 'N' values ranging from 72 blows per 0.275 m of penetration to greater than 100 blows per 0.225 m of penetration were generally measured in Borehole 15-24.

The moisture content of the silty clay till varied from 6% to 18%.

Samples of silty clay till were subjected to gradation analysis and Atterberg Limits testing. Grain size distribution curves for samples of silty clay till are presented on the Record of Borehole sheets and on Figures E2 and E3 in Appendix E. Atterberg Limit test results are presented on Figure E6 of Appendix E. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0 to 7
Sand	17 to 54
Silt	20 to 37
Clay	21 to 46

Soil Particles	Percentage (%)
Liquid Limit	21 to 34
Plasticity Index	9 to 16

The results indicate that the silty clay till typically has low plasticity (CL).

Glacial tills inherently contain cobbles and boulders.

#### 5.5.5 Clayey Silt

A deposit of native clayey silt with sand were contacted in Boreholes 17, 18, 25 and 26. The clayey silt was contacted below the topsoil in Borehole 17 and surficially in Borehole 25. A 600 mm thick layer of clayey silt was contacted in Borehole 18 at 3.7 m depth. In Borehole 26, the clayey silt was encountered at 3.4 m depth. Boreholes 17, 25 and 26 were terminated within the clayey silt at 6.3 and 6.4 m depth (Elevations 160.7 to 162.2 m).

SPT 'N' values in the clayey silt were 16 to 50 blows per 0.3 m of penetration, in the upper 2.5 m in Borehole 17, indicating a very stiff to hard consistency. Generally, the SPT 'N' values measured in the clayey silt, were greater than 104 blows per 0.25 m of penetration to 100 blows per 0.15 m of penetration, indicating hard consistency.

#### 5.5.6 Sands and Silts

A 1.2-m thick layer of grey silty sand containing some clay was contacted below the silty clay till at 4.3 m depth in Borehole 15-22. The depth to the base of this layer was at 5.5 m (Elevation 162.1 m).

Silty sand was contacted surficially in Boreholes 23, 24 and 26 drilled during the previous investigation. The thickness of the silty sand was 3.4 m in Borehole 26 with a depth to its base at 3.4 m (Elevation 165.2 m) in Borehole 26. Boreholes 23 and 24 were terminated within the silty sand at 6.6 and 6.1 m depth (Elevations 159.6 and 160.7 m), respectively. Sandy silt was encountered surficially in Borehole 18, which was terminated within the sandy silt at 6.2 m (Elevation 159.9 m).

An SPT 'N' value measured in the silty sand in Borehole 15-22 was 8 blows per 0.3 m of penetration indicating a loose state. A measured moisture content in the silty sand was 14%.

In the previous Boreholes 23, 24 and 26, SPT 'N' values in the silty sand and sandy silt ranged from 30 blows per 0.3 m of penetration to greater than 100 blows for less than 0.3m of penetration, indicating a dense to very dense state.

A sample of the sand and silt was subjected to gradation analysis. Grain size distribution curve for the sand and silt is presented on the Record of Borehole sheets and on Figure E4 in Appendix E. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0
Sand	60
Silt	27
Clay	13

#### 5.5.7 Sand and Silt Till

Grey sand and silt till containing trace clay and gravel was contacted below the silty sand and silty clay till at 5.5 and 6.7 m depth in Boreholes 15-22 and 15-23, respectively. Boreholes 15-22 and 15-23 were terminated within the sand and silt till at 9.8 m depth (Elevations 157.8 and 161.7 m), respectively.

SPT 'N' values measured in the sand and silt till ranged from 21 to 45 blows per 0.3 m of penetration indicating a compact to dense condition. Moisture content in the sand and silt till ranged from 8% to 16%.

Two samples of the sand and silt till were subjected to gradation analysis. Grain size distribution curves for the sand and silt till are presented on the Record of Borehole sheets and on Figure E5 in Appendix E. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	4 to 8
Sand	50 to 53

Silt	30 to 37
Clay	9

Glacial tills inherently contain cobbles and boulders.

### 5.5.8 Groundwater Levels

Free standing water levels were observed in some open boreholes upon completion of drilling operations. Standpipe piezometers were installed in two boreholes (Boreholes 15-21 and 15-24) to monitor water levels after completion of drilling. The water level measured in the piezometers and open boreholes upon completion of drilling and water levels reported in Boreholes 17, 23 to 26 (previous investigation) are included in Table 5.5. The piezometric levels in Boreholes 15-21 and 15-24 will be measured again in the next round of monitoring and provided in the final report.

**Table 5.5 – Water Level Measurements**

Borehole Number	Date	Water Levels		Comment
		Depth (m)	Elevation (m)	
15-21	August 24, 2015	8.2	159.1	Piezometer
	October 26, 2015	8.4	158.9	
15-24	August 23, 2015	3.3	166.6	Piezometer
	October 26, 2015	2.9	167.0	
15-22	August 24, 2015	5.7	161.9	Open borehole
15-23	August 24, 2015	6.2	165.3	Open borehole
17*	May 20, 1964	4.4	162.6	Open borehole
23*	-	3.2	162.9	Open borehole
24*	May 21, 1964	3.1	163.7	Open borehole
25*	May 21, 1964	2.8	164.6	Open borehole
26*	May 21, 1964	5.0	163.5	Open borehole

\* Previous investigation

All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

### 5.6 Noise Barrier Wall, Segment 7, East of Bayview Borehole 25 (Current investigation) Boreholes 8, 19, 20 (Previous investigation)

Borehole 15-25 was drilled near the alignment of Segment 7 of the noise barrier wall. Boreholes 8, 19 and 20, drilled during the previous investigation (Reference 6) have been included to address the subsurface conditions at this wall segment. Records of boreholes sheets, laboratory testing results and a borehole location drawing are contained in Appendix F.



### **5.6.1 Topsoil**

A 270 mm thick layer of topsoil was contacted surficially in Borehole 8 at the time of the previous investigation.

### **5.6.2 Pavement Structure**

Borehole 15-25 was drilled through the paved surface of the Highway 401 WBL Collector. The pavement structure consisted of 300 mm of asphalt, over a layer of granular road base.

The granular road base consisted of sand containing trace silt and gravel. The thickness of the sand fill was 500 mm. The moisture content measured in the sand fill was 5%.

### **5.6.3 Silty Clay Fill**

A 700 mm thick layer of brown silty clay fill containing trace sand and gravel was contacted below the granular road base in Borehole 15-25. The depth to the base of the silty clay fill was 1.5 m (Elevation 169.3 m).

An SPT 'N' value of 28 blows per 0.3 m of penetration, indicating a very stiff consistency, was measured in the silty clay fill. The moisture content in the silty clay fill was 7%.

### **5.6.4 Silty Clay Till and Clayey Silt Till**

Native brown to grey silty clay till with sand was contacted below the fill at 1.5 m depth. The thickness of the silty clay till was 5.8 m. The depth to the base of the silty clay till was at 7.3 m (Elevation 163.5 m).

Native clayey silt till containing trace of sand was encountered in Boreholes 8, 19 and 20. The clayey silt till was contacted surficially in Boreholes 19 and 20, and at 4.8 m depth in Borehole 8. The thickness of the clayey silt till was 1.7 and 2.4 m in Boreholes 19 and 20, respectively. The depth to the base of the clayey silt till was 1.7 and 2.4 m (Elevations 161.7 and 160.9 m) in Boreholes 19 and 20, respectively. Borehole 8 was terminated within the clayey silt till at 9.4 m depth (Elevation 158.3 m).

SPT 'N' values measured in the silty clay till generally ranged from 22 to 60 blows per 0.3 m of penetration, indicating a very stiff to hard consistency. An SPT 'N' value of 100 blows for less than 0.3 m of penetration was measured in Borehole 15-25 near Elevation 168.5 m. The moisture content in the silty clay till ranged from 6% to 10%.

SPT 'N' values measured in the clayey silt till generally ranged from 41 per 0.3 m of penetration to greater than 100 blows for less than 0.3 m of penetration, indicating a hard consistency. SPT 'N' values of 4 and 6 blows per 0.3 m of penetration, indicating the presence of firm zones, were encountered at shallow depths in Boreholes 19 and 20, respectively.

A sample of the silty clay till was subjected to gradation analysis and Atterberg Limits testing. The grain size distribution curve for the silty clay till is presented on the Record of Borehole sheets and on Figure F1 in Appendix F. Atterberg Limit test results are presented on Figure F3 of Appendix F. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	0
Sand	37
Silt	36
Clay	27

Soil Particles	Percentage (%)
Liquid Limit	17
Plasticity Index	7

The results indicate that the silty clay till has slight plasticity and belong to the group CL-ML.

Glacial tills inherently contain cobbles and boulders.

#### **5.6.5 Clayey Silt to Silty Clay**

Layers of native clayey silt to silty clay containing trace of sand, were contacted in Boreholes 8 and 19. In Borehole 8, the clayey silt was encountered surficially and in Borehole 19 at 3.8 m depth. The thickness of the clayey silt/silty clay was 4.8 and 1.7 m in Boreholes 8 and 19, respectively. The depth to the base of the clayey silt was at 4.8 and 5.5 m (Elevations 162.9 and 157.8 m).

SPT 'N' values in the clayey silt ranged from 4 to 32 blows per 0.3 m of penetration, indicating a soft to hard consistency.

#### **5.6.6 Silty Sand and Sandy Silt**

Layers of silty sand and sandy silt were encountered in Boreholes 19 and 20.

Silty sand was contacted in Boreholes 19 and 20 at 1.7 and 2.4 m depth (Elevations 161.7 and 160.9 m), respectively. The thickness of the silty sand was 2.1 m in Borehole 19. Borehole 20 was terminated within the silty sand at 4.1 m depth (Elevation 159.3 m).

Sandy silt was encountered in Boreholes 19 and 20 at 5.5 and 2.4 m depth (Elevations 157.8 and 160.9 m), respectively. The thickness of the sandy silt was 1.0 m in Borehole 20. Borehole 19 was terminated within the sandy silt at 6.6 m depth (Elevation 156.8 m).

SPT 'N' values measured in the silty sand were 27 and 29 blows per 0.3 m of penetration, in Borehole 19 indicating a compact state. In Borehole 20, an SPT 'N' value of the silty sand was 75 blows per 0.3 m of penetration, indicating a very dense condition.

SPT 'N' values in the sandy silt were 50 and 75 blows per 0.3 m of penetration, indicating a very dense state.

#### 5.6.7 Sand and Silt Till

Grey sand and silt till containing some gravel and clay was contacted below the silty clay till at 7.3 m depth in Borehole 15-25, which was terminated within the sand and silt till at 9.8 m depth (Elevation 161.0 m).

SPT 'N' values measured in the sand and silt till ranged between 42 blows per 0.3 m of penetration and greater than 100 blows for less than 0.3 m of penetration, indicating a dense to very dense state. The moisture content in the sand and silt till was 7%.

A sample of the sand and silt till was subjected to gradation analysis. The grain size distribution curve for this sample is presented on the Record of Borehole sheets and on Figure F2 in Appendix F. The results of the laboratory test are summarized as follows:

Soil Particles	Percentage (%)
Gravel	12
Sand	47
Silt	30
Clay	11

Glacial tills inherently contain cobbles and boulders.

#### 5.6.8 Groundwater Levels

There was no record of water level conditions in the previous open boreholes. A standpipe piezometer was installed in Borehole 15-25 to monitor water levels after completion of drilling. The measured piezometric level is shown in Table 5.6. The piezometric level will be measured again in the next round of monitoring and provided in the final report.

**Table 5.6 – Water Level Measurements**

Borehole Number	Date	Water Levels		Comment
		Depth (m)	Elevation (m)	
15-25	August 25, 2015	7.9	162.9	Piezometer
	October 26, 2015	6.0	164.8	

All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

## **6 MISCELLANEOUS**

Borehole locations were established in the field based on information provided by MMM Group Limited (MMM). The coordinates at all as-drilled borehole locations were established by Thurber upon completion of drilling. The ground surface elevations of the as-drilled locations were provided by MMM. Underground utility clearances were obtained for the borehole locations prior to drilling.

DBW Drilling of Ajax, Ontario supplied track-mounted and truck-mounted drill rigs, and conducted the drilling, sampling and in-situ testing operations.

The field investigation was supervised by Mr. Amir Fereidouni and Mr. Abdul Nasri of Thurber. Geotechnical laboratory testing was carried out in Thurber's laboratory.

Planning and co-ordination of the field program was conducted by Mr. Stephane Loranger, C.E.T. Overall direction of the program was provided by Mr. Sydney Pang, P.Eng. Interpretation of the data and preparation of this report was carried out by Ms. R. Palomeque Reyna, P.Eng.

The report was reviewed by Mr. Sydney Pang, P.Eng. and Mr. P.K. Chatterji, P.Eng., who is a Designated Principal Contact for MTO Foundations Projects.

THURBER ENGINEERING LTD.



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## 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 <sup>(1)</sup> '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<sub>pen</sub>






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.

# 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			

## EXPLANATION OF ROCK LOGGING TERMS

ROCK WEATHERING CLASSIFICATION		SYMBOLS	
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)

DISCONTINUITY SPACING		STRENGTH CLASSIFICATION			
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				
Very thinly bedded	20 to 60mm	Strong	50-100	7,500 to 15,000	Requires more than one blow of geological hammer to break
Laminated	6 to 20mm				
Thinly Laminated	Less than 6mm	Medium Strong	25.0 to 50.0	3,500 to 7,500	Breaks under single blow of geological hammer.
		Weak	5.0 to 25.0	750 to 3,500	Can be peeled by a pocket knife with difficulty
		Very Weak	1.0 to 5.0	150 to 750	Can be peeled by a pocket knife, crumbles under firm blows of geological pick.
		Extremely Weak (Rock)	0.25 to 1.0	35 to 150	Indented by thumbnail

TERMS	
Total Core Recovery: (TCR)	Core recovered as a percentage of total core run length.
Solid Core Recovery: (SCR)	Percent Ratio of solid core of full cylindrical shape recovered. Expressed with respect to the total length of core run.
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.



## **Appendix A**

### **Noise Barrier Wall, Segment 1, East of Jane Street Boreholes 15-01 to 15-08 (Current investigation) Boreholes 2, 5, 7 (Previous investigation)**

- Record of Borehole Sheets
- Laboratory Test Results
- Drawing titled “Borehole Locations”

# RECORD OF BOREHOLE No 15-01

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 046.1 E 304 381.7 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.23 - 2015.09.23 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT   NATURAL MOISTURE CONTENT   LIQUID LIMIT			UNIT WEIGHT  γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)					
132.9	GROUND SURFACE							20	40	60	80	100	W <sub>P</sub>	W	W <sub>L</sub>	kN/m <sup>3</sup>	GR   SA   SI   CL
0.0	ASPHALT:(275mm)							20	40	60	80	100					
132.6																0   30   44   26	
0.3	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS													
132.1																	
0.8	Silty CLAY, with sand, trace gravel Stiff Brown Moist (FILL)		1	SS	13		132										
			2	SS	11		131										
			3	SS	10		130										
	Very Stiff		4	SS	20		129										
	Occasional roots and rootlets Grey		5	SS	18		128										
127.3																0   15   51   34	
5.6	Silty CLAY, some sand, trace gravel Very Stiff Brown Moist (TILL)		6	SS	28		127										
			7	SS	20		125										
124.3																	
8.6	Silty CLAY Firm Grey Moist																
			8	SS	8		124										
123.1																	
9.8	END OF BOREHOLE AT 9.8m.																

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# RECORD OF BOREHOLE No 15-01

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 046.1 E 304 381.7 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.23 - 2015.09.23 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)			
								20	40	60	80	100		20	40	60		GR	SA	SI	CL
	Continued From Previous Page																				
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep23/2015      Dry Oct26/2015      5.7      127.2																				

## METRIC

[illegible]

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity

# RECORD OF BOREHOLE No 15-02

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 076.3 E 304 535.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.23 - 2015.09.23 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	WATER LEVEL AT 5.5m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND AUGER CUTTINGS TO SURFACE.																

# RECORD OF BOREHOLE No 15-03

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 128.7 E 304 680.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.22 - 2015.09.22 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa													
137.6	GROUND SURFACE							20	40	60	80	100									
0.0	ASPHALT:(100mm)																				
0.1	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS			137														
136.8																					
0.8	Silty CLAY, trace sand and gravel Very Stiff to Stiff Brown Moist (FILL)		1	SS	20		136														
			2	SS	13																
			3	SS	23		135														
134.6																					
3.0	Silty CLAY, with sand, trace gravel, sand seams, oxidized stains Very Stiff Brown Moist (TILL)		4	SS	22		134											2	30	43	25
132.8							133														
4.8	Silty CLAY Stiff to Firm Grey Moist		5	SS	11		132														
			6	SS	8		131											0	0	52	48
			7	SS	6		130														
			8	SS	5		129														
							128														
127.8																					
9.8	END OF BOREHOLE AT 9.8m.																				

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-03

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 128.7 E 304 680.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.22 - 2015.09.22 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	NO WATER OBSERVED IN THE BOREHOLE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND AUGER CUTTINGS TO SURFACE.																

# RECORD OF BOREHOLE No 15-04

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 180.5 E 304 801.2 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.22 - 2015.09.22 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
							20	40	60	80	100	20	40	60			
140.6	GROUND SURFACE																
0.0	ASPHALT:(100mm)																
0.1	SAND and GRAVEL, some silt and clay Brown Moist (FILL)		1	GS												42 39 19 (SI+CL)	
139.8	Silty CLAY, some sand, trace gravel Very Stiff Brown Moist (FILL)		1	SS	18												
0.8			2	SS	15												
			3	SS	15											0 14 44 42	
	Grey		4	SS	25												
136.5	Silty CLAY, trace sand and gravel Very Stiff to Stiff Brown Moist (TILL)		5	SS	22												
4.1																	
			6	SS	9												
	Firm Grey		7	SS	7												
132.1	Silty CLAY Firm Grey Moist																
8.5			8	SS	6											0 0 45 55	
130.8	END OF BOREHOLE AT 9.8m.																
9.8																	

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE



# RECORD OF BOREHOLE No 15-04

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 180.5 E 304 801.2 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.22 - 2015.09.22 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep22/2015      Dry Oct26/2015      6.0      134.6																

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# RECORD OF BOREHOLE No 15-05

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 243.0 E 305 055.4 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.21 - 2015.09.21 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT      NATURAL MOISTURE      LIQUID CONTENT      LIMIT			UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR   SA   SI   CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL      × LAB VANE					WATER CONTENT (%) w <sub>p</sub> w      w <sub>L</sub>				
150.6	GROUND SURFACE							20	40	60	80	100					
0.0	ASPHALT:(200mm)							20	40	60	80	100					
0.2	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS			150							○			
149.8																	
0.8	Silty CLAY, with sand, occasional roots and rootlets Very Stiff Brown to Grey Moist (FILL)		1	SS	23		149							○			
			2	SS	23		148							○			
			3	SS	15		147							○			
147.6																	
3.0	Silty CLAY, with sand Very Stiff Grey Moist (TILL)		4	SS	26		146							○			0   30   46   24
			5	SS	24		145							○			
			6	SS	25		144							4 — 1			0   35   40   25
			7	SS	37		143							○			
141.9							142										
8.7	Silty CLAY Stiff Grey Moist		8	SS	11		141							○			
140.8																	
9.8	END OF BOREHOLE AT 9.8m.																

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE

## METRIC

[illegible]

# RECORD OF BOREHOLE No 15-06

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 248.1 E 305 211.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.21 - 2015.09.21 CHECKED BY RPR

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 <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W <sub>P</sub>	W			W <sub>L</sub>	WATER CONTENT (%)	GR	SA	SI
149.7	GROUND SURFACE																				
0.0	ASPHALT:(200mm)																				
0.2	SAND, some silt and gravel Brown Moist (FILL)		1	GS																	
148.9																					
0.8	Silty CLAY, with sand, trace gravel, occasional roots and rootlets Very Stiff Brown Moist (FILL)		1	SS	21													3	33	46	18
			2	SS	23																
			3	SS	25																
146.7																					
3.0	Silty CLAY, with sand Very Stiff to Stiff Brown Moist (TILL)		4	SS	27																
	Grey		5	SS	10																
			6	SS	15																
142.5																					
7.2	Silty CLAY Hard to Very Stiff Brown Moist		7	SS	43																
			8	SS	24																
139.9																					
9.8	END OF BOREHOLE AT 9.8m.																				

Continued Next Page

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

# RECORD OF BOREHOLE No 15-06

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 248.1 E 305 211.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.21 - 2015.09.21 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep21/2015      Dry Oct26/2015      6.5      143.2																

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# RECORD OF BOREHOLE No 15-07

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 259.6 E 305 354.8 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.14 - 2015.09.14 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
151.7	GROUND SURFACE							20 40 60 80 100					
0.0	Gravelly <b>SAND</b> , some silt and clay Brown Moist (FILL)		1	GS			151						
150.8													
0.9	Silty <b>CLAY</b> , trace sand and gravel, oxidized seams Very Stiff to Stiff Brown Moist (FILL)		1	SS	22		150						
			2	SS	15								
	Occasional roots and rootlets Occasional wood fibres		3	SS	13		149						
148.7													
3.0	Silty <b>CLAY</b> Very Stiff to Stiff Grey Moist (TILL)		4	SS	18		148						0 36 43 21
			5	SS	10		147						
			6	SS	22		146						
144.8							145						
6.9	Silty <b>CLAY</b> Stiff Grey Moist		7	SS	14		144						0 0 48 52
			8	SS	12		143						
141.9							142						
9.8	END OF BOREHOLE AT 9.8m.												

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-07

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 259.6 E 305 354.8 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.14 - 2015.09.14 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	NO WATER OBSERVED IN THE BOREHOLE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND AUGER CUTTINGS TO 0.3m, SAND FROM 0.3m TO 0.2m, THEN ASPHALT COLDPATCH TO SURFACE.																

# RECORD OF BOREHOLE No 15-08

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 300.7 E 305 514.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.14 - 2015.09.14 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa											
155.3	GROUND SURFACE							20	40	60	80	100							
0.0	ASPHALT:(150mm)							20	40	60	80	100							
0.2	Gravelly <b>SAND</b> , some silt and clay Brown Moist (FILL)		1	GS			155												
154.5																			
0.8	Silty <b>CLAY</b> , some sand, trace gravel, occasional roots, rootlets and organics Stiff Grey Moist (FILL)		1	SS	11		154												
			2	SS	10														
			3	SS	10		153												
			4	SS	9		152												
151.5																			
3.8	Silty <b>CLAY</b> , some sand Firm to Stiff Grey Moist (TILL)		5	SS	6		151												
							150												
			6	SS	14		149												
							148												
	Hard		7	SS	44		147												
146.5																			
8.8	<b>SAND</b> and <b>SILT</b> , some clay, trace gravel Very Dense Grey Wet (TILL)		8	SS	65		146												
145.5																			
9.8	END OF BOREHOLE AT 9.8m.																		

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity 20  
15 10 5 (%) STRAIN AT FAILURE



# RECORD OF BOREHOLE No 15-08

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 1 N 4 842 300.7 E 305 514.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.14 - 2015.09.14 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)			
								20	40	60	80	100		20	40	60		GR	SA	SI	CL
	Continued From Previous Page																				
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep14/2015      5.1      150.2 Oct26/2015      4.7      150.6																				

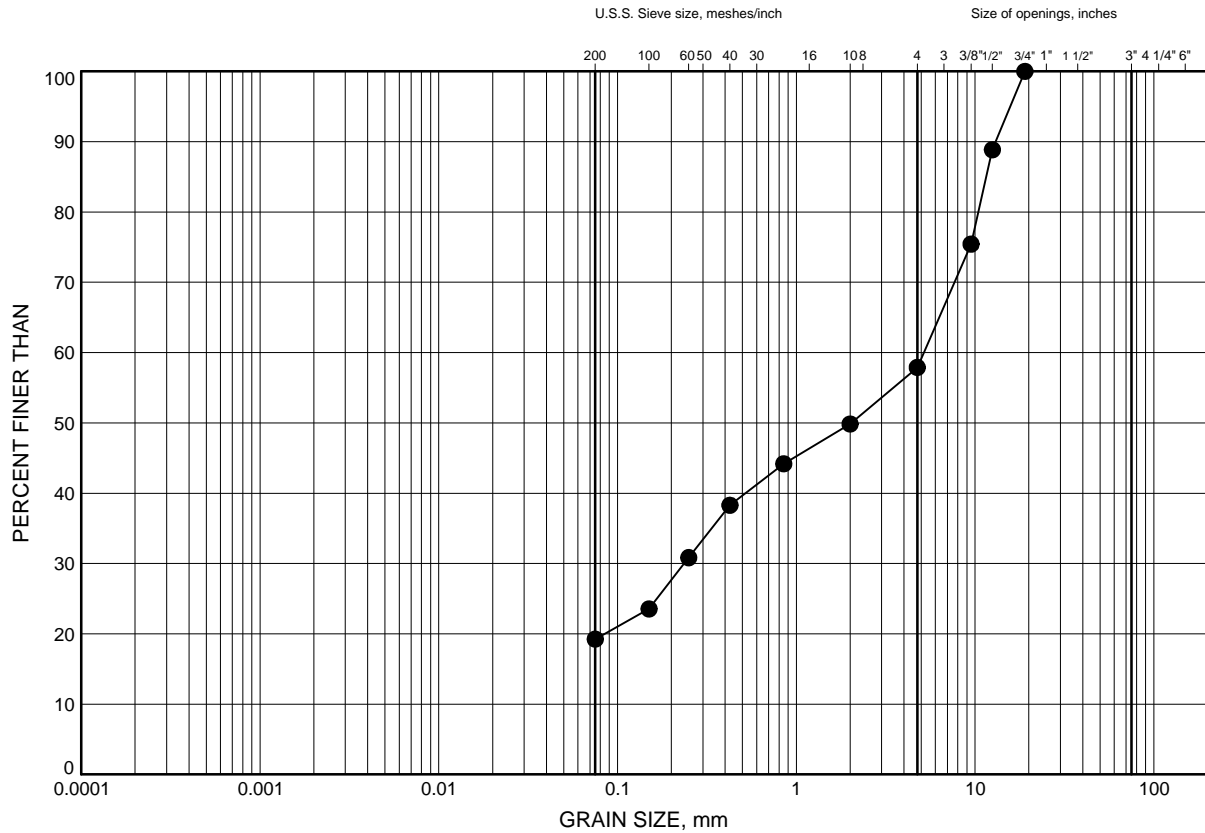
ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE A1

### SAND & GRAVEL FILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-04	0.46	140.14

Date October 2015  
W.P. 2074-13-00



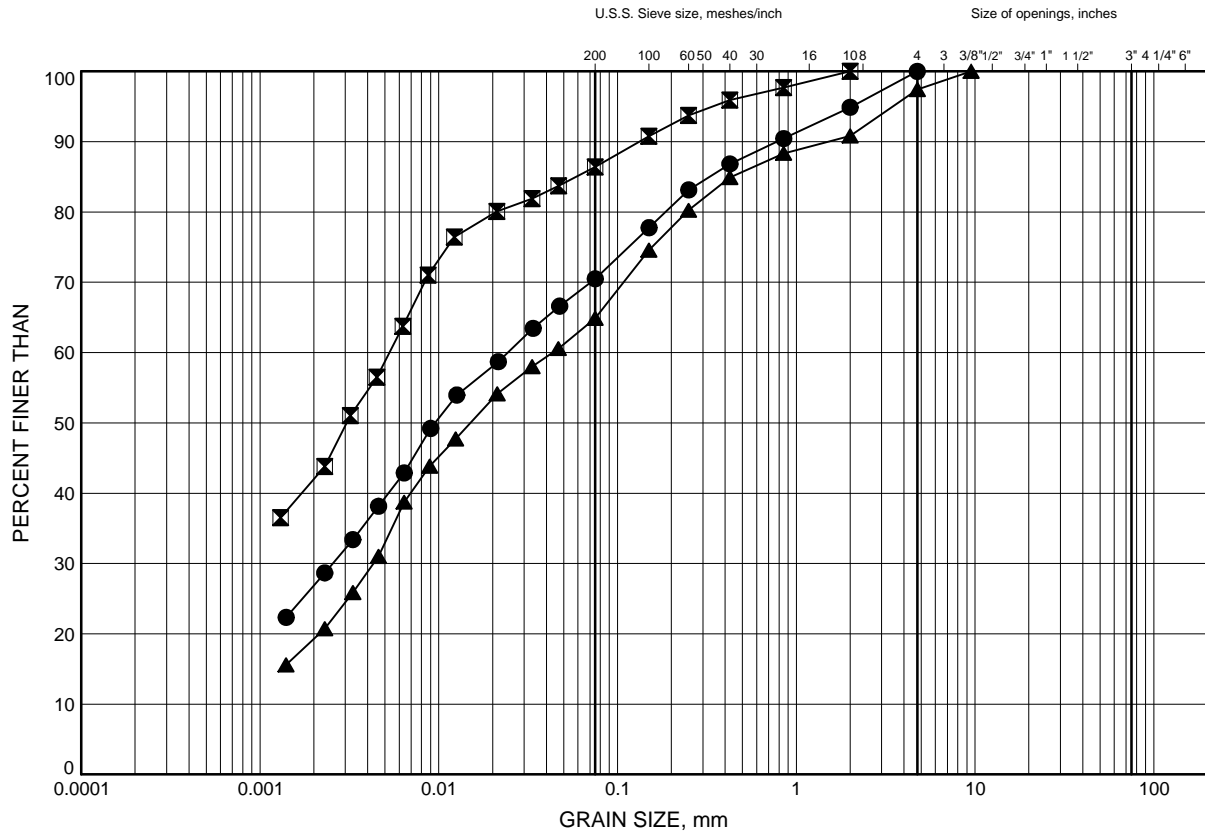
Prep'd AN  
Chkd. RPR

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE A2

### Silty CLAY FILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-01	1.83	131.07
⊠	15-04	2.59	138.01
▲	15-06	1.07	148.63

Date ..October 2015.....  
W.P. ..2074-13-00.....



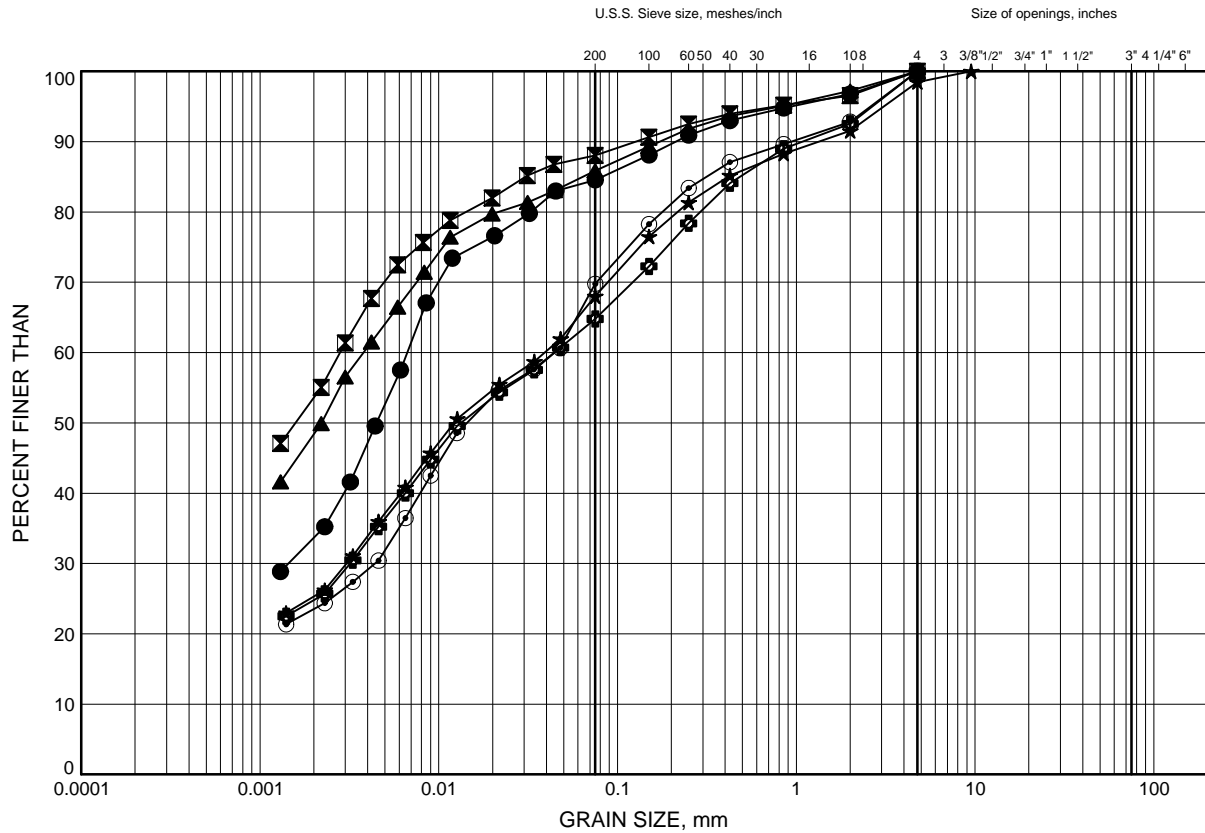
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE A3

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-01	6.40	126.50
⊠	15-02	3.35	130.85
▲	15-02	7.92	126.28
★	15-03	3.35	134.25
⊙	15-05	3.35	147.25
⊕	15-05	6.40	144.20

Date ..October 2015.....  
W.P. ..2074-13-00.....



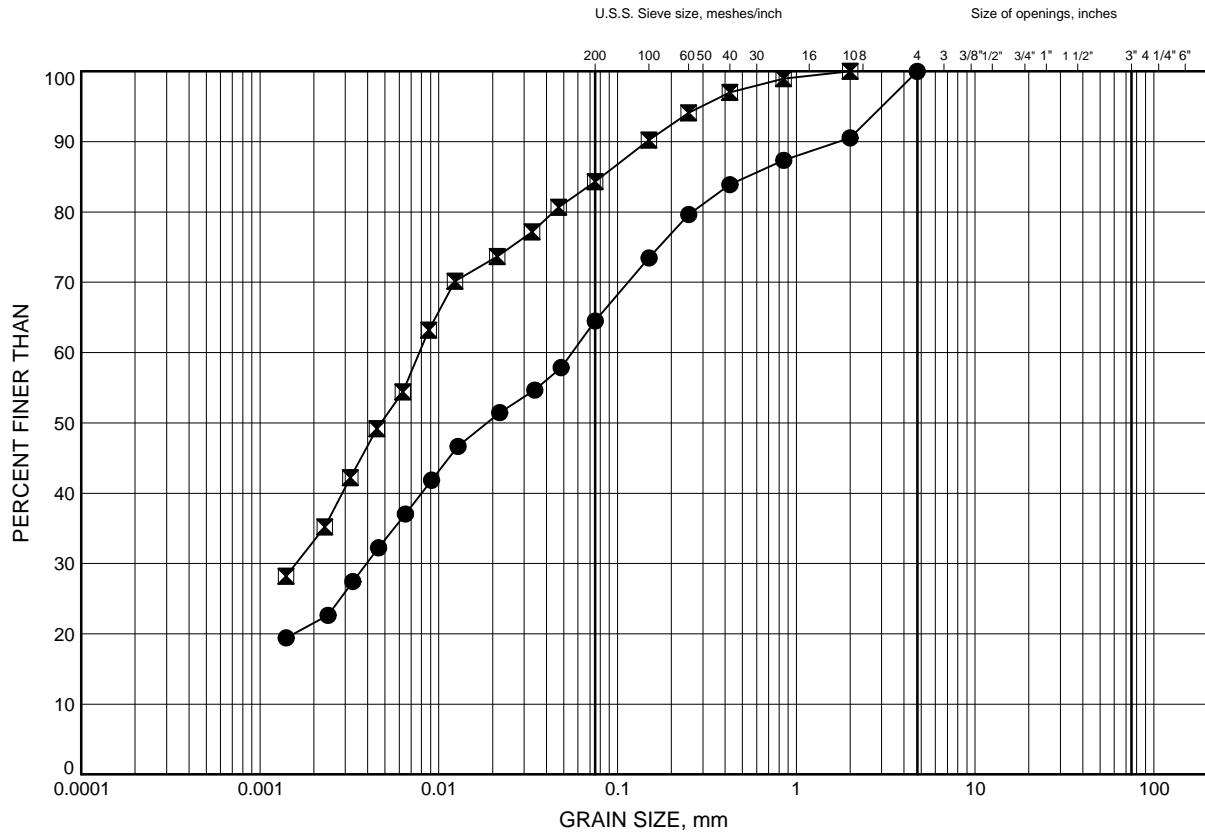
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE A4

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-07	3.35	148.35
⊠	15-08	4.88	150.42

Date ..October 2015.....  
W.P. ..2074-13-00.....

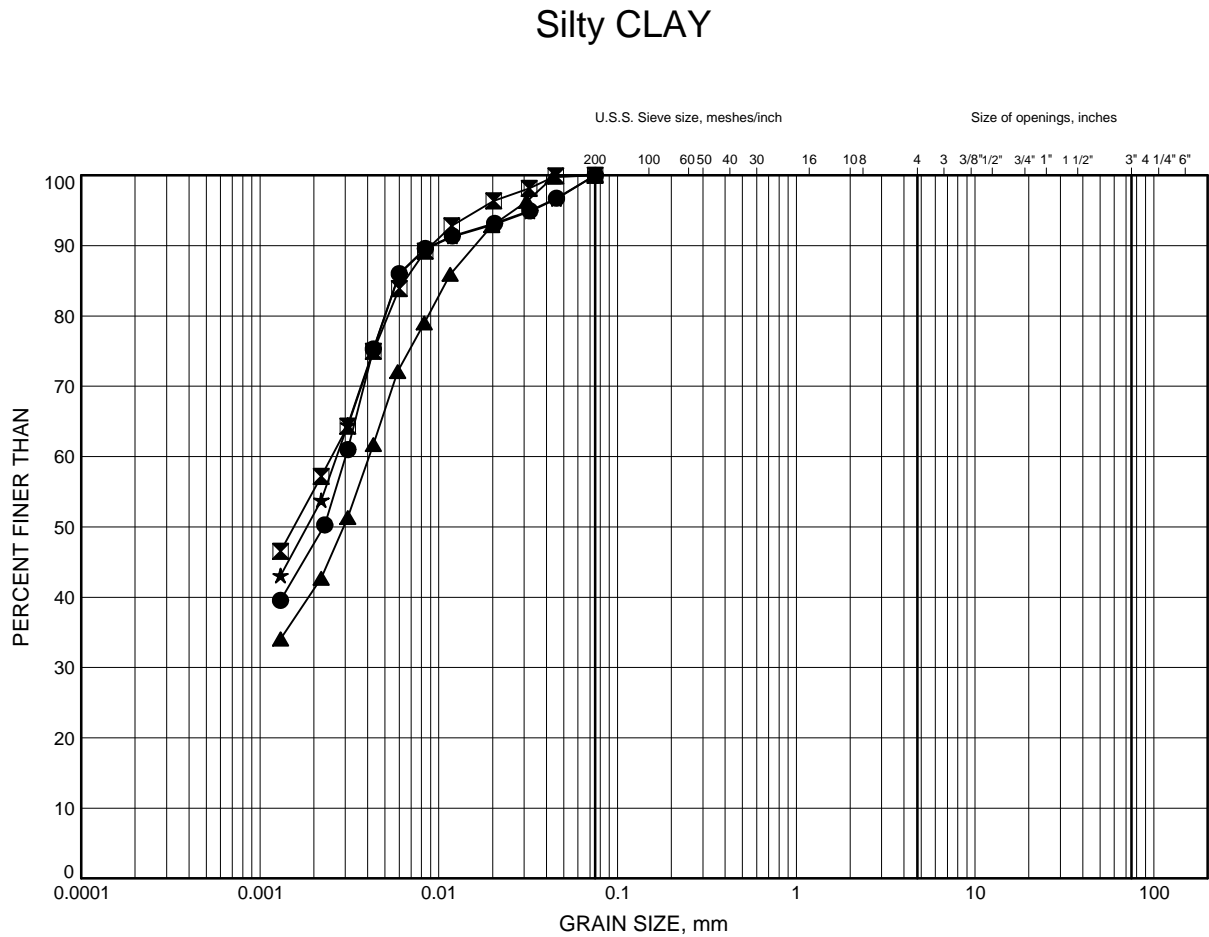


Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE A5



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-03	6.40	131.20
⊠	15-04	9.45	131.15
▲	15-06	7.92	141.78
★	15-07	7.92	143.78

Date October 2015  
W.P. 2074-13-00



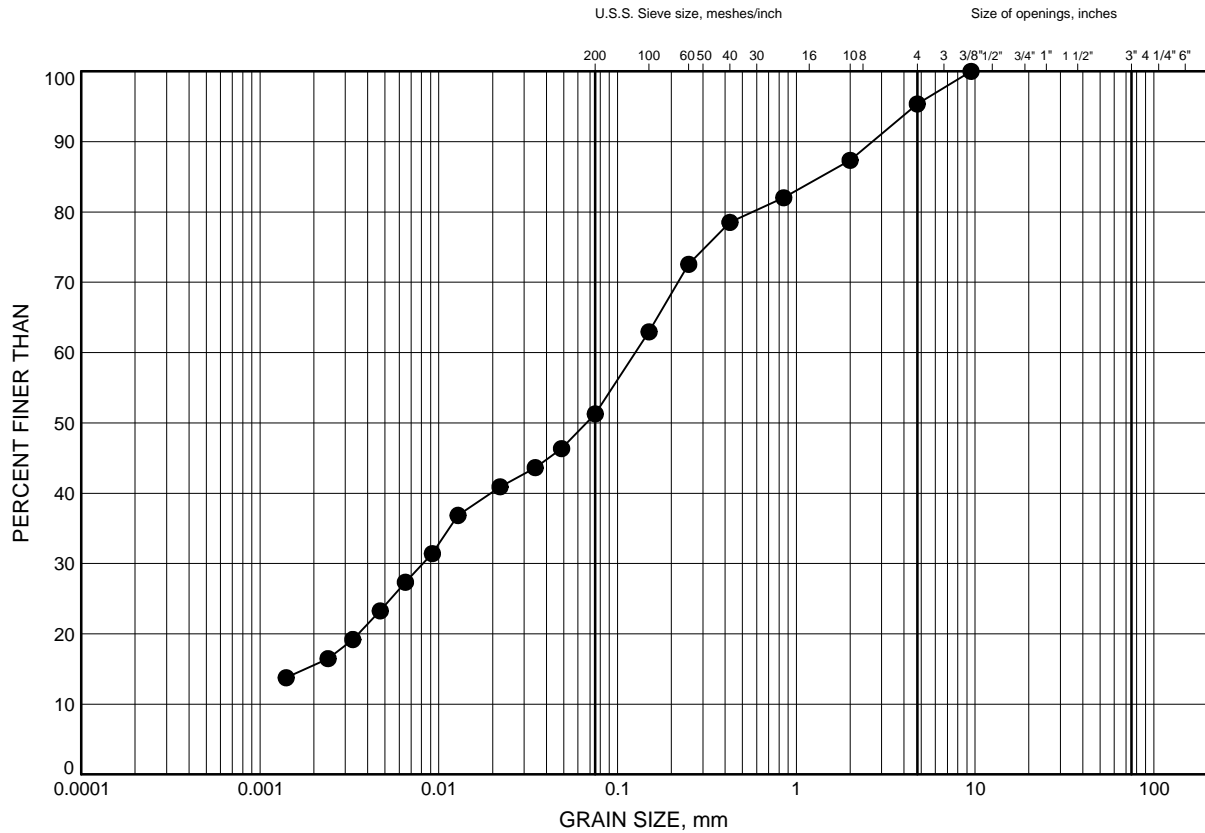
Prep'd AN  
Chkd. RPR

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE A6

### SAND & SILT TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-08	9.45	145.85

Date ..October 2015.....  
W.P. ..2074-13-00.....

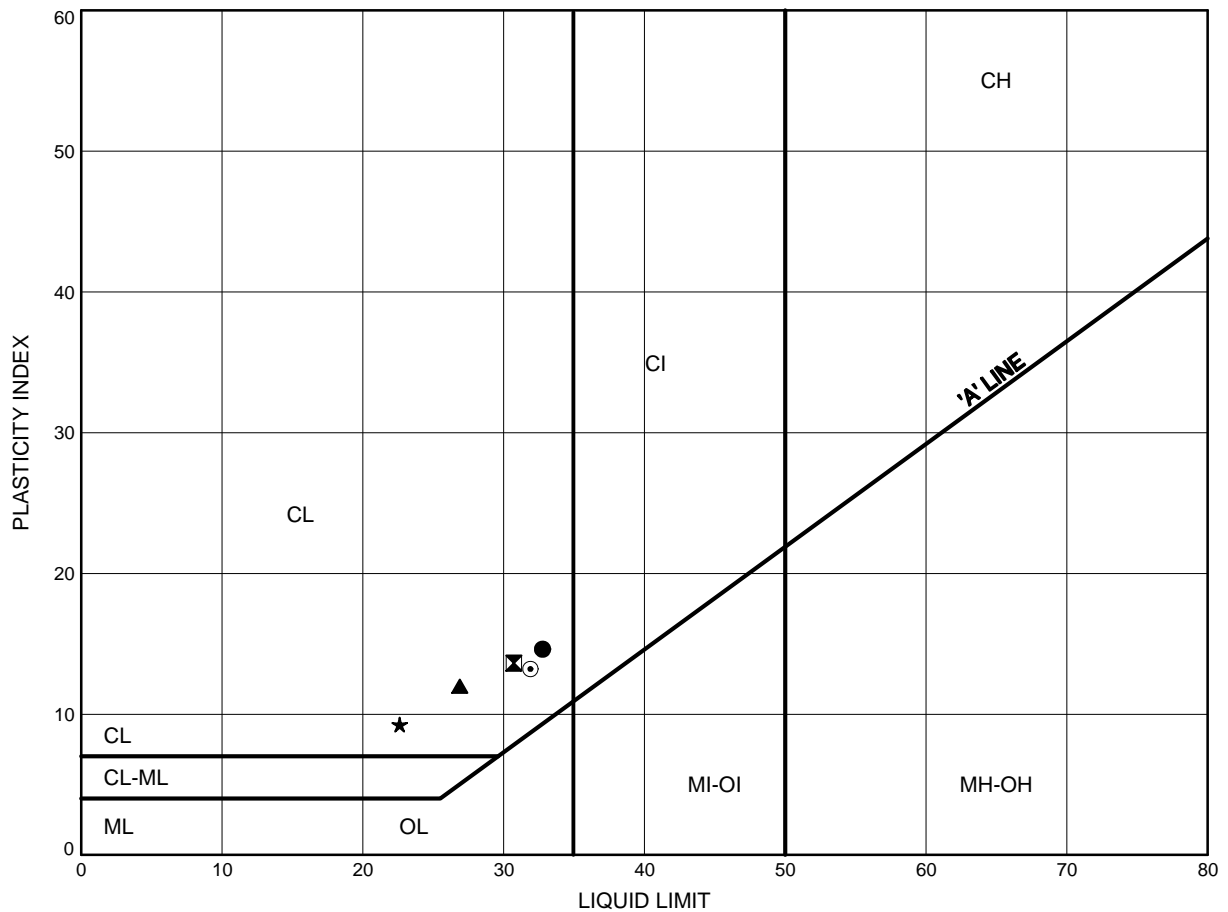


Prep'd .....AN.....  
Chkd. ....RPR.....

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE A7

Silty CLAY TILL



**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-01	6.40	126.50
⊠	15-02	7.92	126.28
▲	15-05	6.40	144.20
★	15-07	3.35	148.35
⊙	15-08	4.88	150.42

Date October 2015  
W.P. 2074-13-00



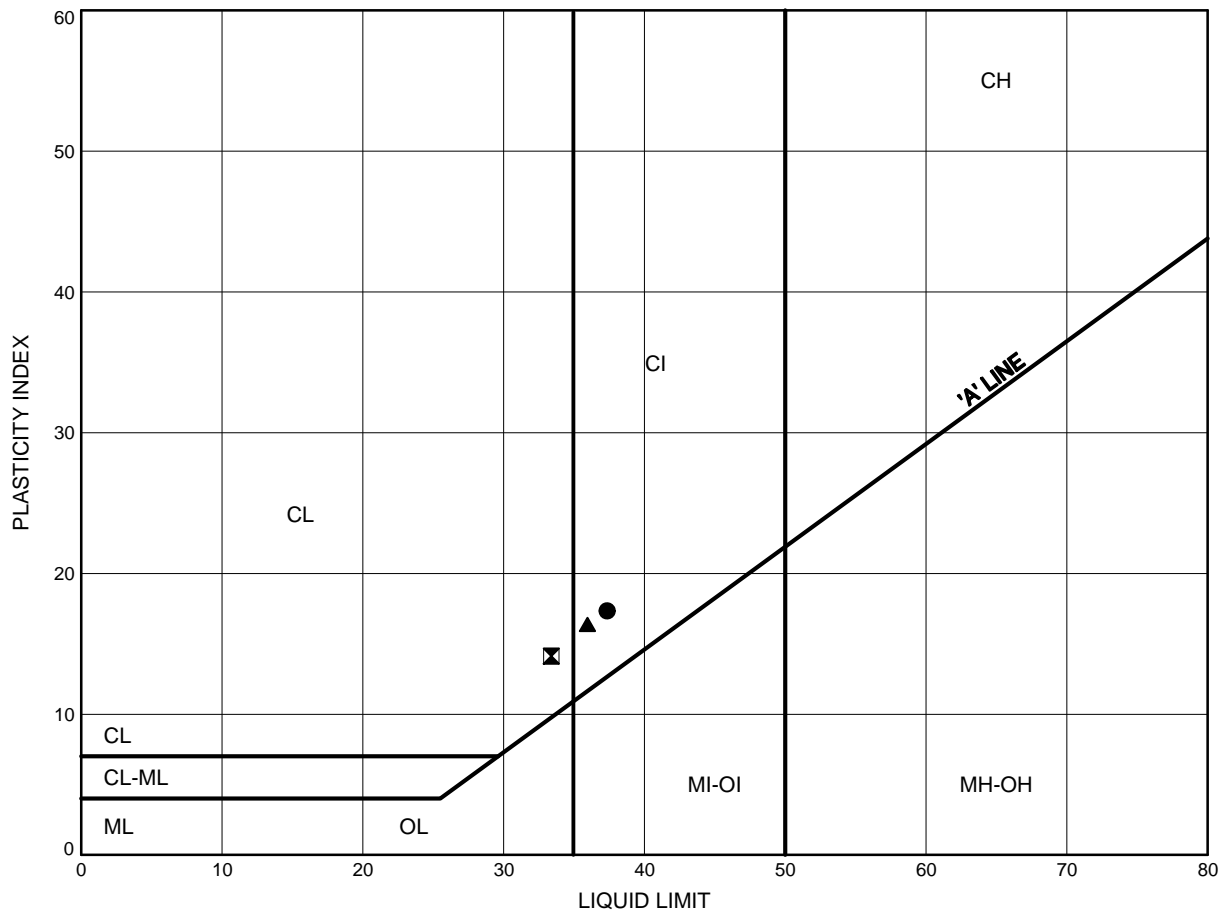
Prep'd AN  
Chkd. RPR



Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE A8

Silty CLAY



**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-04	9.45	131.15
⊠	15-06	7.92	141.78
▲	15-07	7.92	143.78

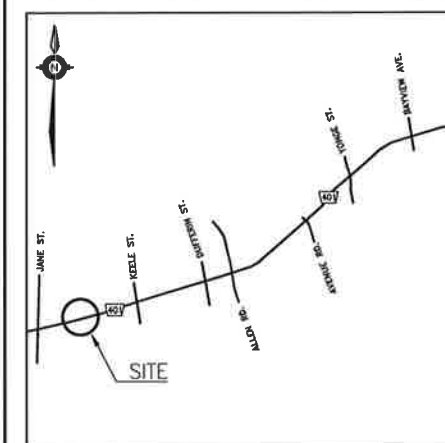
Date October 2015  
W.P. 2074-13-00



Prep'd AN  
Chkd. RPR






HWY 401 WBL COLLECTORS  
NOISE BARRIER WALL (SEGMENT 1)  
EAST OF JANE STREET  
BOREHOLE LOCATIONS PLAN

SHEET



## KEYPLAN

LEGEND

- |   |                                       |
|---|---------------------------------------|
|  | Borehole (By Thurber)                 |
|  | Borehole (By Others)                  |
| 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
15-01	132.9	4 842 046.1	304 381.1
15-02	134.2	4 842 076.3	304 535.3
15-03	137.6	4 842 128.7	304 680.3
15-04	140.6	4 842 180.6	304 801.2
15-05	150.6	4 842 243.0	305 055.4
15-06	149.7	4 842 248.1	305 211.6
15-07	151.7	4 842 259.6	305 354.8
15-08	155.3	4 842 300.7	305 514.6
BH2*	123.4	4 842 017.7	304 267.3
BH5*	124.4	4 842 005.7	304 193.3
BH7*	143.9	4 842 222.7	305 040.5

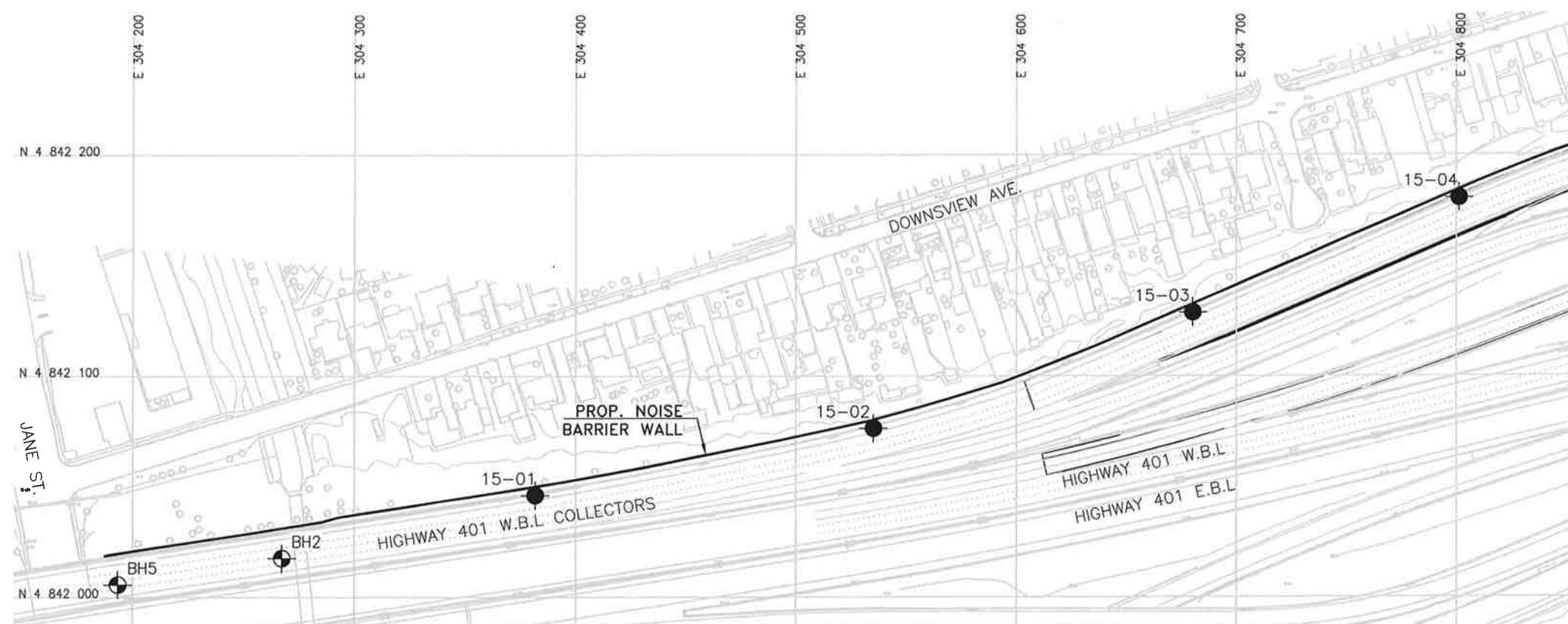
**-NOTES-**

- 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) \* Estimated coordinates.

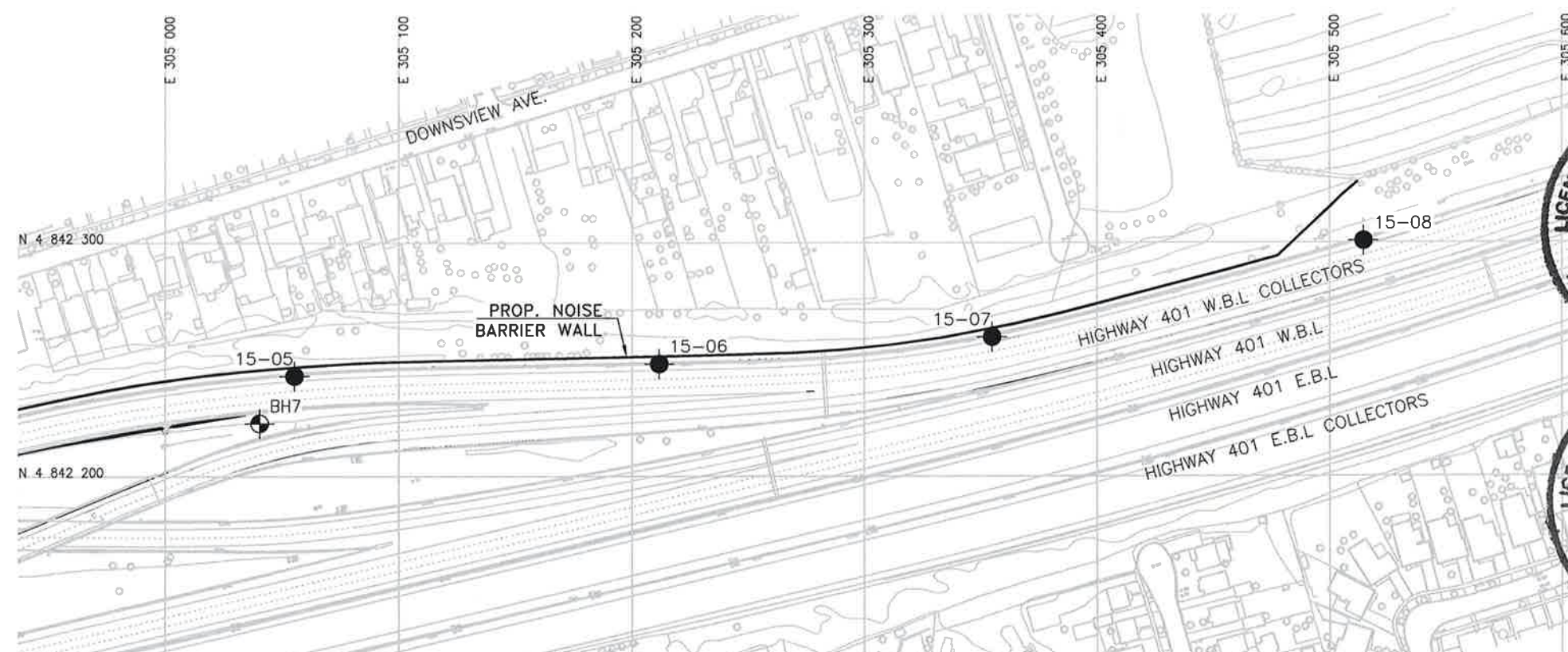
**GEOCRES No. 30M11-259**

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FILENAME: H:\Drafting\19\5161\216\ted1216-BoreholePlan (Noise Barrier Wall).dwg



## PLAN



## PLAN





# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 85-59-3

BORE HOLE NO. 2

JOB 61-F-113

STATION 85+46 (120' R.L.)

DATUM 404.7

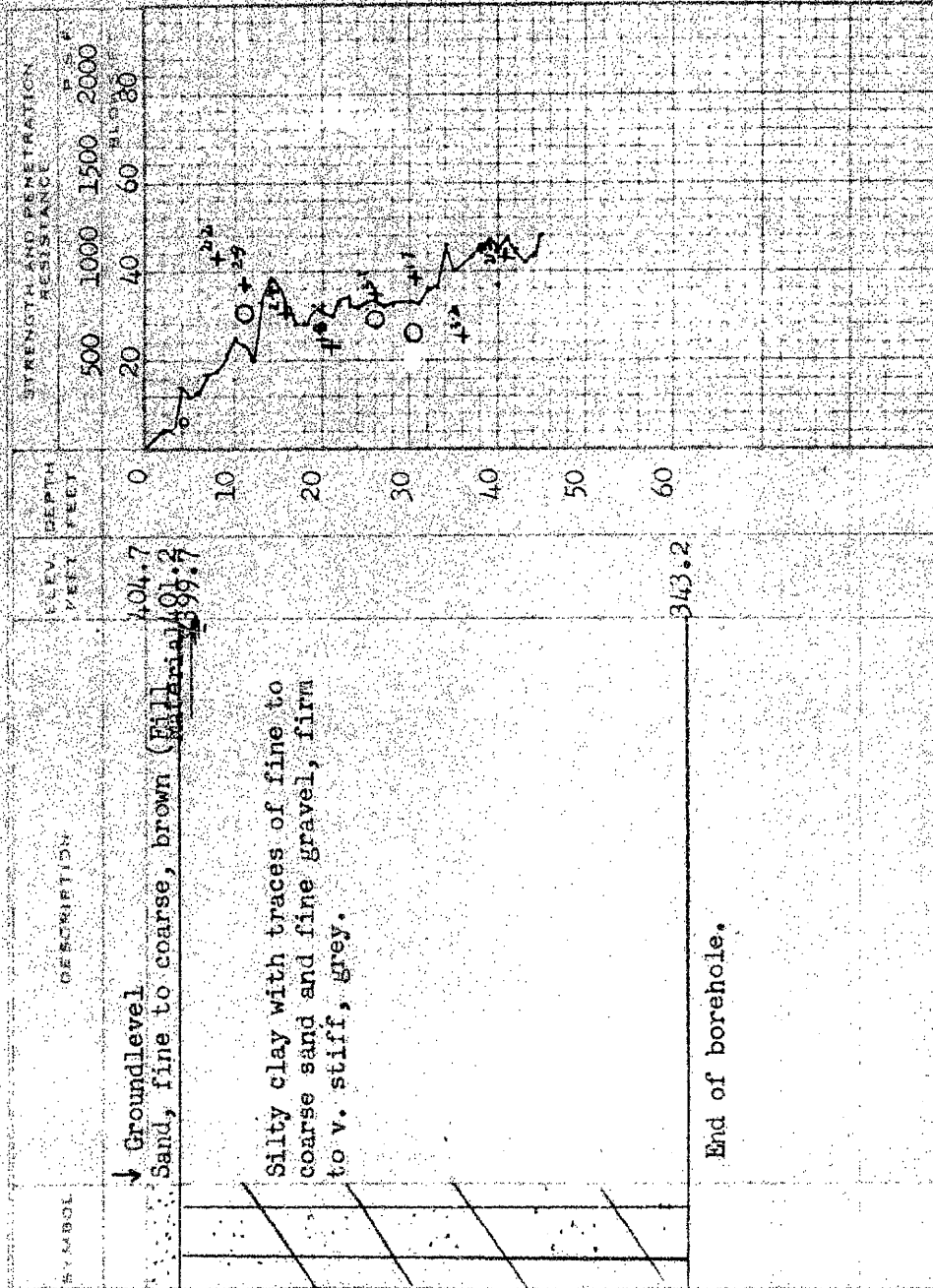
COMPILED BY I.H.

BORING DATE Nov. 16/61

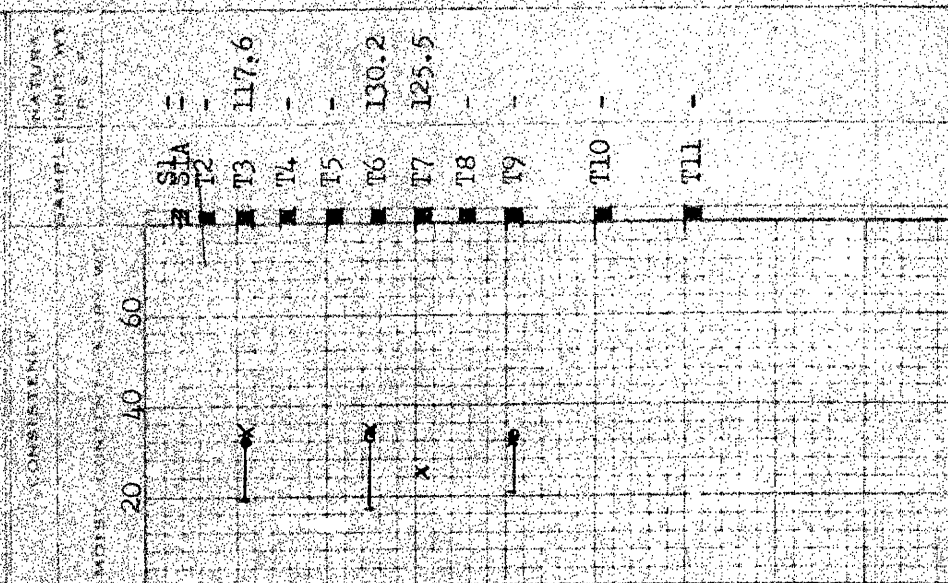
CHECKED BY K.S.

## LEGEND

1/2 UNCONFINED COMPRESSION (QU)  
VANE TEST (C) AND SENSITIVITY  
NATURAL MOISTURE AND  
LIQUIDITY INDEX  
LIQUID LIMIT  
PLASTIC LIMIT



End of borehole.



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

JOB 61-F-113

LOCATION Sta. 86+14 (139' Rt. E Hwy. 401)

ORIGINATED BY H.S.

W P 85-59-3

BORING DATE March 13, 1963.

COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Washboring using NX casing.

CHECKED BY B.K.

SOIL PROFILE			SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		SHEAR STRENGTH P.S.F. + Unconfined Shear Strength					WP	W	WL		
						400	800	1200	1600	2000	WATER CONTENT % 20 40 60				
408.0	Groundlevel														
0.0	Fine sand Loose brown.		1	SS	6										
398.0					400										
397.0	Sand and gravel.		2	SS	12										
11.0			3	SS	18										
	Grey silty clay - Firm to stiff.		4	SS	12			1.4							
			5	SS	7		2.9								
			6	SS	12		2.9								
			7	SS	12			5.7							
370.0					370										
368.0	Clayey silt to silt- stiff.		8	SS	12			3.6							
42.0	Grey silty clay Stiff		9	SS	11				1.9						
360.0					360										
48.0	Grey silt Very stiff.		10	SS	28										
			11	SS	21				4.2						
350.5					350										
37.5	End of borehole.				340										

W.L. in  
borehole  
397.7  
10.3

134.8

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 7

FOUNDATION SECTION

JOB 62-F-85 LOCATION Sta. 273+35 (218' Rt.) ORIGINATED BY H.S.  
W.P. 105-62 BORING DATE Oct. 4, 1962. COMPILED BY H.S.  
DATUM 472.3 BOREHOLE TYPE Washboring CHECKED BY B.K.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH P.S.F.	LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT				WP	W	WL		
472.3	Groundlevel					480							
0.0	Desiccated zone. Hard to very stiff.												WL in borehole on 10/10/62
456.3													456.3
16.0	Clayey silt. Firm to stiff.		1	SS	3	450							16.0
437.3													
35.0	Sandy silt with some gravel.		2	SS	61	420							
407.3													
65.0	Clayey silt with sand, gravel and boulders. (Glacial Till) Very dense.		3	SS	88	390							GR. 27% SA. 46% SI. 22% CL. 5%
377.3													
372.8	Weathered zone.		4	SS	>100								GR. 34% SA. 11% SI. 36% CL. 19%
97.5	Sound Bedrock (Grey Shale)		5	RC	-								
365.8			6	RC	-								
106.5	End of borehole.		7	RC	-								
			8	RC	-								
			9	RC	-								
						360							

## **Appendix B**

### **Noise Barrier Wall, Segment 2, West of Dufferin Street Boreholes 15-09 to 15-14 (Current investigation) Boreholes 1C, 2A (Previous investigation)**

- Record of Borehole Sheets
- Laboratory Test Results
- Drawing titled “Borehole Locations”

# RECORD OF BOREHOLE No 15-09

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 842 933.1 E 307 433.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.10.01 - 2015.10.01 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)						
						20	40	60	80	100	20	40	60				
185.8	GROUND SURFACE																
0.0	ASPHALT:(200mm)																
0.2	SAND, some silt, trace gravel Compact Brown Moist (FILL)		1	GS													
			1	SS	29												
184.4																	
1.4	Silty CLAY, with sand, trace gravel, sand seams Hard Brown Moist (TILL)		2	SS	30												
			3	SS	57												
			4	SS	49												
			5	SS	36												
			6	SS	34												
			7	SS	38												
			8	SS	70												
176.0																	
9.8	END OF BOREHOLE AT 9.8m.																

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity 20  
15 10  
(%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-09

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 842 933.1 E 307 433.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.10.01 - 2015.10.01 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m)  Oct01/2015 Dry Oct26/2015 7.5 178.3																

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15



# RECORD OF BOREHOLE No 15-10

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 842 962.5 E 307 524.1 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.30 - 2015.09.30 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC      NATURAL      LIQUID LIMIT    MOISTURE    LIMIT CONTENT    CONTENT    CONTENT				UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	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 <sub>p</sub> w      w <sub>L</sub>								
186.0	GROUND SURFACE						20	40	60	80	100									
0.0	ASPHALT:(175mm)						20	40	60	80	100									
0.2	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS																
185.2																				
0.8	Silty CLAY, with sand, trace gravel, oxidized seams Hard Brown Moist (TILL)		1	SS	37															
			2	SS	43															
			3	SS	46															
183.0																				
3.0	Very Stiff Grey		4	SS	25													4   33   40   23		
			5	SS	28															
180.5																				
5.5																		0   34   45   21		
			6	SS	30															
			7	SS	31															
			8	SS	30															
176.2																				
9.8	END OF BOREHOLE AT 9.8m.																			

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-10

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 842 962.5 E 307 524.1 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.30 - 2015.09.30 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	WATER NOT OBSERVED IN BOREHOLE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND AUGER CUTTINGS TO SURFACE.																

# RECORD OF BOREHOLE No 15-11

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 842 999.3 E 307 647.8 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.30 - 2015.09.30 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE				WATER CONTENT (%) w <sub>p</sub> w                      w <sub>L</sub>				GR	SA	SI	CL
187.1	GROUND SURFACE							20	40	60	80	100							
0.0	ASPHALT:(175mm)						187												
0.2	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS															
186.3																			
0.8	Silty CLAY, with sand, trace gravel, oxidized seams Hard Brown Moist (TILL)		1	SS	36		186												
			2	SS	60														
							185												
	Grey		3	SS	33														
	Very Stiff		4	SS	25		184												
							183												
			5	SS	29														
							182												
							181												
			6	SS	16														
							180												
			7	SS	15		179												
							178												
177.3																			
9.8	END OF BOREHOLE AT 9.8m.																		

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

## METRIC

[illegible]

# RECORD OF BOREHOLE No 15-12

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 843 038.1 E 307 770.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.29 - 2015.09.29 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa													
189.0	GROUND SURFACE							20	40	60	80	100									
0.0	ASPHALT:(175mm)							20	40	60	80	100									
0.2	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS																	
188.2																					
0.8	Silty CLAY, trace sand and gravel Hard Brown Moist (FILL)		1	SS	34		188														
187.5																					
1.5	Silty CLAY, with sand, trace gravel, oxidized seam Very Stiff to Hard Brown Moist (TILL)		2	SS	42		187														
			3	SS	28		186											2	34	41	23
	Grey		4	SS	35		185														
			5	SS	30		184											3	33	42	22
							183														
			6	SS	42		182														
			7	SS	38		181														
							180														
			8	SS	36																
179.2																					
9.8	END OF BOREHOLE AT 9.8m.																				

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-12

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 843 038.1 E 307 770.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.29 - 2015.09.29 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep29/2015      Dry Oct26/2015      7.0      182.0																

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# RECORD OF BOREHOLE No 15-13

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 843 081.9 E 307 889.4 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.29 - 2015.09.29 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED    + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE							PLASTIC LIMIT W <sub>P</sub> NATURAL MOISTURE CONTENT W    LIQUID LIMIT W <sub>L</sub>		
191.0	GROUND SURFACE							20	40	60	80	100					
0.0	ASPHALT:(175mm)							20	40	60	80	100					
0.2	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS										○			
190.2																	
0.8	Silty CLAY, trace sand and gravel Hard Brown Moist (FILL)		1	SS	30		190							○			
			2	SS	34		189							○			
188.7																	
2.3	Silty CLAY, with sand, trace gravel, oxidized seams Hard Brown Moist (TILL)		3	SS	38		188							○			
			4	SS	50									○			0 25 45 30
							187										
			5	SS	66		186							○			
	Boulder fragments Wet																
							185										
							184										
			7	SS	50		183							○			3 34 43 20
							182										
			8	SS	43									○			
181.2																	
9.8	END OF BOREHOLE AT 9.8m.																

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-13

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 843 081.9 E 307 889.4 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.29 - 2015.09.29 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	WATER LEVEL AT 4.3m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND AUGER CUTTINGS TO SURFACE.																



# RECORD OF BOREHOLE No 15-14

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 843 133.4 E 308 031.4 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.24 - 2015.09.24 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>P</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
192.7	GROUND SURFACE							20	40	60	80	100					
0.0	<b>SAND</b> , some silt, trace gravel Brown Moist (FILL)		1	GS			192										
191.9																	
0.8	Silty <b>CLAY</b> , with sand, trace gravel Very Stiff to Hard Brown Moist (FILL)		1	SS	29												
	Occasional cobbles		2	SS	30		191										3 34 43 20
	Grey		3	SS	20		190										
	Stiff		4	SS	9		189										
188.6																	
4.1	Silty <b>CLAY</b> , with sand, trace gravel Hard to Very Stiff Brown Moist (TILL)		5	SS	45		188										
	Grey		6	SS	29		187										

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-14

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 2 N 4 843 133.4 E 308 031.4 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.24 - 2015.09.24 CHECKED BY RPR

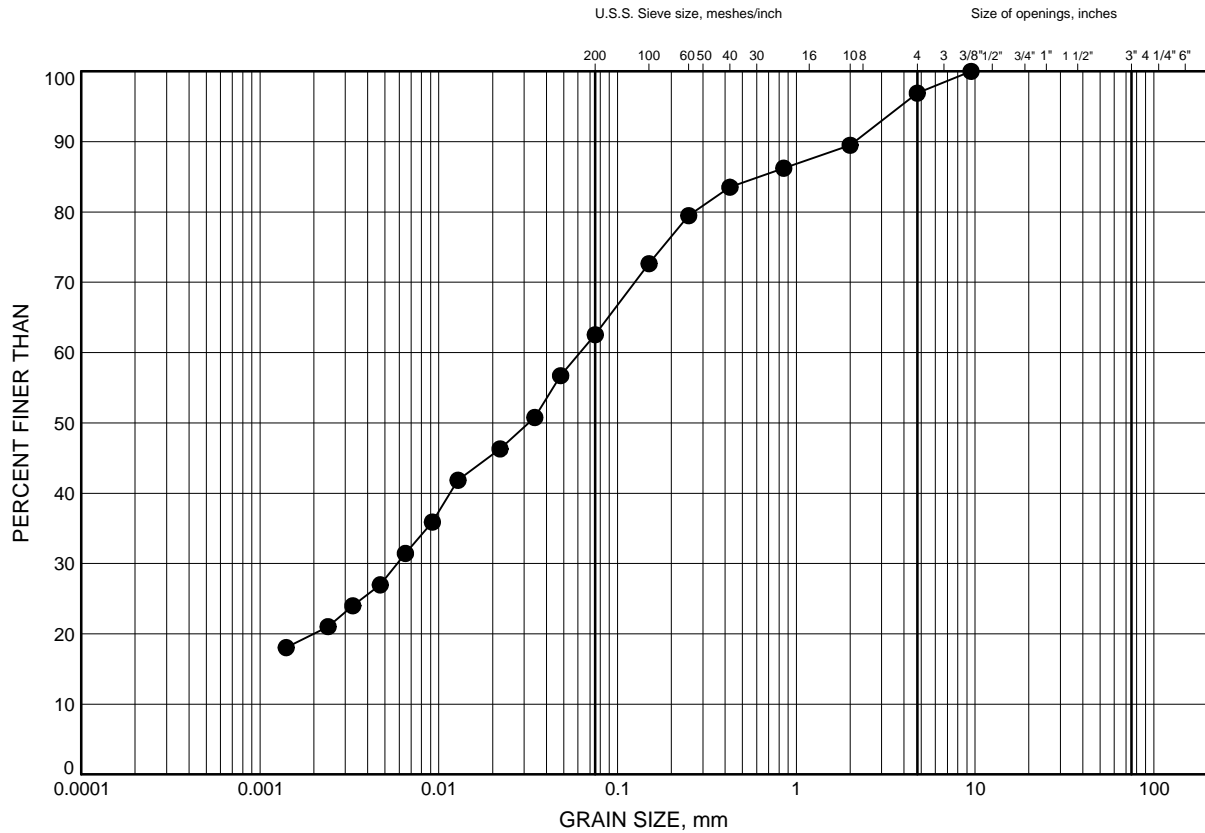
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100									
	Continued From Previous Page  Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep 24/ 15      8.6      184.1 Oct26/2015      4.5      188.2																

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE B1

### Silty CLAY FILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-14	1.83	190.87

Date ..October 2015.....  
W.P. ..2074-13-00.....



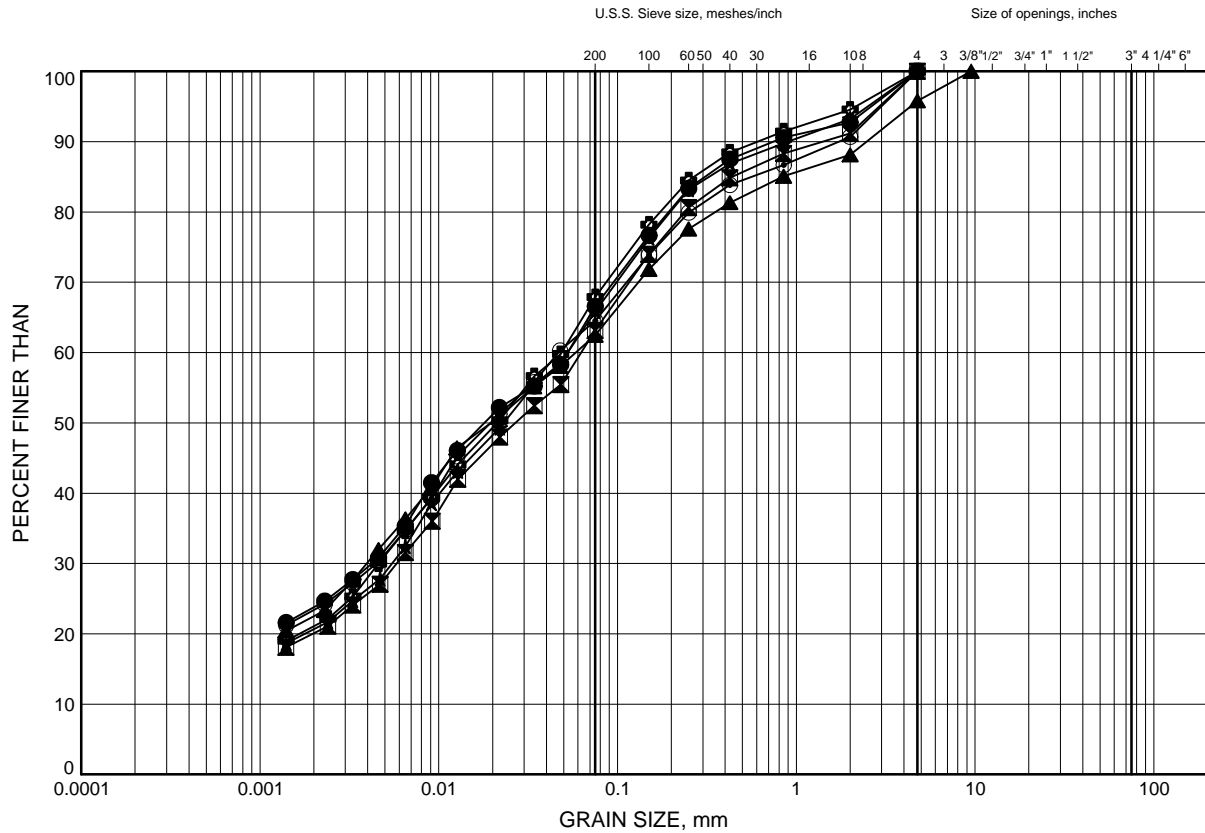
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE B2

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-09	2.59	183.21
⊠	15-09	7.92	177.88
▲	15-10	3.35	182.65
★	15-10	6.40	179.60
⊙	15-11	1.83	185.27
⊕	15-11	4.88	182.22

Date ..October 2015.....  
W.P. ..2074-13-00.....



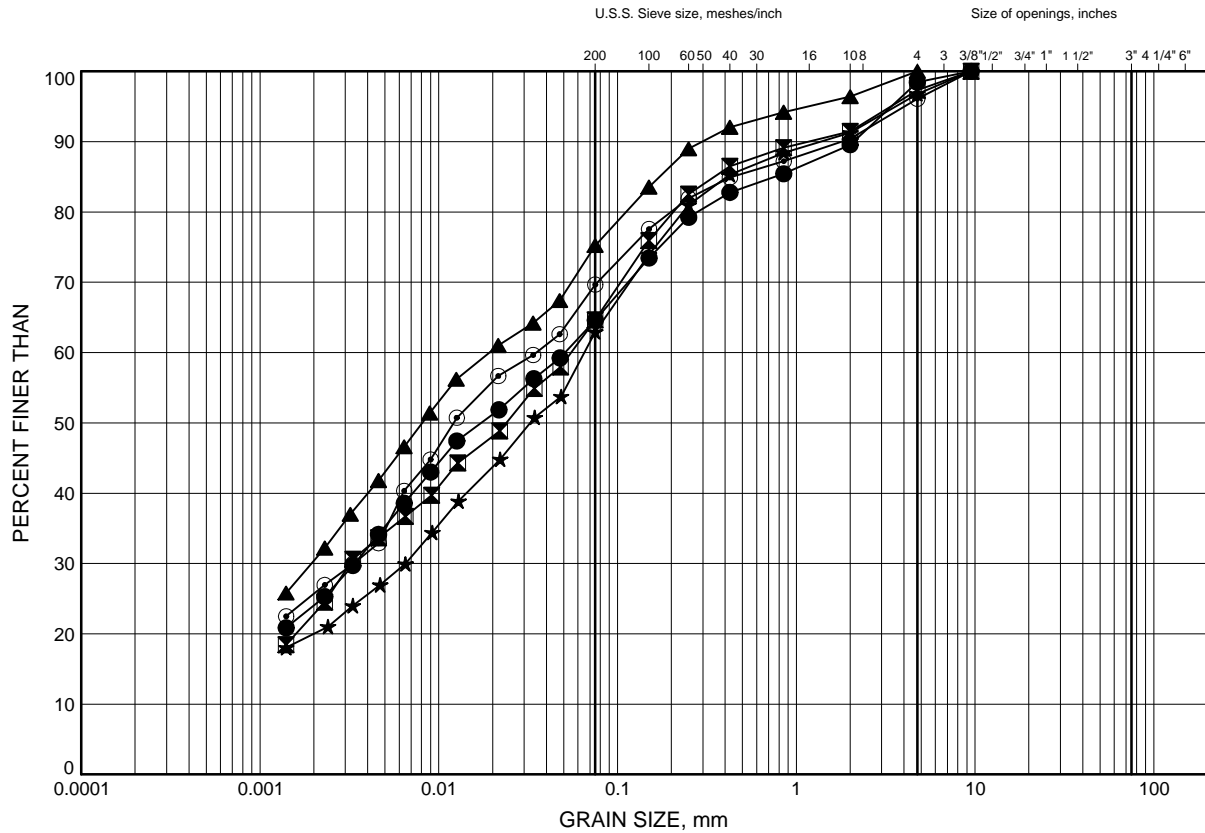
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE B3

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-12	2.59	186.41
⊠	15-12	4.88	184.12
▲	15-13	3.35	187.65
★	15-13	7.92	183.08
⊙	15-14	6.40	186.30

Date ..October 2015.....  
W.P. ..2074-13-00.....

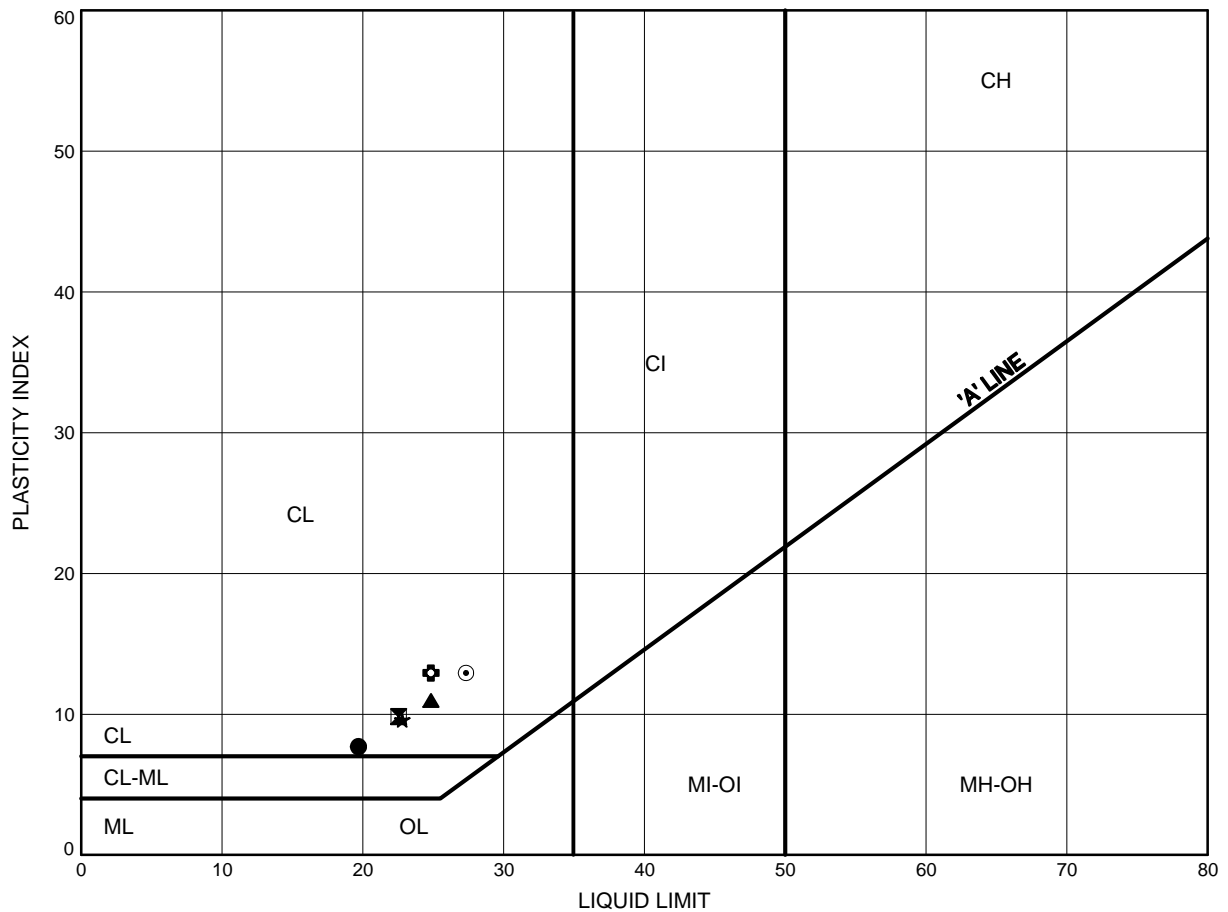


Prep'd .....AN.....  
Chkd. ....RPR.....

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE B4

Silty CLAY TILL



**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-09	7.92	177.88
⊠	15-10	3.35	182.65
▲	15-11	1.83	185.27
★	15-12	2.59	186.41
⊙	15-13	3.35	187.65
⊕	15-14	6.40	186.30

Date October 2015  
W.P. 2074-13-00



Prep'd AN  
Chkd. RPR

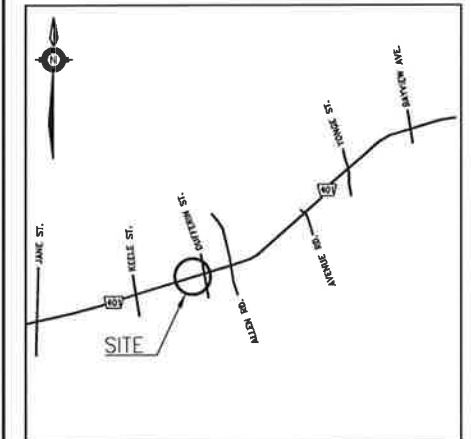
METRIC  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

CONT No  
GWP No 2074-13-00



HWY 401 WBL COLLECTORS  
NOISE BARRIER WALL (SEGMENT 2)  
WEST OF DUFFERIN STREET  
BOREHOLE LOCATIONS PLAN

SHEET



KEYPLAN

LEGEND

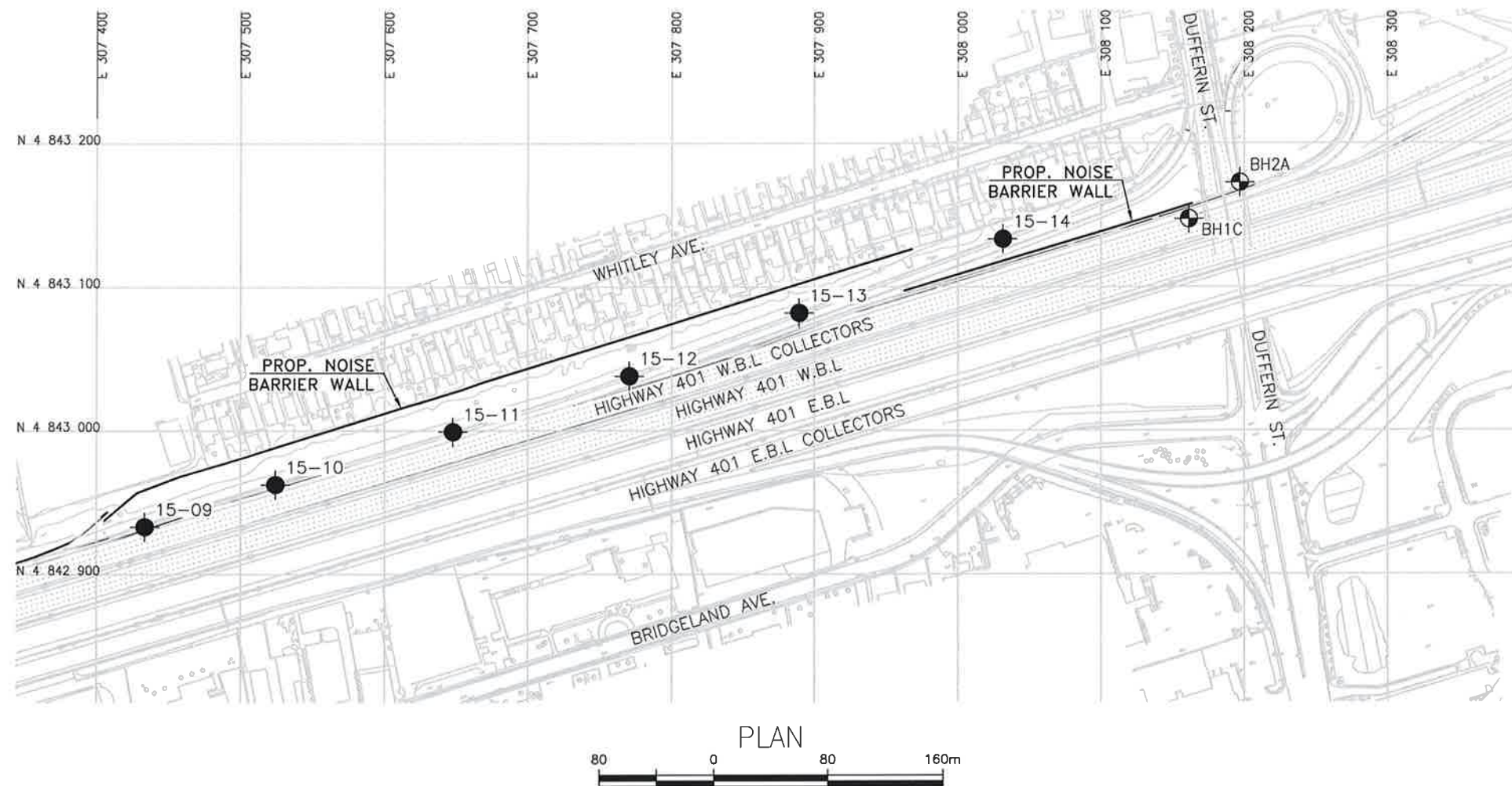
- Borehole (By Thurber)
- ⊕ Borehole (By Others)
- N Blows /0.3m (Std Pen Test, 475J/blow)
- CONE Blows /0.3m (60° Cone, 475J/blow)
- PH Pressure, Hydraulic
- ▽ Water Level
- ↑ Head Artesian Water
- ⊥ Piezometer
- 90% Rock Quality Designation (RQD)
- A/R Auger Refusal

NO	ELEVATION	NORTHING	EASTING
15-09	185.8	4 842 933.1	307 433.6
15-10	186.0	4 842 962.5	307 524.1
15-11	187.1	4 842 999.3	307 647.8
15-12	189.0	4 843 038.1	307 770.6
15-13	191.0	4 843 081.9	307 889.4
15-14	192.7	4 843 133.4	308 031.4
BH1C*	189.9	4 843 147.5	308 161.4
BH2A*	190.2	4 843 172.8	308 197.0

-NOTES-

- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.
- \* Estimated coordinates.

GEOCRES No. 30M11-259



PLAN



REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK RPR	CODE
DRAWN	AN	CHK SKP	SITE
			LOAD
			DATE DEC 2015
			STRUCT
			DWG 2

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

# RECORD OF BOREHOLE NO. 10

FOUNDATION SECTION

JOB 63-F-24 LOCATION 218+35 102' Lt. ORIGINATED BY B.M.G.  
W.P. 229-60 BORING DATE March 25, 1963. COMPILED BY B.M.G.  
DATUM Geodetic BOREHOLE TYPE Pennsylvania Auger - 4 1/2" Ø CHECKED BY K.G.S.

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL		BULK DENSITY	REMARKS
ELEV	DESCRIPTION	STRAT. PLT.	NUMBER	TYPE	BLOWS / FOOT	20 40 60 80 100	PLASTIC LIMIT — WP		
DEPTH							WATER CONTENT — W		
							WP — W — WL		
							WATER CONTENT %		
623.0	Groundlevel								
0.0	Topsoil and fill material V. stiff to hard. Brown and black.								
618.4			1	SS	32				
4.6			2	SS	30				
	Silty clay and clayey silt with traces of sand and fine gravel. (Glacial Till)		3	SS	31				
	V. stiff to hard.								
	Brown changing to grey at El. 613.		4	SS	37				
			5	SS	27				
601.5			6	SS	36				
21.5	End of borehole.								

NWL 605.0  
18.0





## **Appendix C**

### **Noise Barrier Wall, Segment 3, East of Bathurst Street off Ramp and West of Bathurst Street off Ramp Boreholes 15-15 to 15-19 (Current investigation) Boreholes 16, 17, 18 (Previous investigation)**

- Record of Borehole Sheets
- Laboratory Test Results
- Drawing titled “Borehole Locations”

# RECORD OF BOREHOLE No 15-15

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 843 604.7 E 309 458.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.17 - 2015.09.17 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
190.6	GROUND SURFACE							20	40	60	80	100						
0.0	ASPHALT:(100mm)																	
190.3	CONCRETE:(200mm)																	
0.3	Gravelly SAND, trace silt, trace gravel		1	GS			190											
189.8	Brown																	
0.8	Moist (FILL)		1	SS	11													
	Silty CLAY, with sand																	
	Stiff																	
	Brown		2	SS	13		189											
	Moist (FILL)																	
	Brown to Brownish Grey																	
			3	SS	8		188										0	32 42 26
	Occasional rootlets		4	SS	14		187											
	Grey																	
	Very Stiff		5	SS	21		186											
184.8							185											
5.8	Silty CLAY, with sand																	
	Stiff																	
	Grey		6	SS	14		184										0	31 42 27
	Moist																	
183.4																		
7.2	Silty CLAY, with sand, trace gravel																	
	Very Stiff to Hard																	
	Brown		7	SS	28		183											
	Moist (TILL)																	
			8	SS	44		182											
180.8							181										2	34 44 20
9.8	END OF BOREHOLE AT 9.8m.																	

Continued Next Page

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

# RECORD OF BOREHOLE No 15-15

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 843 604.7 E 309 458.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.17 - 2015.09.17 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	NO WATER OBSERVED IN BOREHOLE UPON COMPLETION OF DRILLING. Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep17/2015      Dry Oct26/2015      6.9      183.7																

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# RECORD OF BOREHOLE No 15-16

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 843 706.8 E 309 621.2 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.16 - 2015.09.16 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT      NATURAL MOISTURE CONTENT      LIQUID LIMIT				UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)					
								<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div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Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE

## METRIC

SOIL PROFILE					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES	GROUND WATER CONDITIONS	ELEVATION SCALE
<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div>SHEAR STRENGTH kPa</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div> <div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div> <div>w<sub>P</sub> w w<sub>L</sub></div> <div>WATER CONTENT (%)</div> <div>UNIT WEIGHT</div> <div>γ</div> <div>REMARKS &amp; GRAIN SIZE DISTRIBUTION (%)</div> <div>GR SA SI CL</div>					
	Continued From Previous Page				
	NO WATER OBSERVED IN BOREHOLE UPON COMPLETION OF DRILLING. BOREHOLE WAS BACKFILLED WITH AUGER CUTTINGS AND BENTONITE HOLEPLUG TO 0.6m, SAND FROM 0.6m TO 0.3m. THEN ASPHALT COLDPATCH TO SURFACE.				

# RECORD OF BOREHOLE No 15-17

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 843 795.0 E 309 775.8 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.16 - 2015.09.16 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)				
184.4	GROUND SURFACE															
0.0	ASPHALT:(200mm)															
0.2	Gravelly <b>SAND</b> , some silt and clay		1	GS			184									22 57 21 (SI+CL)
183.6	Brown Moist (FILL)															
0.8	Silty <b>CLAY</b> , trace sand and gravel		1	SS	10		183									
183.0	Stiff Brown Moist (FILL)															
1.4	Silty <b>CLAY</b> , with sand, trace gravel, oxidized seams Very Stiff to Hard		2	SS	20		182									
	Brown Moist (TILL)															
			3	SS	35		181									2 37 44 17
			4	SS	49		180									
			5	SS	50/ 0.075		179									
	Occasional boulder fragments Grey		6	SS	42		178									0 40 43 17
			7	SS	38		177									
			8	SS	40		176									
174.6							175									
9.8	END OF BOREHOLE AT 9.8m.															

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-17

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 843 795.0 E 309 775.8 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.16 - 2015.09.16 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)				
								20	40	60	80	100		20	40	60		GR	SA	SI	CL	
	Continued From Previous Page  NO WATER OBSERVED IN BOREHOLE UPON COMPLETION OF DRILLING. Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep17/2015      Dry Oct26/2015      2.7      181.7																					

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15



# RECORD OF BOREHOLE No 15-18

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 844 028.3 E 309 819.0 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.15 - 2015.09.15 CHECKED BY RPR

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 <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL      × LAB VANE				WATER CONTENT (%) w <sub>P</sub> w      w <sub>L</sub>					
184.2	GROUND SURFACE							20	40	60	80	100					
0.0	ASPHALT: (150mm)							20	40	60	80	100					
0.2	CONCRETE: (250mm)							20	40	60	80	100					
0.4	SAND, some silt and clay, trace gravel		1	GS			184							○			3    81    16 (SI+CL)
183.4	Brown Moist (FILL)		1	SS	12									○			
0.8	Silty CLAY, trace sand and gravel Stiff						183										
182.7	Brown Moist (FILL)		2	SS	21									○			
1.5	Silty CLAY, with sand, oxidized seams Very Stiff to Hard						182							○			
	Brown Moist (TILL)		3	SS	27									○			
			4	SS	48		181							○			0    38    42    20
							180										
	Grey		5	SS	36		179							○			
							178							○			
							177							○			
			7	SS	100/ 0.275		176							○			
							175							○			
174.4	END OF BOREHOLE AT 9.8m.		8	SS	70												
9.8																	

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-18

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 844 028.3 E 309 819.0 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.15 - 2015.09.15 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	NO WATER OBSERVED IN BOREHOLE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND AUGER CUTTINGS TO SURFACE.																

## METRIC

[illegible]

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity

# RECORD OF BOREHOLE No 15-19

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 3 N 4 843 929.4 E 309 918.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.09.15 - 2015.09.15 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
	Continued From Previous Page																
	OBSERVED IN BOREHOLE. Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Sep15/2015      Dry Oct26/2015      6.9      177.4																

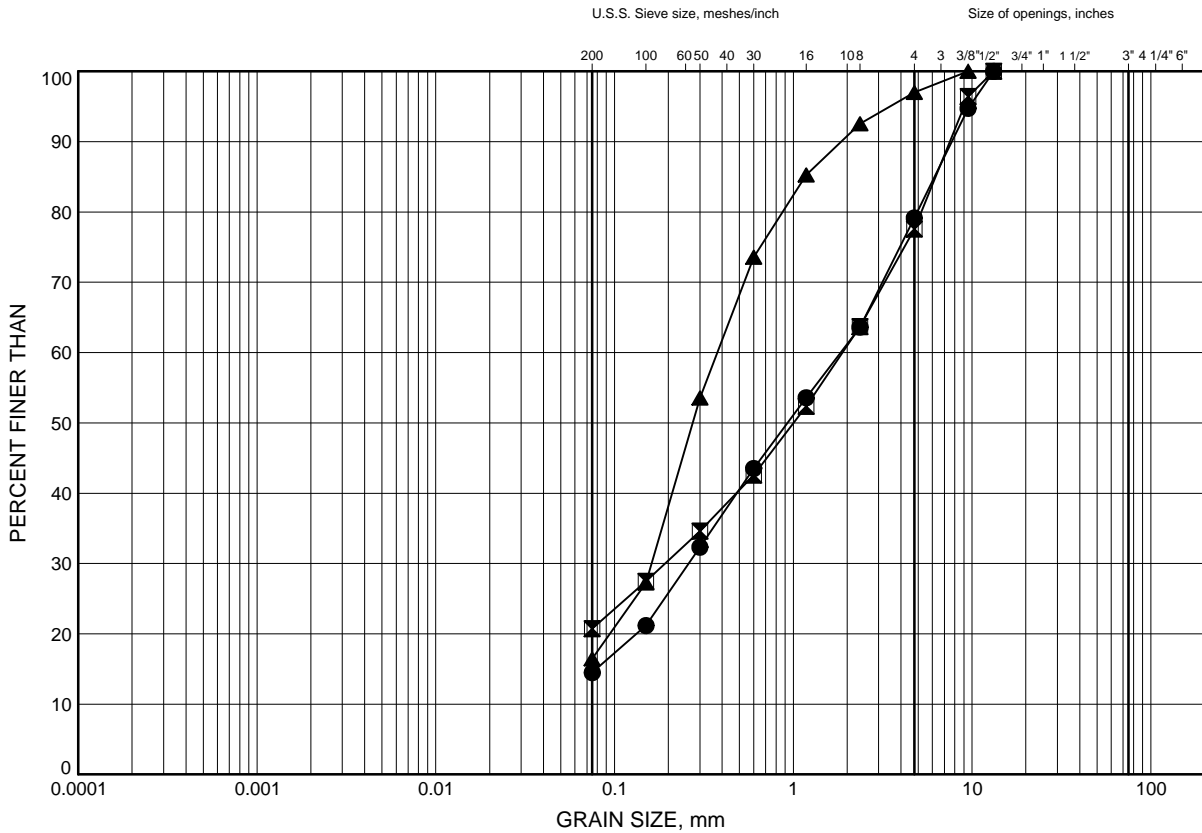
ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE C1

### Gravelly SAND FILL/SAND FILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-16	0.46	185.54
⊠	15-17	0.46	183.94
▲	15-18	0.46	183.74

Date ..October 2015.....  
W.P. ..2074-13-00.....



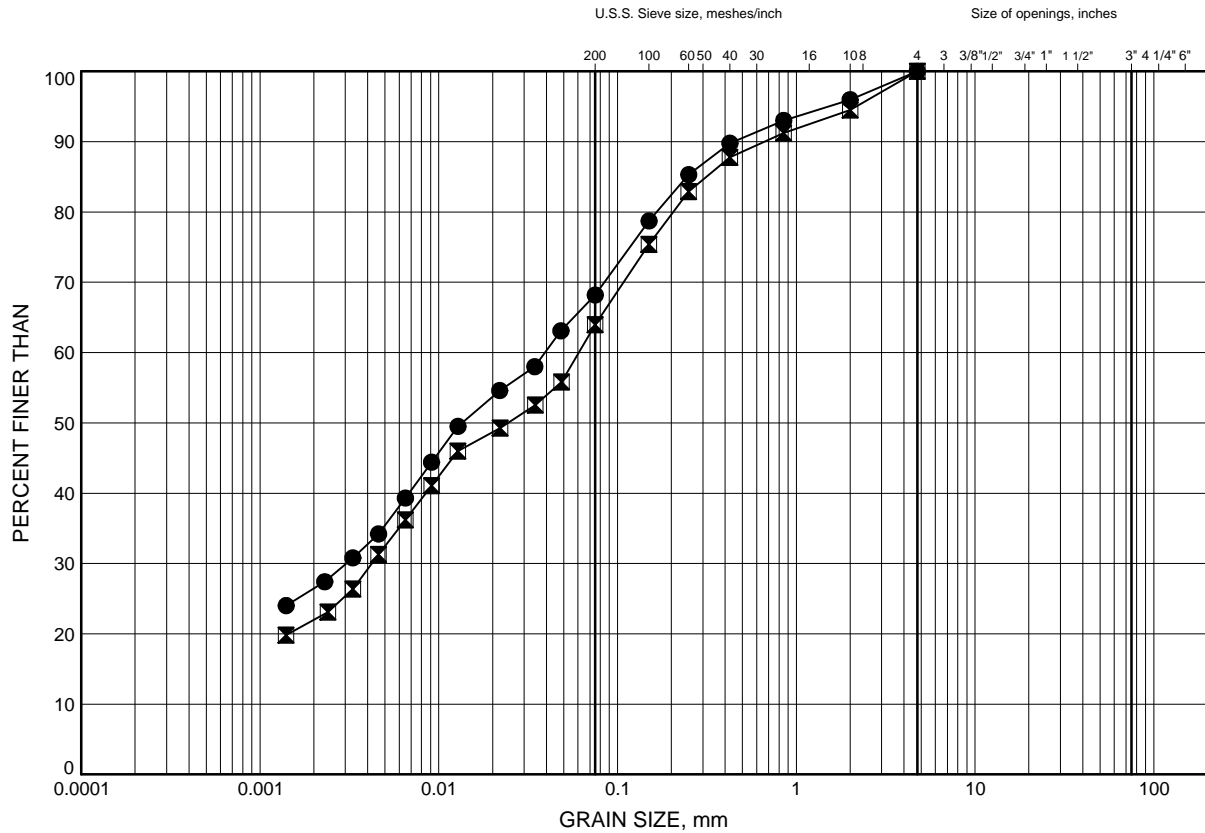
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Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE C2

### Silty CLAY FILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-15	2.59	188.01
⊠	15-19	1.83	182.47

Date ..October 2015.....  
W.P. ..2074-13-00.....



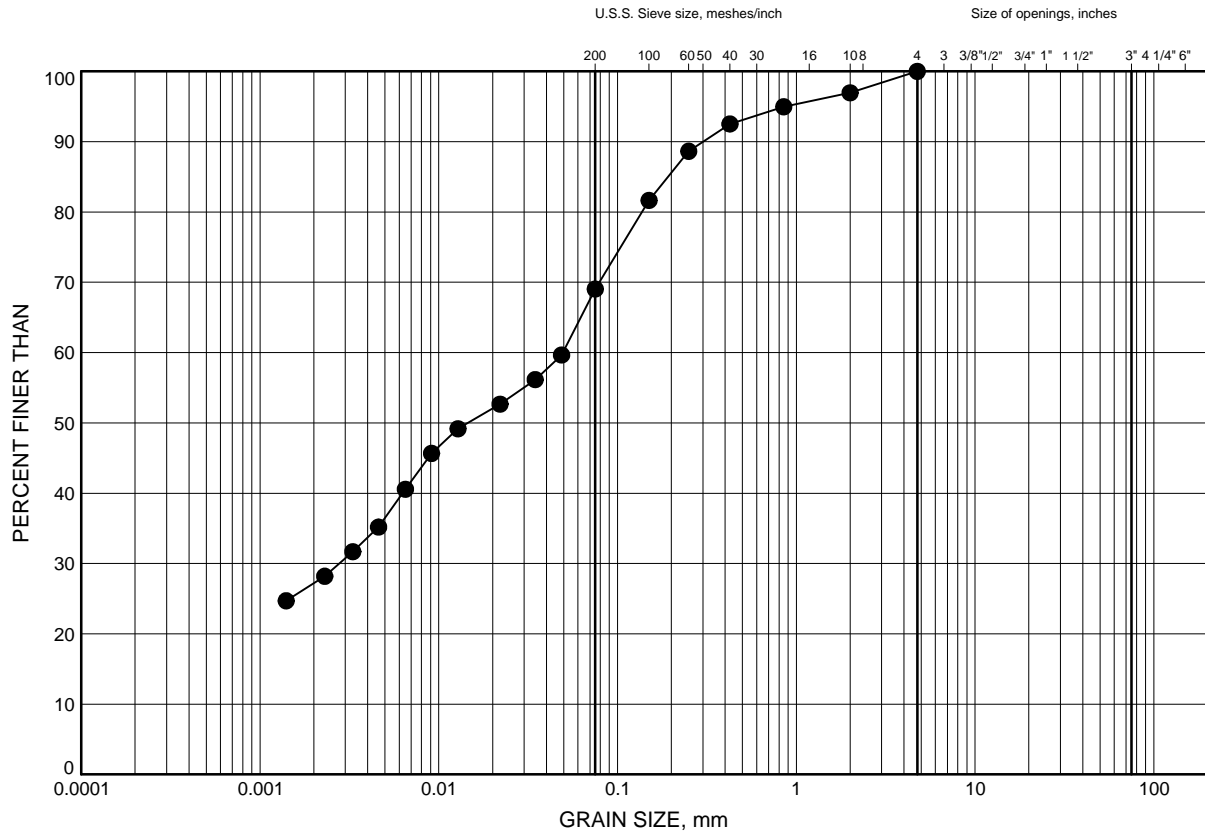
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE C3

### Silty CLAY



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-15	6.40	184.20

Date October 2015  
W.P. 2074-13-00

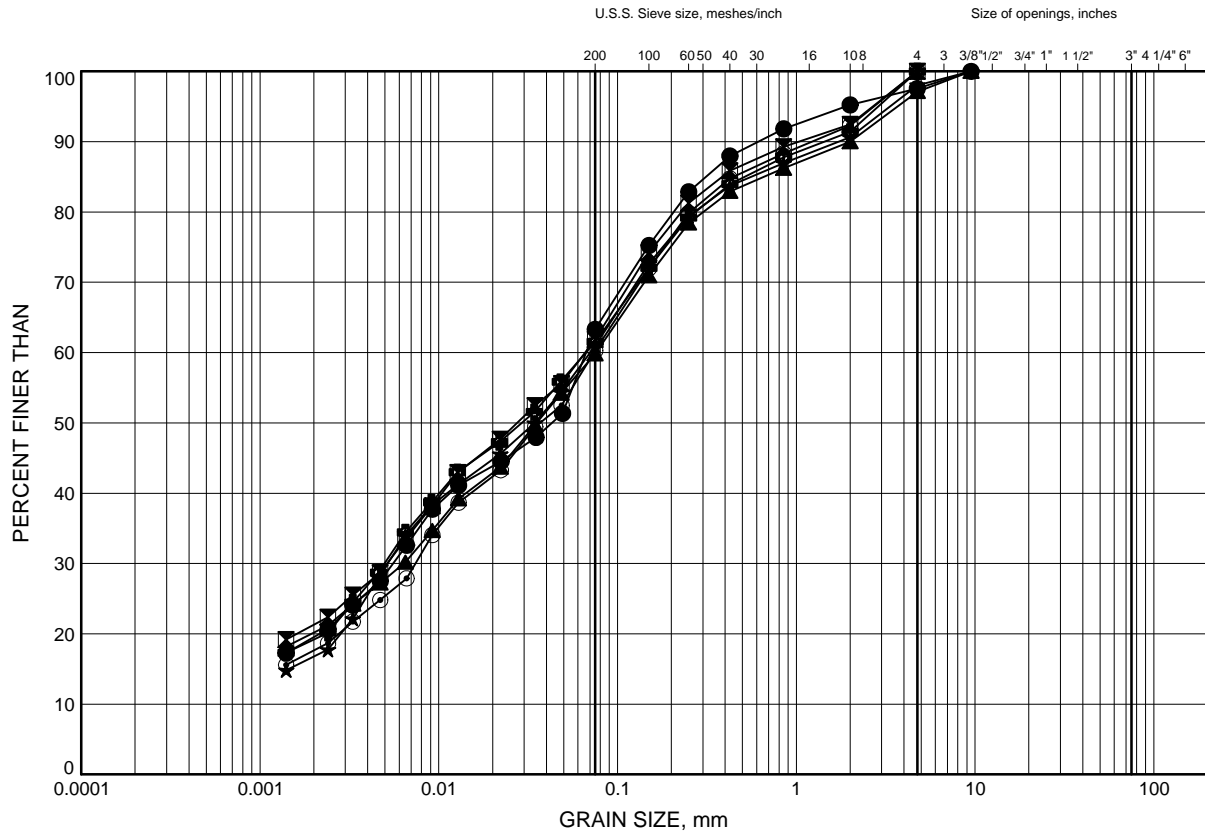


Prep'd AN  
Chkd. RPR

Hwy 401 WBL Coll Rehab Bayview to Jane  
**GRAIN SIZE DISTRIBUTION**

FIGURE C4

**Silty CLAY TILL**



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

**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-15	9.45	181.15
⊠	15-16	3.35	182.65
▲	15-16	7.92	178.08
★	15-17	2.59	181.81
⊙	15-17	6.40	178.00
⊕	15-18	3.35	180.85

Date October 2015  
W.P. 2074-13-00



Prep'd AN  
Chkd. RPR

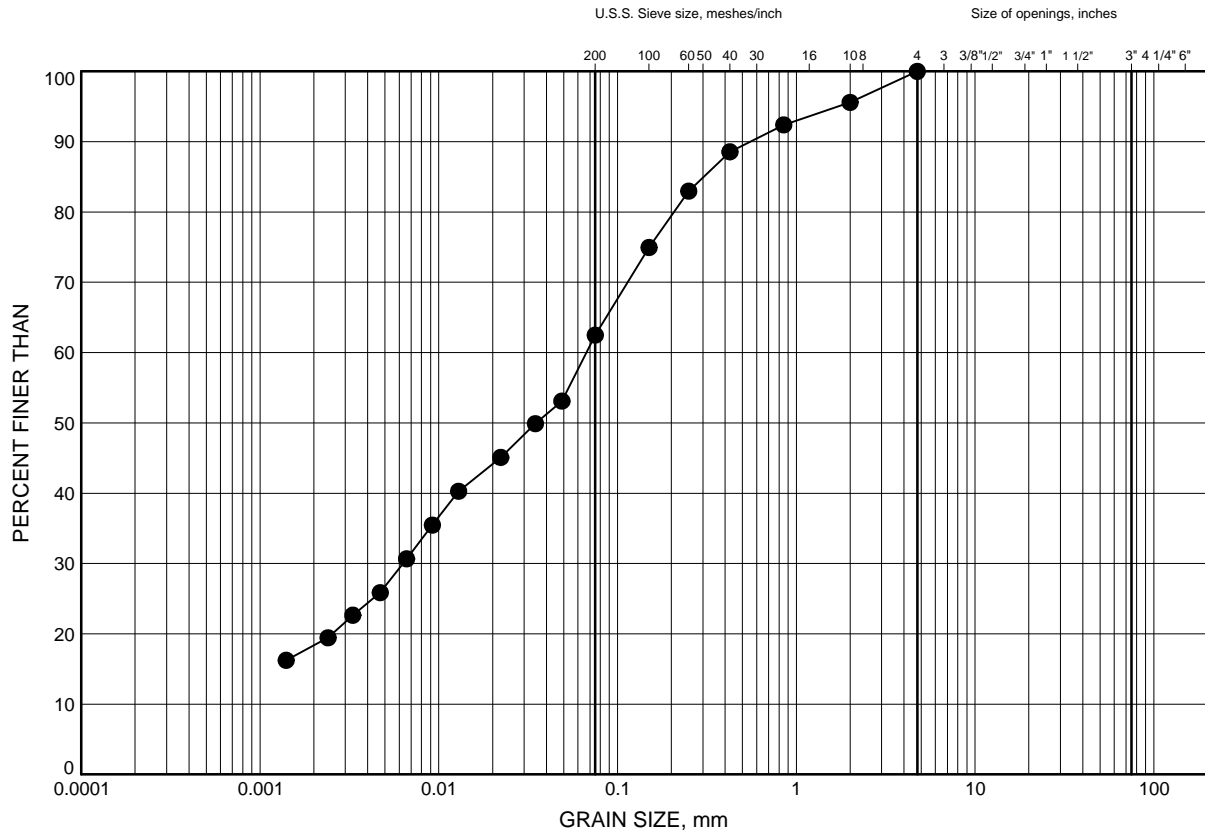


# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE C5

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-19	6.40	177.90

Date ..October 2015.....  
W.P. ..2074-13-00.....

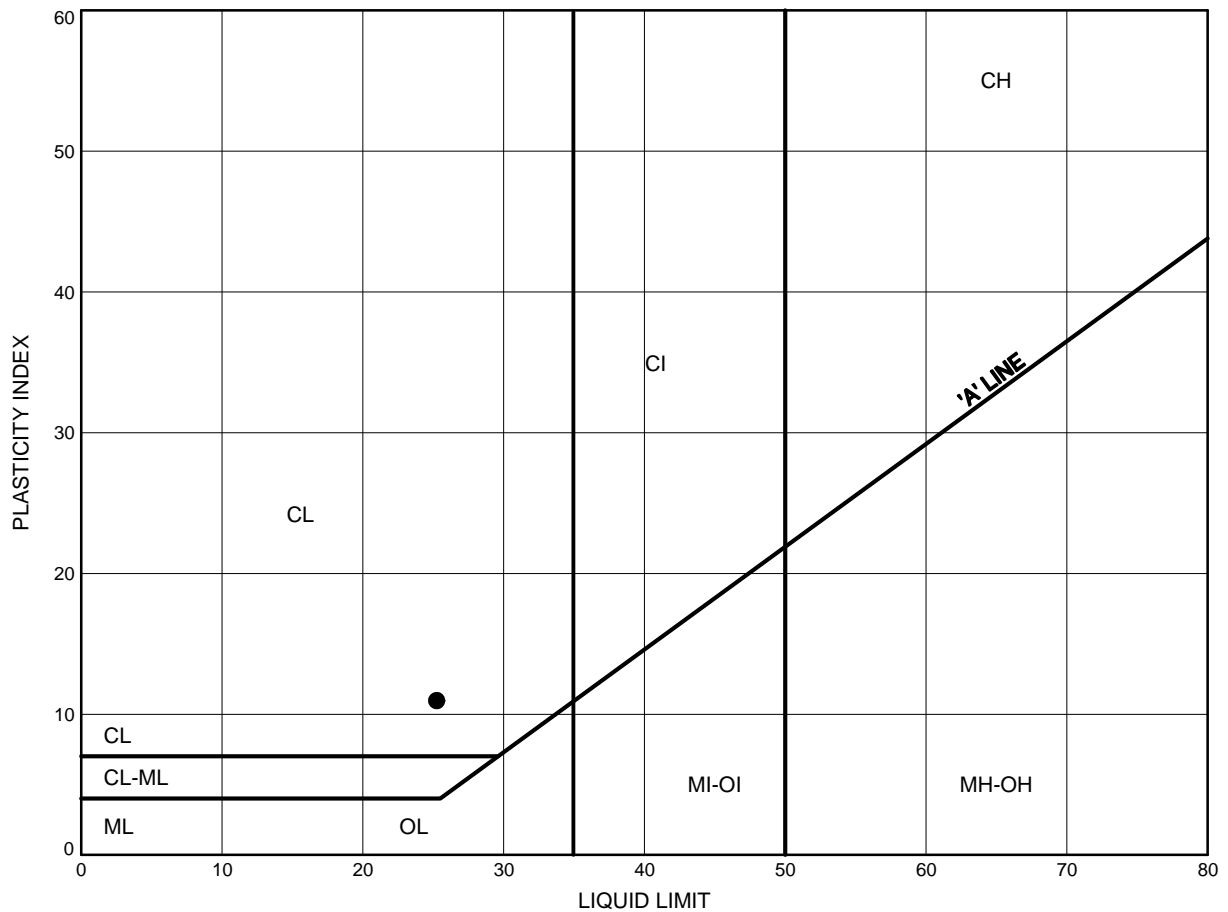


Prep'd .....AN.....  
Chkd. ....RPR.....

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE C6

Silty CLAY FILL



**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-19	1.83	182.47

Date ..October 2015.....  
W.P. ..2074-13-00.....

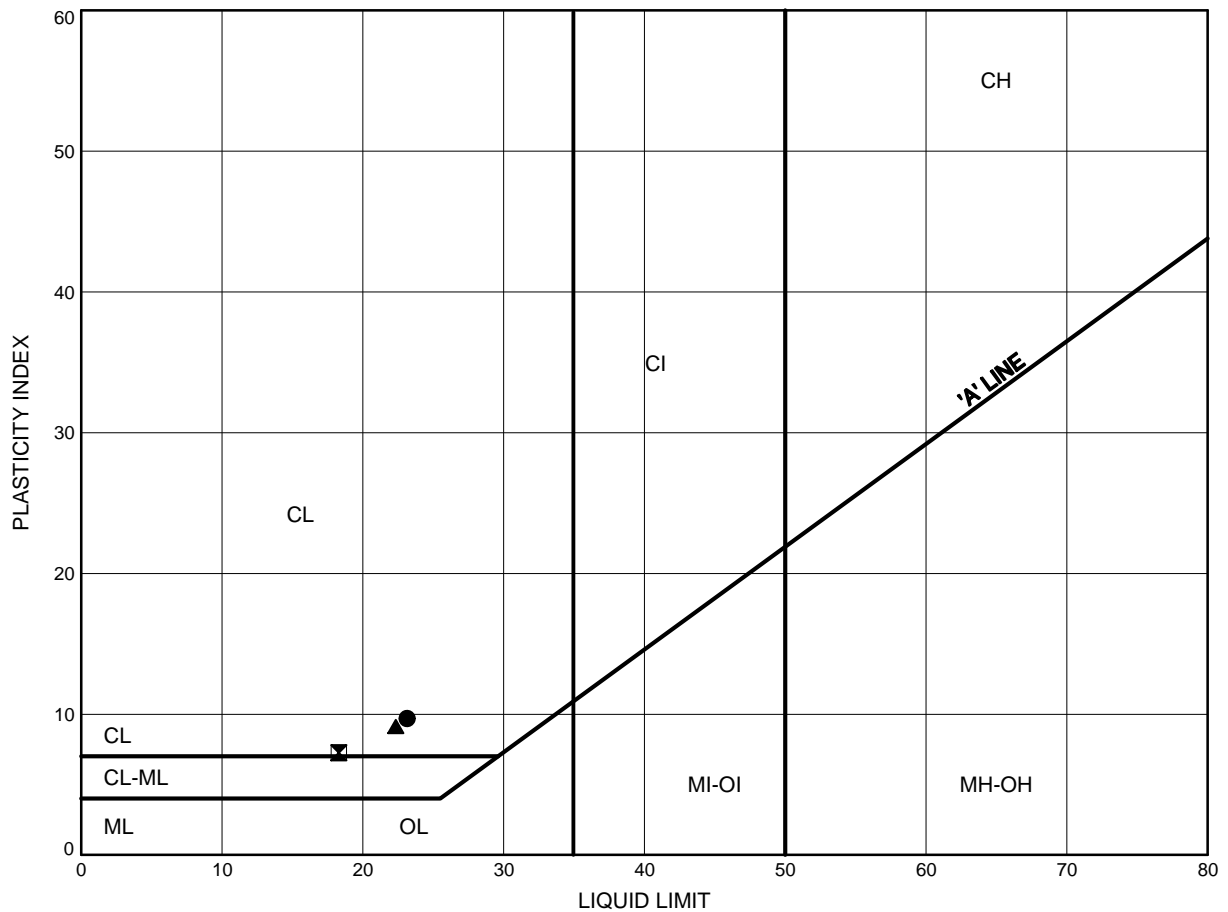


Prep'd .....AN.....  
Chkd. ....RPR.....

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE C7

Silty CLAY TILL



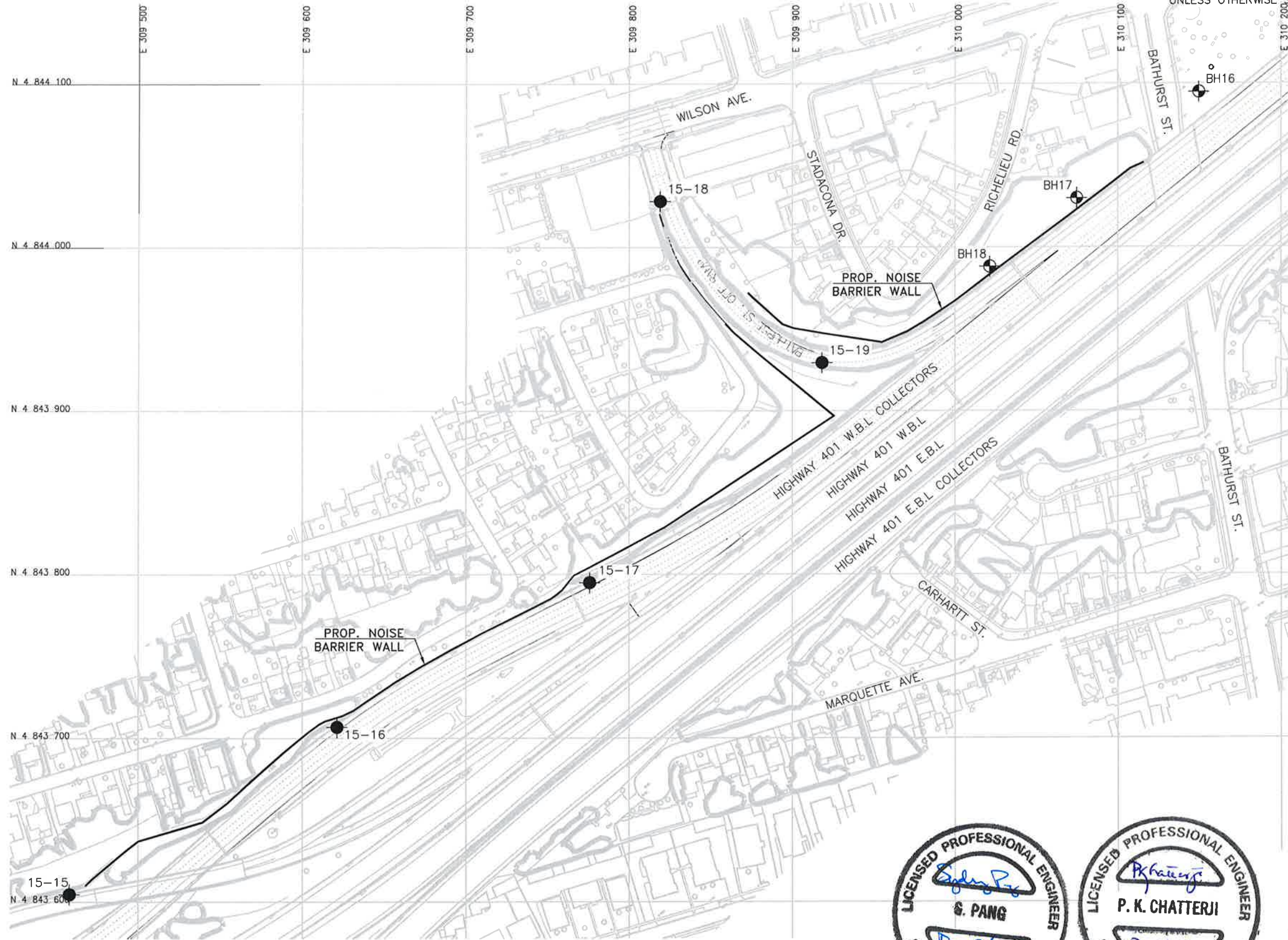
**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-15	9.45	181.15
⊠	15-17	6.40	178.00
▲	15-18	3.35	180.85

Date October 2015  
W.P. 2074-13-00

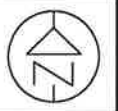


Prep'd AN  
Chkd. RPR



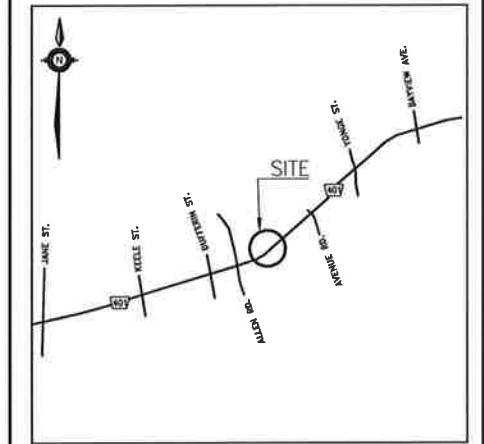
METRIC  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

CONT No  
GWP No 2074-13-00



HWY 401 WBL COLLECTORS  
NOISE BARRIER WALL (SEGMENT 3)  
E. & W. OF BATHURST ST. OFF RAMP  
BOREHOLE LOCATIONS PLAN

SHEET



KEYPLAN

LEGEND

- Borehole (By Thurber)
- ⊕ Borehole (By Others)
- 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
15-15	190.6	4 843 604.7	309 458.3
15-16	186.0	4 843 706.8	309 621.2
15-17	184.4	4 843 795.0	309 775.8
15-18	184.2	4 844 028.3	309 819.0
15-19	184.3	4 843 929.4	309 918.3
BH16*	183.1	4 844 094.8	310 149.6
BH17*	183.4	4 844 030.0	310 074.6
BH18*	183.3	4 843 988.2	310 021.2

NOTES-

- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.
- \* Estimated coordinates.

GEOCRES No. 30M11-259



PLAN



REVISIONS	DATE	BY	DESCRIPTION
DESIGN RPR	CHK RPR	CODE	LOAD
DRAWN AN	CHK SKP	SITE	STRUCT
			DWG 3



# OFFICE REPORT ON SOIL EXPLORATION

### SAMPLE CONDITION

## SAMPLE TYPES

## ABBREVIATIONS



DISTURBED  
FAIR  
GOOD  
LOST

A.S. - AUGER SAMPLE  
S.T. - SLOTTED TUBE  
W.S. - WASHED SAMPLE  
D.O. - DRIVE-OPEN  
D.F. - DRIVE-FOOT VALVE  
C.S. - CHUNK SAMPLE

F.S. - FOIL SAMPLE  
S.O. - SLEEVE-OPEN  
S.F. - SLEEVE-FOOT VALVE  
T.O. - THIN WALLED OPEN  
R.C. - ROCK CORE

- V - IN-SITU VANE TEST
- M - MECHANICAL ANALYSIS
- U - UNCONFINED COMPRESSION
- QC - TRIAXIAL CONSOLIDATED QUICK
- Q - TRIAXIAL QUICK
- S - TRIAXIAL SLOW

γ - WET UNIT WEIGHT PCF  
 K - PERMEABILITY  
 C - CONSOLIDATION

WL - WATER LEVEL IN CASING  
WT - WATER TABLE IN SOIL

SOIL PROFILE					COMPRESSIVE STRENGTH TONS PER SQ. FT. UNDRAINED TRIAXIAL TEST		OTHER TESTS	SAMPLES			
ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	WATER CONTENT W%	0 NAT. □ LW △ Pw		CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.
DYNAMIC PENETRATION TEST BLOWS PER FOOT											
593.0 4.0	STANDPIPE W. @ EL. 593.1 MAY 5 1962	GROUND LEVEL		590	BH #15		γ = 144		2' D.O.	1	35
579.0 24.0		LOOSE TO COMPACT BROWN SILTY TILL FILL		570	101 BLOW FOR LAST 30 INCHES END OF PENETRATION TEST AT ELEV. 595.2						
END OF HOLE		DENSE TO VERY DENSE BROWN SILTY TILL	550			γ = 140		D.O.	3	> 100	
			530								γ = 140
			510			γ = 140		D.O.	5	> 100	
			570								γ = 140
						γ = 140		D.O.	7	> 100	
											γ = 140
						γ = 140		D.O.	9	> 100	
											γ = 140
						γ = 140		D.O.	11	> 100	
											γ = 140
						γ = 140		D.O.	13	> 100	
											γ = 140
						γ = 140		D.O.	15	> 100	
											γ = 140
						γ = 140		D.O.	17	> 100	
											γ = 140
						γ = 140		D.O.	19	> 100	
											γ = 140
						γ = 140		D.O.	21	> 100	
											γ = 140
						γ = 140		D.O.	23	> 100	
											γ = 140
						γ = 140		D.O.	25	> 100	
											γ = 140
						γ = 140		D.O.	27	> 100	
											γ = 140
						γ = 140		D.O.	29	> 100	
											γ = 140
						γ = 140		D.O.	31	> 100	
											γ = 140
						γ = 140		D.O.	33	> 100	
											γ = 140
						γ = 140		D.O.	35	> 100	
											γ = 140
						γ = 140		D.O.	37	> 100	
											γ = 140
						γ = 140		D.O.	39	> 100	
											γ = 140
						γ = 140		D.O.	41	> 100	
											γ = 140
						γ = 140		D.O.	43	> 100	
											γ = 140
						γ = 140		D.O.	45	> 100	
											γ = 140
						γ = 140		D.O.	47	> 100	
											γ = 140
						γ = 140		D.O.	49	> 100	
											γ = 140
						γ = 140		D.O.	51	> 100	
											γ = 140
						γ = 140		D.O.	53	> 100	
											γ = 140
						γ = 140		D.O.	55	> 100	
											γ = 140
						γ = 140		D.O.	57	> 100	
											γ = 140
						γ = 140		D.O.	59	> 100	
											γ = 140
						γ = 140		D.O.	61	> 100	
											γ = 140
						γ = 140		D.O.	63	> 100	
											γ = 140
						γ = 140		D.O.	65	> 100	
											γ = 140
						γ = 140		D.O.	67	> 100	
											γ = 140
						γ = 140		D.O.	69	> 100	
											γ = 140
						γ = 140		D.O.	71	> 100	
											γ = 140
						γ = 140		D.O.	73	> 100	
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											γ = 140
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											γ = 140
						γ = 140		D.O.	103	> 100	
											γ = 140
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						γ = 140		D.O.	107	> 100	
											γ = 140
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											γ = 140
						γ = 140		D.O.	113	> 100	
											γ = 140
						γ = 140		D.O.	115	> 100	
											γ = 140
						γ = 140		D.O.	117	> 100	
											γ = 140
						γ = 140					

# GEOCON

## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT 27358 BORING # 17 18 DATUM GEODETIC CASING WT  
 BORING DATE APRIL 30 1962 REPORT DATE MAY 1 1962 COMPILED BY ALL CHECKED BY DBO  
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

### SAMPLE CONDITION



A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE

### SAMPLE TYPES

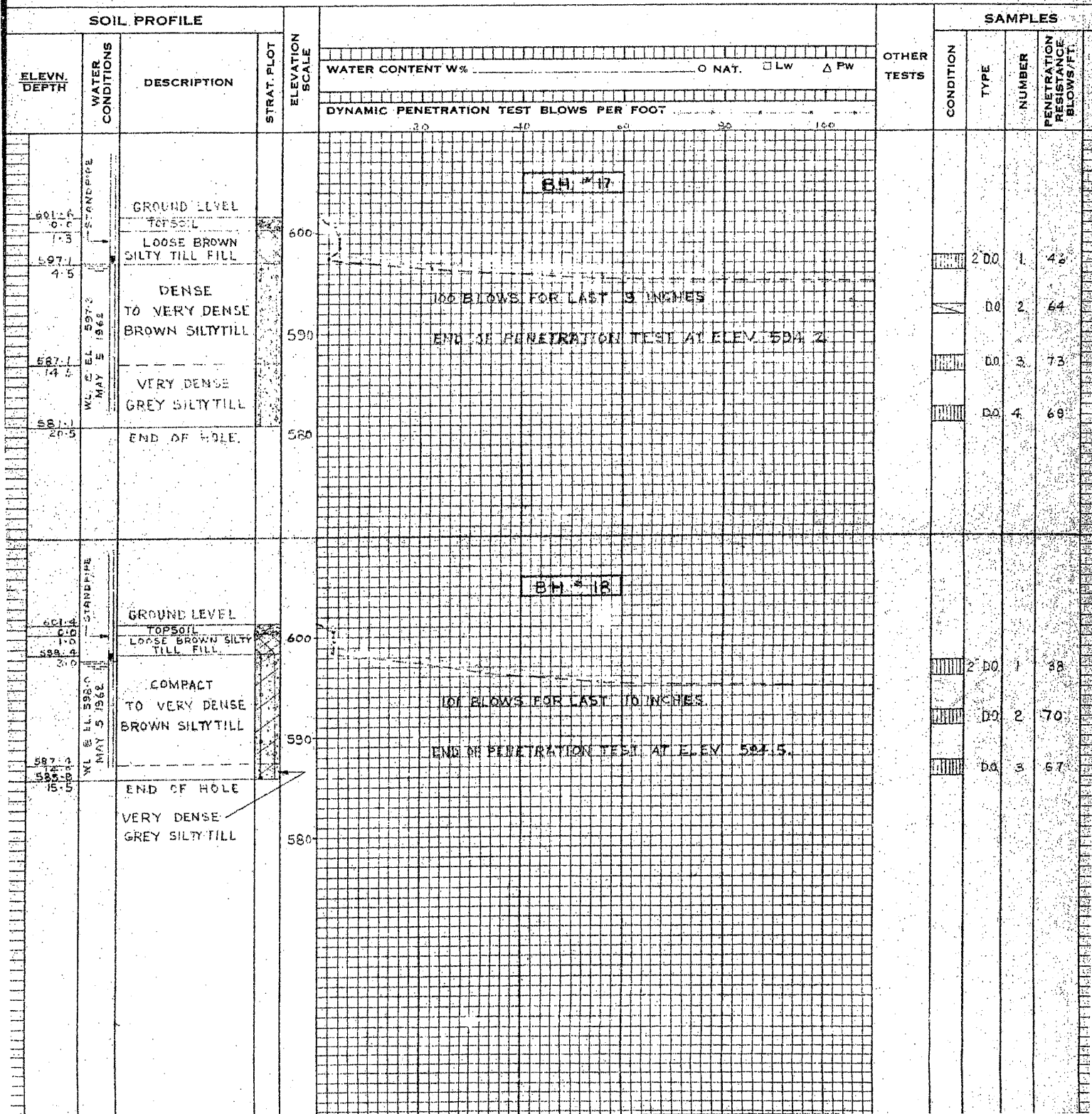
F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

### ABBREVIATIONS

V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 QC - TRIAXIAL CONSOLIDATED QUICK  
 Q - TRIAXIAL QUICK  
 S - TRIAXIAL SLOW

γ - WET UNIT WEIGHT  
 K - PERMEABILITY  
 C - CONSOLIDATION

WL - WATER LEVEL IN CASING  
 WT - WATER TABLE IN SOIL



## **Appendix D**

### **Noise Barrier Wall, Segment 4, West of Avenue Road Borehole 15-20 (Current investigation) Boreholes 11 to 14 (Previous investigation)**

- Record of Borehole Sheets
- Laboratory Test Results
- Drawing titled “Borehole Locations”

# RECORD OF BOREHOLE No 15-20

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 4 N 4 844 596.1 E 310 776.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.25 - 2015.08.25 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W <sub>P</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED    + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE								
180.2	GROUND SURFACE															
0.0	ASPHALT:(175mm)															
0.2	SAND, trace silt and gravel Brown Moist (FILL)		1	GS												
179.5																
0.7	Silty CLAY, with sand, trace gravel, oxidized seams Very Stiff Brown Moist (TILL)		1	SS	19											
			2	SS	18											
	Grey		3	SS	24											7 37 34 22
			4	SS	14											
			5	SS	25											
	Boulder fragments Hard		6	SS	100/ 0.225											4 42 39 15
172.9																
7.3	Silty CLAY, trace gravel Hard Grey Moist		7	SS	53											0 0 26 74
171.5																
8.7	Silty SAND, trace clay and gravel Dense Grey Wet (TILL)		8	SS	45											
170.4																
9.8	END OF BOREHOLE AT 9.8m.															

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15



# RECORD OF BOREHOLE No 15-20

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 4 N 4 844 596.1 E 310 776.6 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.25 - 2015.08.25 CHECKED BY RPR

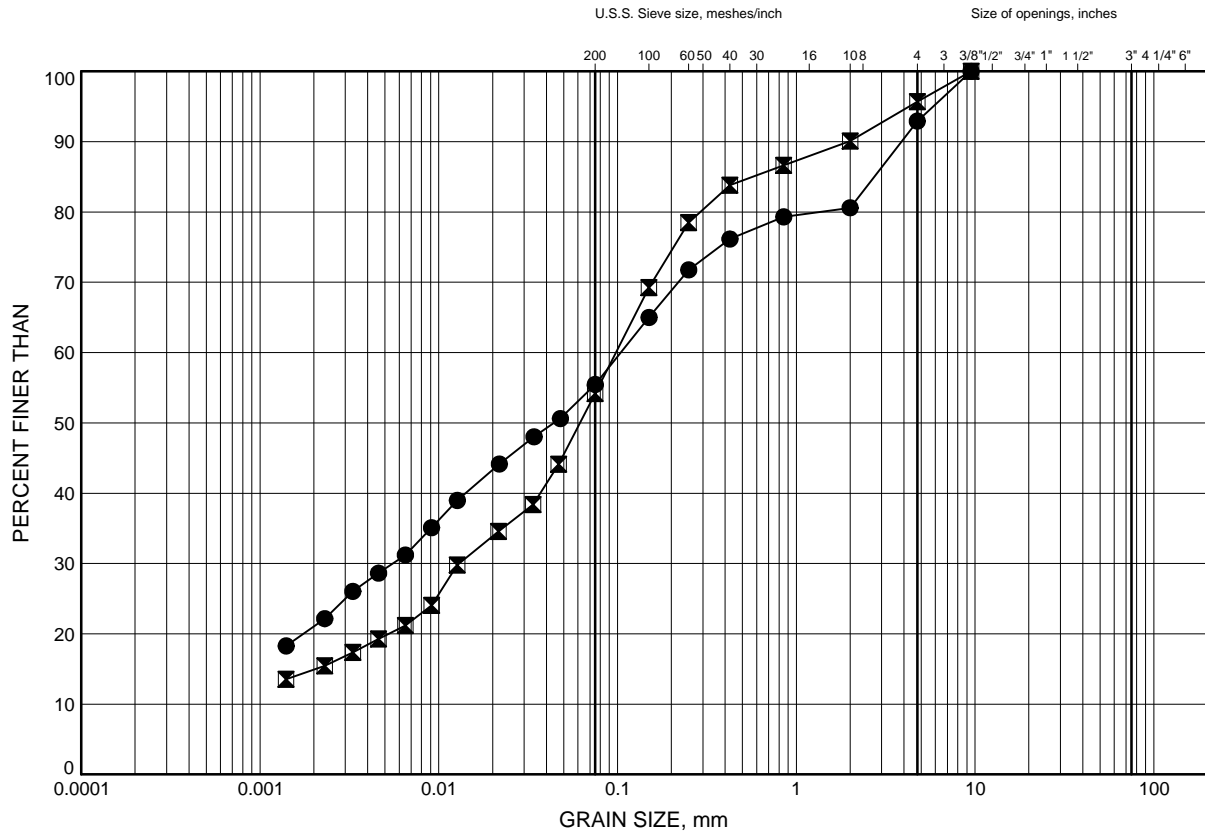
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.04m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Aug 25/ 15      3.1      177.1 Oct26/2015      2.0      178.2																

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE D1

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-20	2.59	177.61
⊠	15-20	6.28	173.92

Date ..October 2015.....  
W.P. ..2074-13-00.....



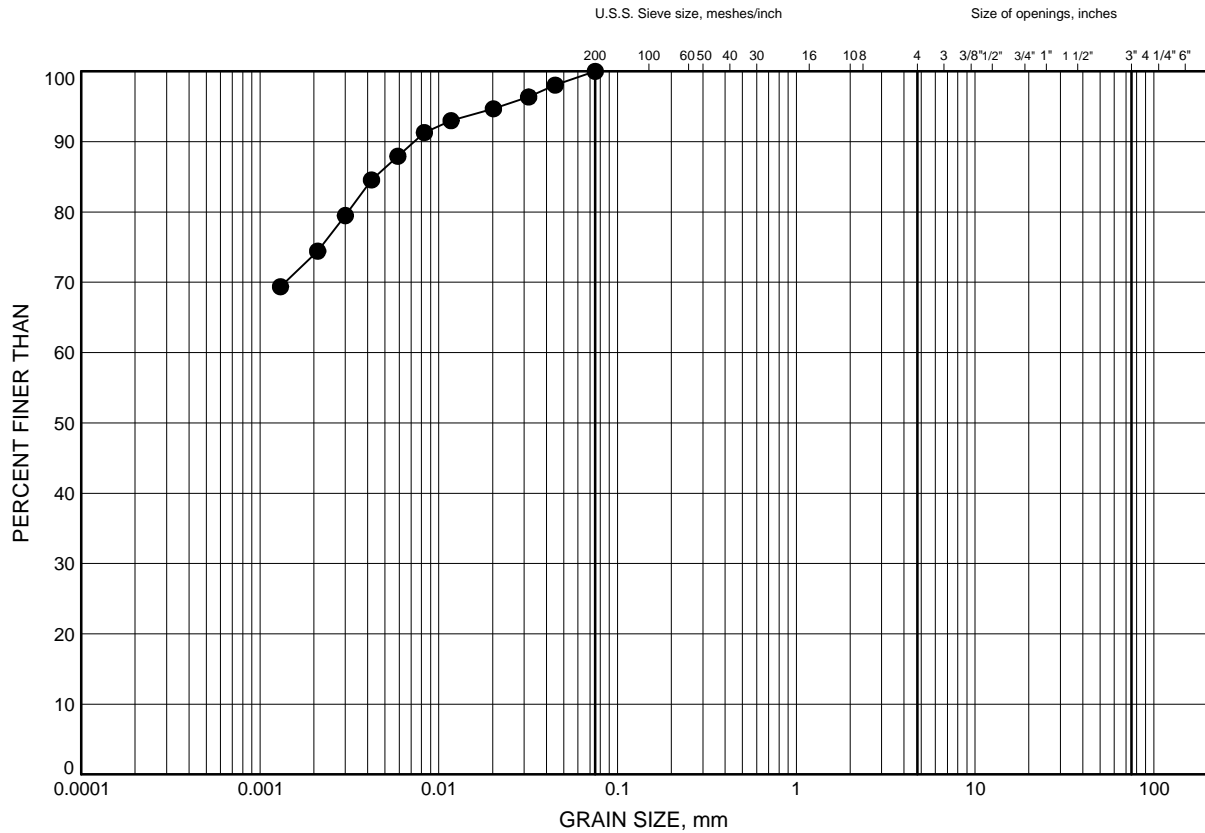
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE D2

### Silty CLAY



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-20	7.92	172.28

Date ..October 2015.....  
W.P. ..2074-13-00.....

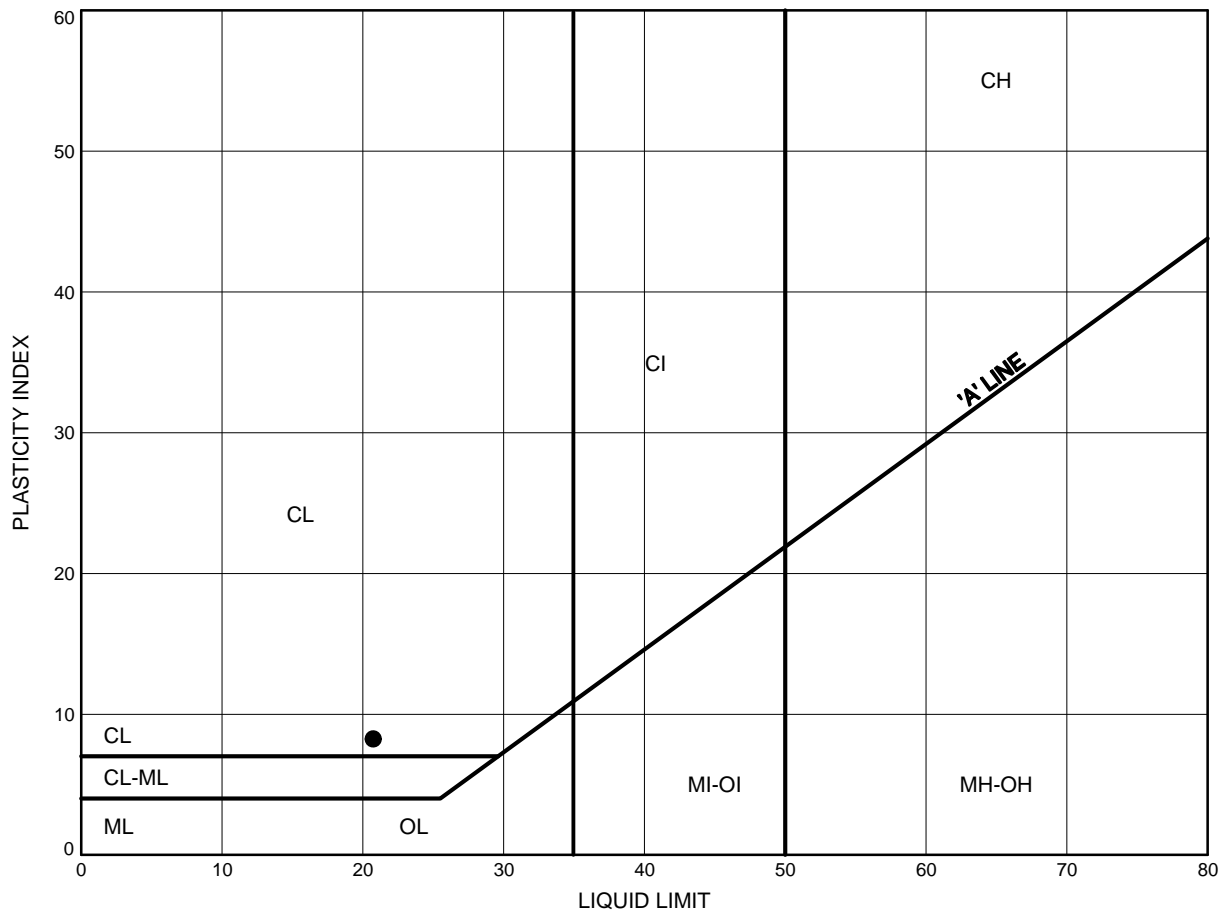


Prep'd .....AN.....  
Chkd. ....RPR.....

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE D3

Silty CLAY TILL



**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-20	2.59	177.61

Date October 2015  
W.P. 2074-13-00

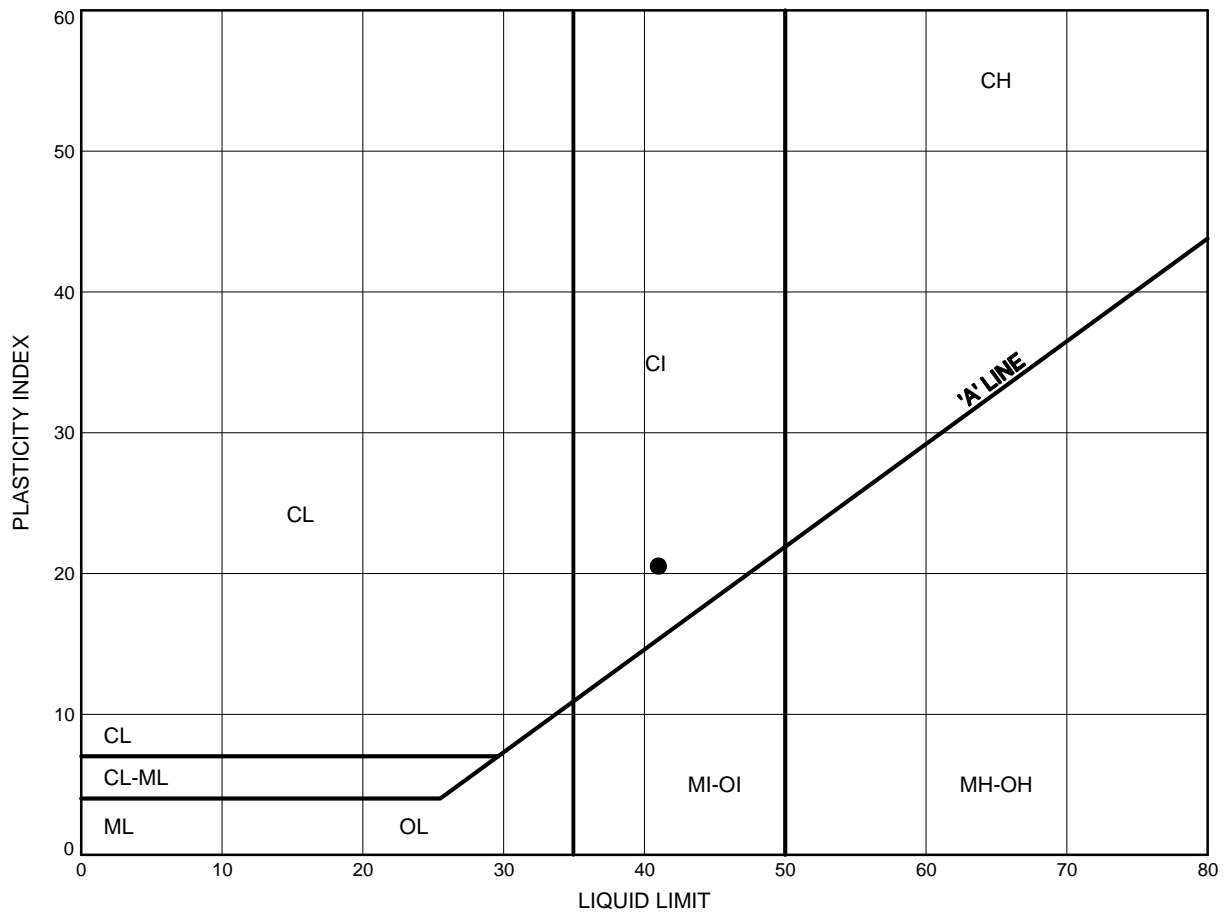


Prep'd AN  
Chkd. RPR

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE D4

Silty CLAY



**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-20	7.92	172.28

Date ..October 2015.....  
W.P. ..2074-13-00.....



Prep'd .....AN.....  
Chkd. ....RPR.....

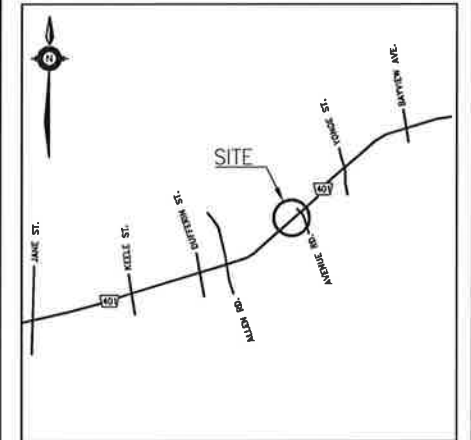
METRIC  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

CONT No  
GWP No 2074-13-00



HWY 401 WBL COLLECTORS  
NOISE BARRIER WALL (SEGMENT 4)  
WEST OF AVENUE ROAD  
BOREHOLE LOCATIONS PLAN

SHEET



### KEYPLAN

### LEGEND

●	Borehole (By Thurber)
◆	Borehole (By Others)
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
15-20	180.2	4 844 596.1	310 776.6
BH11*	181.5	4 844 538.6	310 704.1
BH12*	180.9	4 844 489.6	310 651.0
BH13*	181.0	4 844 425.3	310 574.5
BH14*	183.0	4 844 333.4	310 458.1

### 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) \* Estimated coordinates.

GEOCRES No. 30M11-259

REVISIONS	DATE	BY	DESCRIPTION	DATE
DESIGN	RPR	CHK	RPR	CODE
DRAWN	AN	CHK	SKP	SITE
STRUCT				DWG 4





# GEOCON

## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT 57358 BORING # 11 4 12 DATUM GEODETIC CASING -  
 BORING DATE APRIL 20, 1962 REPORT DATE APRIL 30, 1962 COMPILED BY AEL CHECKED BY D.B.O.  
 SAMPLER HAMMER WT. 140 LBS. DROP 20 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

### SAMPLE CONDITION



### SAMPLE TYPES

A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE  
 F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

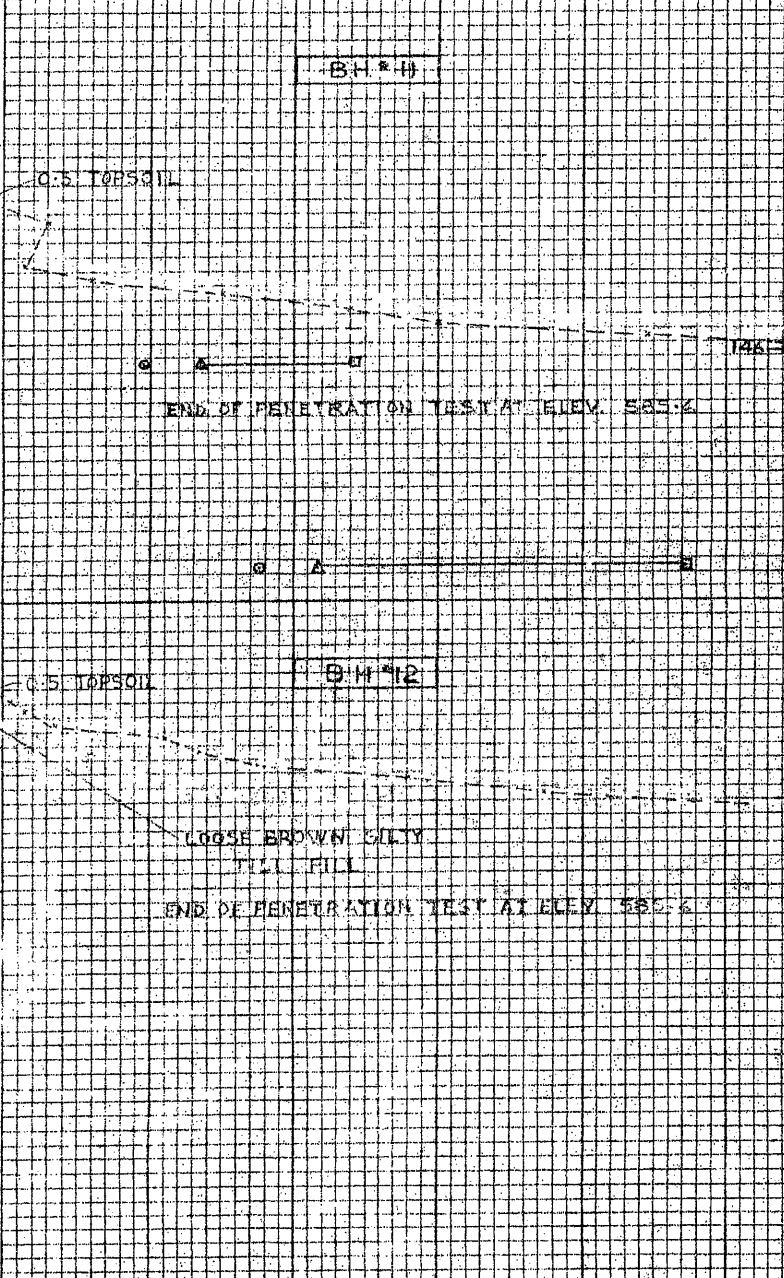
### ABBREVIATIONS

V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 QC - TRIAXIAL CONSOLIDATED QUICK  
 Q - TRIAXIAL QUICK  
 S - TRIAXIAL SLOW  
 γ - WET UNIT WEIGHT  
 K - PERMEABILITY  
 C - CONSOLIDATION  
 WL - WATER LEVEL IN CASIN  
 WT - WATER TABLE IN SOIL

### SOIL PROFILE

ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE
503.6 0.0	STANDPIPE	GROUND LEVEL		500
501.6 4.0		LOOSE BROWN SILTY TILL FILL		500
502.6 13.0		COMPACT TO VERY DENSE BROWN SILTY TILL		500
577.6 18.0	WL @ EL 593.1 MAY 5 1962	DENSE GREY SILTY TILL		500
570.6 25.0		HARD GREY SILTY CLAY		500
		END OF HOLE		500
503.6 0.0	STANDPIPE	GROUND LEVEL		500
501.6 2.0		COMPACT TO VERY DENSE BROWN SILTY TILL		500
578.6 18.5	WL @ EL 597.2 MAY 5 1962	LOOSE BROWN SILTY TILL FILL		500
577.1		END OF HOLE		500
		VERY DENSE GREY SILTY TILL		500

WATER CONTENT W% O NAT. □ LW ▲ FW  
 10 20 30 40 50 60  
 DYNAMIC PENETRATION TEST BLOWS PER FOOT  
 20 40 60 80 100



### OTHER TESTS

### SAMPLES

CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.
2' DO	1	26	
DO	2	56	
DO	3	41	
DO	4	46	
DO	5	74	
2' DO	1	33	
DO	2	67	
DO	3	60	

# GEOCON

## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT 5725 BORING # 10-4-14 DATUM GEODLTIC CASING  
 BORING DATE APRIL 27 1962 REPORT DATE MAY 1 1962 COMPILED BY A.E.L. CHECKED BY D.B.O.  
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. - LBS. ENERGY)

### SAMPLE CONDITION



A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE

### SAMPLE TYPES

F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

### ABBREVIATIONS

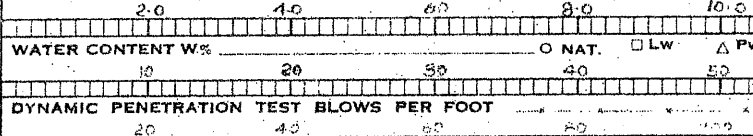
V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 Qc - TRIAXIAL CONSOLIDATED QUICK  
 Q - TRIAXIAL QUICK  
 S - TRIAXIAL SLOW

γ - WET UNIT WEIGHT PCF  
 K - PERMEABILITY  
 C - CONSOLIDATION  
 WL - WATER LEVEL IN CASING  
 WT - WATER TABLE IN SOIL

### SOIL PROFILE

### COMPRESSIVE STRENGTH TONS PER SQ. FT.

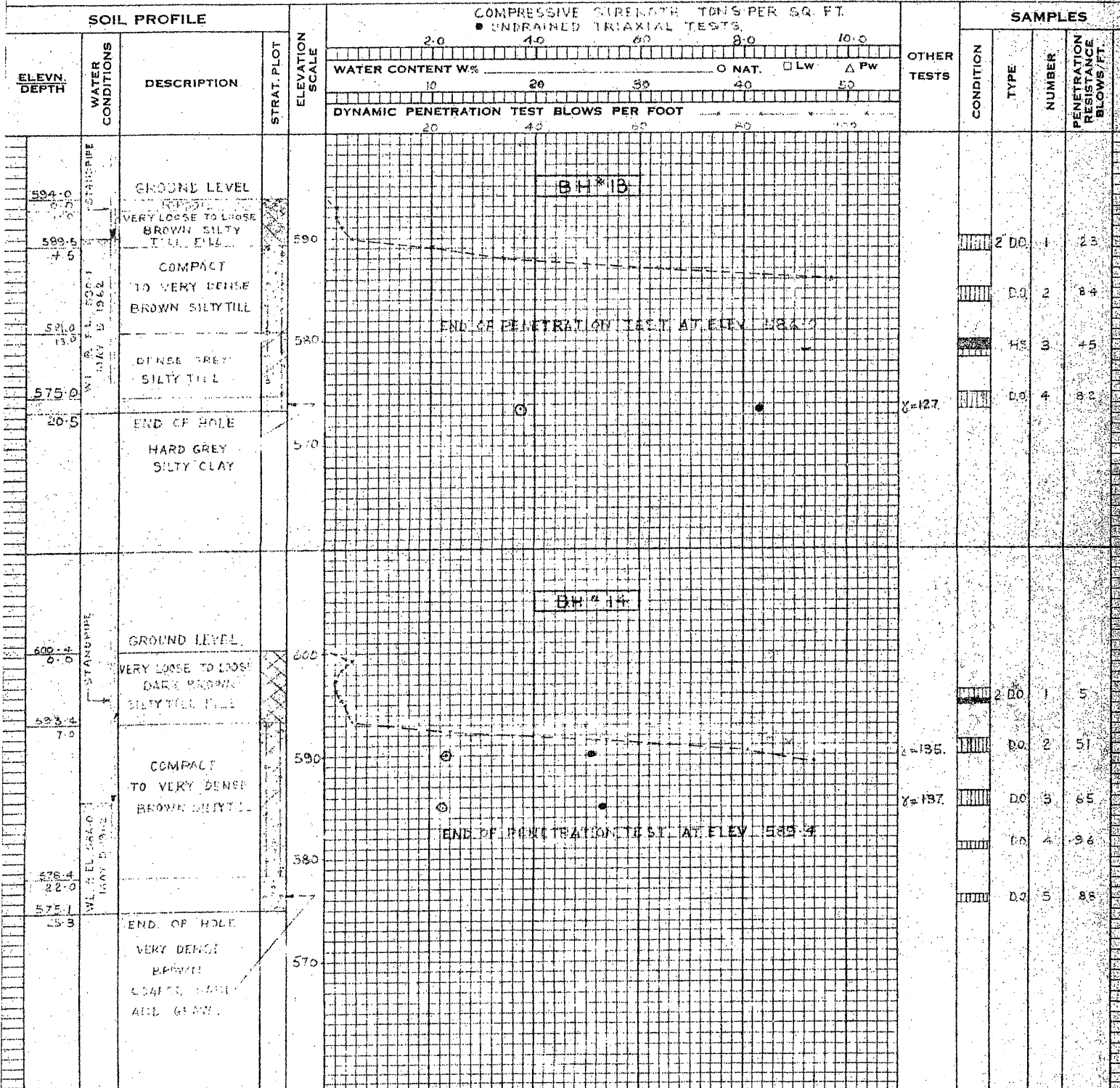
UNDRAINED TRIAXIAL TESTS



### SAMPLES

CONDITION  
 TYPE  
 NUMBER  
 PENETRATION RESISTANCE BLOWS/FT

OTHER TESTS





## **Appendix E**

### **Noise Barrier Wall, Segments 5 & 6, West of Bayview Boreholes 15-21 to 15-24 (Current investigation) Boreholes 17, 18, 23 to 26 (Previous investigation)**

- Record of Borehole Sheets
- Laboratory Test Results
- Drawing titled “Borehole Locations”

## METRIC

[illegible]

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity

# RECORD OF BOREHOLE No 15-21

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 5 N 4 846 751.3 E 313 061.2 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Soild Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.24 - 2015.08.24 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.04m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Aug 24/ 15      8.2      159.1 Oct26/2015      8.4      158.9																

ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# RECORD OF BOREHOLE No 15-22

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 5 N 4 846 844.4 E 313 220.9 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.24 - 2015.08.24 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
167.6	GROUND SURFACE												
0.0	ASPHALT:(150mm)												
0.2	SAND, some silt, trace gravel Brown Moist (FILL)		1	GS			167						
166.9													
0.7	Silty CLAY, trace sand, trace gravel Stiff to Very Stiff Brown Moist (FILL)		1	SS	12		166						
			2	SS	17								
165.4													
2.2	Silty CLAY, with sand, trace gravel, oxidized seams Very Stiff Brown to Grey Moist (TILL)		3	SS	24		165						
	Boulder fragments Grey		4	SS	22		164						2 39 34 25
163.3													
4.3	Silty SAND, some clay Loose Grey Moist		5	SS	8		163						0 60 27 13
162.1													
5.5	SAND and SILT, trace clay and gravel Compact to Dense Brown Wet (TILL)		6	SS	21		162						
							161						
			7	SS	43		160						4 50 37 9
							159						
			8	SS	45		158						
157.8													
9.8	END OF BOREHOLE AT 9.8m.												

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

## METRIC

[illegible]

# RECORD OF BOREHOLE No 15-23

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 6 N 4 847 026.0 E 313 688.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.24 - 2015.08.24 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT w <sub>P</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)
171.5	GROUND SURFACE							20	40	60	80	100					
0.0	ASPHALT:(100mm)																
170.2	CONCRETE:(175mm)																
0.3	SAND, some silt, trace clay, trace gravel Compact Brown to Grey Moist (FILL)		1	GS			171									10	67 17 6
			1	SS	18												
170.1							170										
1.4	Silty CLAY, some sand, trace gravel, roots and rootlets, topsoil stained Very Stiff to Stiff Grey Moist (FILL)		2	SS	20												
			3	SS	8		169										
			4	SS	16		168										
167.7																	
3.8	Silty CLAY, with sand, trace gravel, oxidized seams Hard Brown Moist (TILL)		5	SS	36		167									3	38 37 22
							166										
			6	SS	91/ 0.225		165										
164.8																	
6.7	SAND and SILT, trace clay, trace gravel Dense Grey Wet (TILL)		7	SS	33		164										
							163										
			8	SS	40		162									8	53 30 9
161.7																	
9.8	END OF BOREHOLE AT 9.8m.																

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity  
 20  
 15  
 10  
 (%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 15-23

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 6 N 4 847 026.0 E 313 688.3 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Soild Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.24 - 2015.08.24 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
	Continued From Previous Page																
	WATER LEVEL AT 6.2m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND AUGER CUTTINGS TO SURFACE.																

## METRIC

[illegible]

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity



# RECORD OF BOREHOLE No 15-24

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 6 N 4 847 101.5 E 313 828.7 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.23 - 2015.08.23 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.04m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Aug 23/ 15      3.3      166.6 Oct26/2015      2.9      167.0																

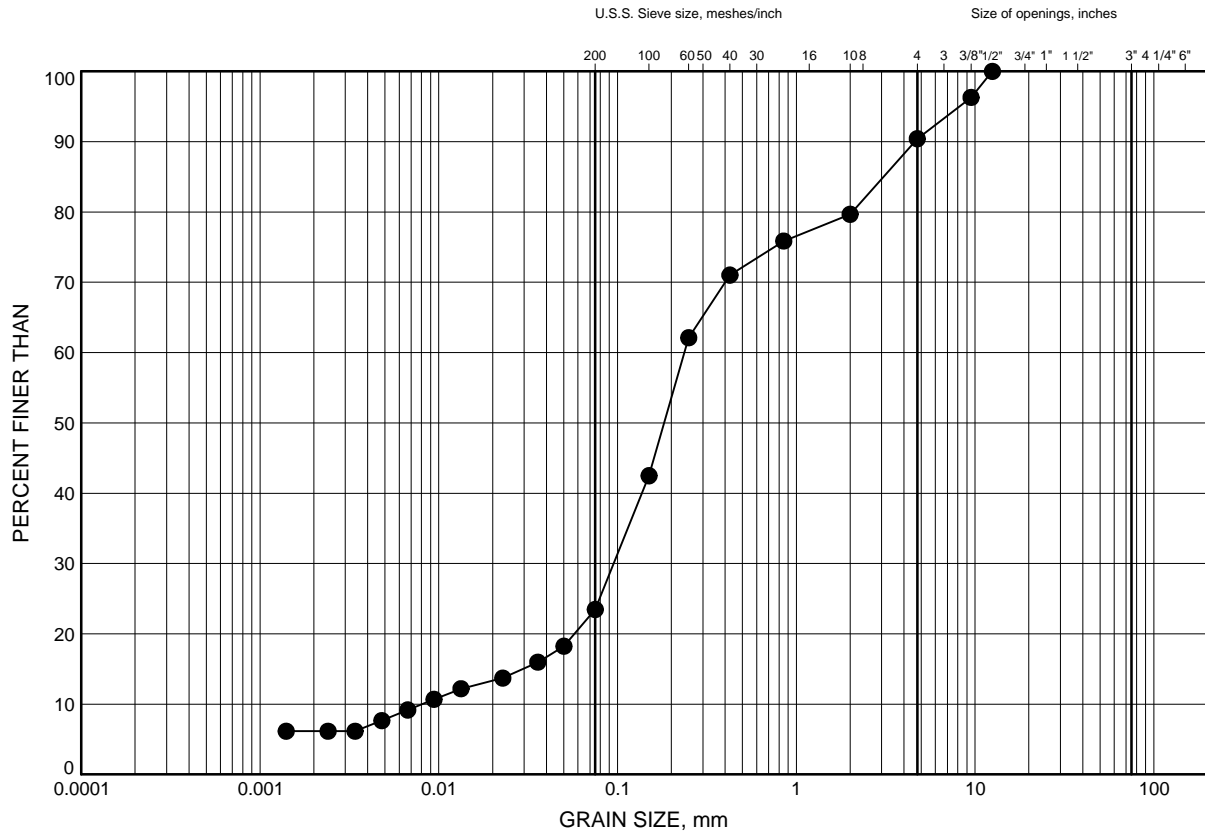
ONTMT4S 19-5161-216.GPJ 2015TEMPLATE(MTO).GDT 12/7/15

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE E1

### SAND FILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-23	0.46	171.04

Date ..October 2015.....  
W.P. ..2074-13-00.....



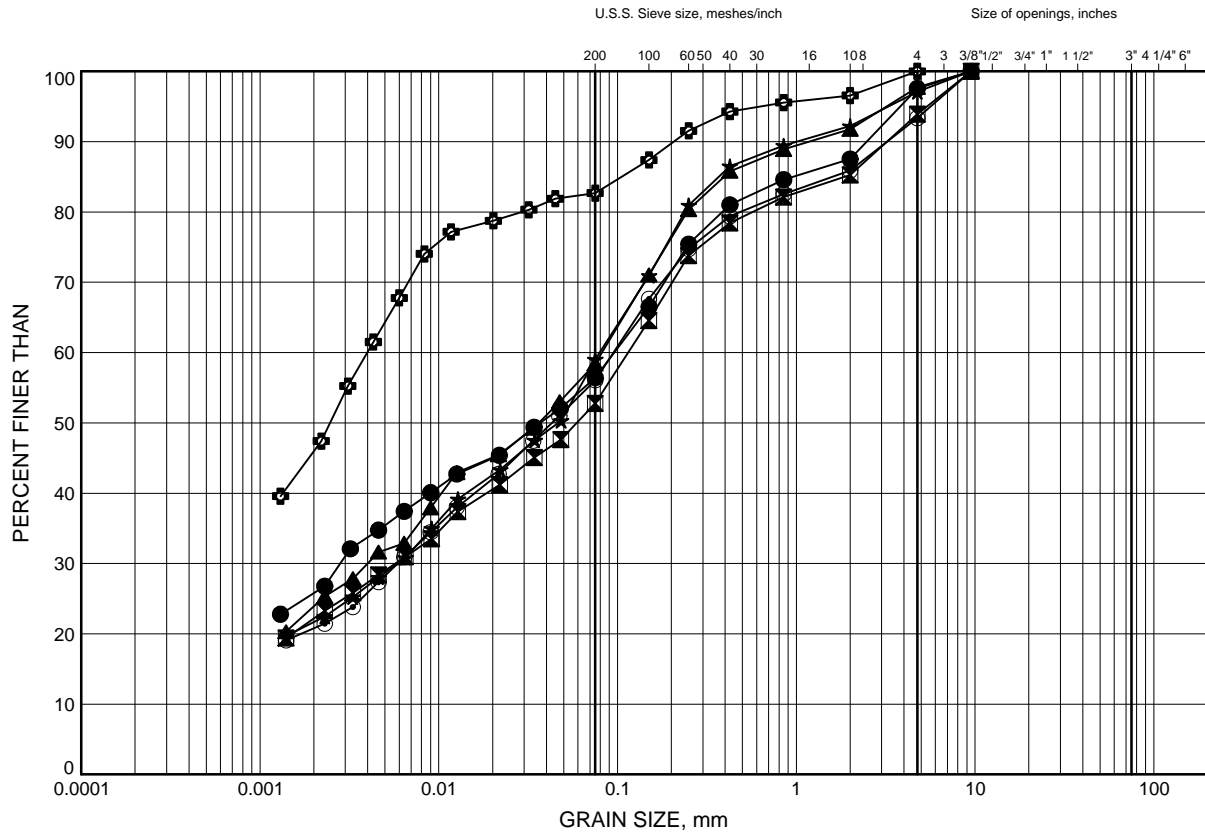
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE E2

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-21	3.35	163.95
⊠	15-21	7.92	159.38
▲	15-22	3.35	164.25
★	15-23	4.88	166.62
⊙	15-24	3.35	166.55
⊕	15-24	6.32	163.58

Date ..October 2015.....  
W.P. ..2074-13-00.....



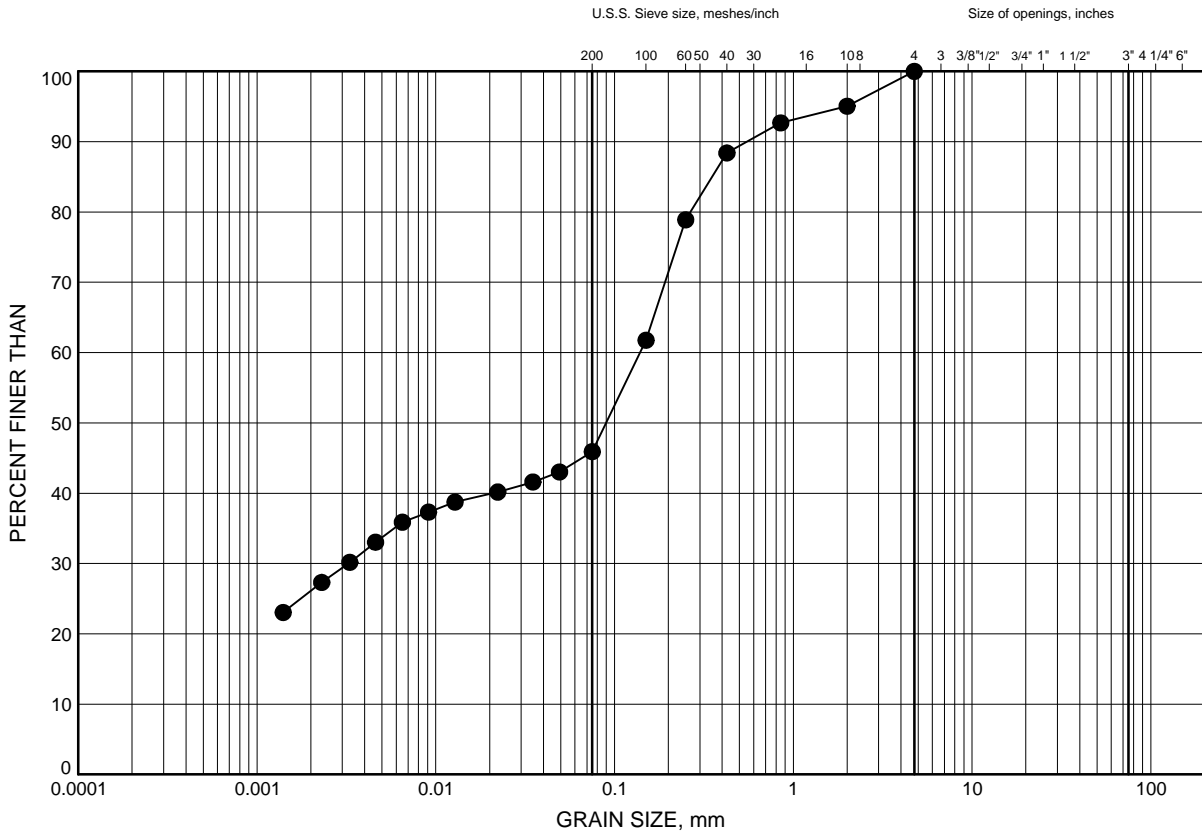
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE E3

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-24	7.92	161.98

Date ..October 2015.....  
W.P. ..2074-13-00.....



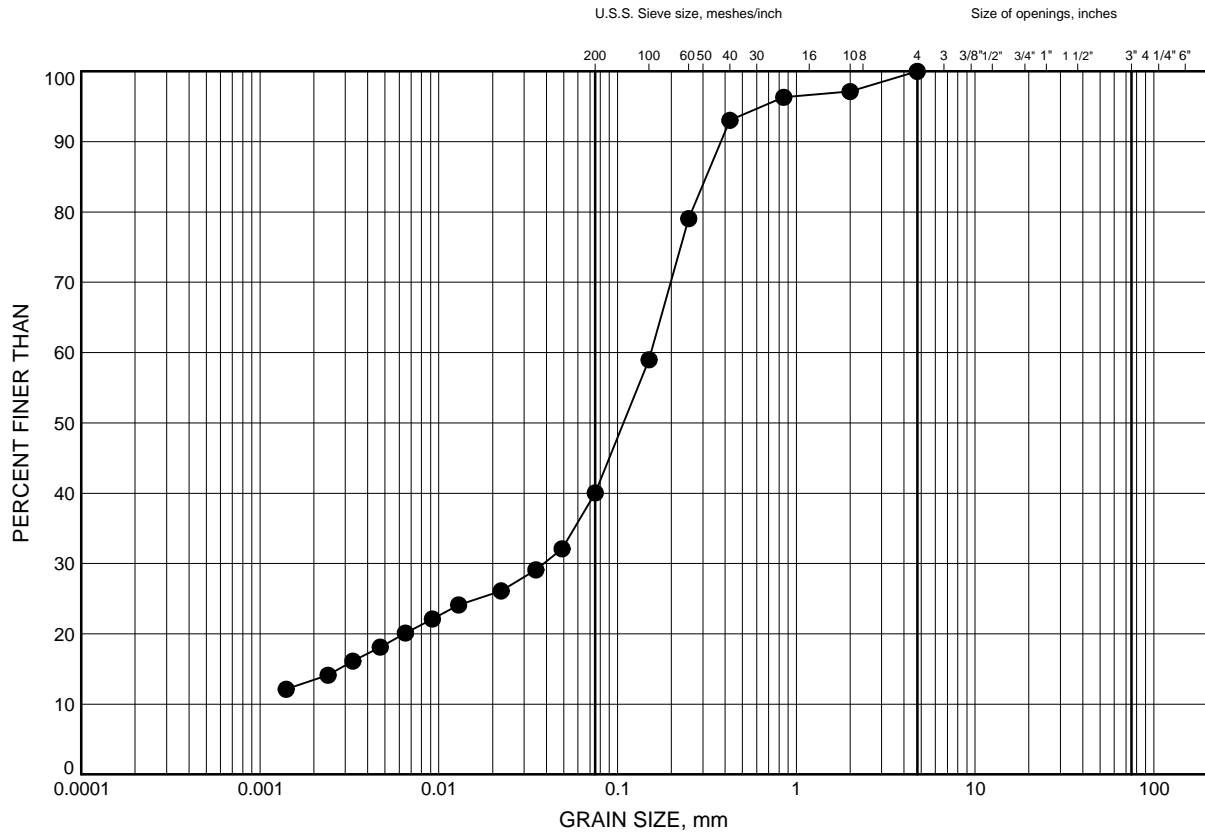
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE E4

### Silty SAND



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-22	4.88	162.72

Date October 2015  
W.P. 2074-13-00



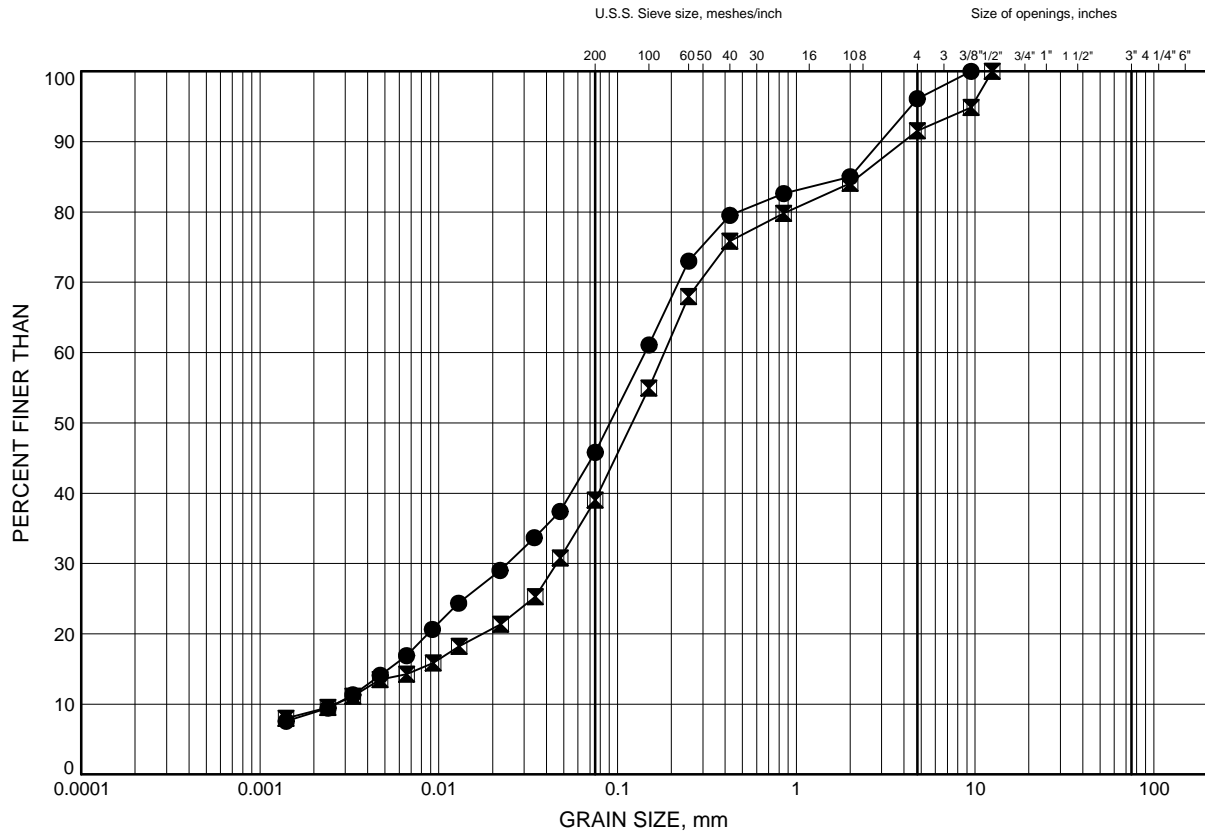
Prep'd AN  
Chkd. RPR

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE E5

### SAND & SILT TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-22	7.92	159.68
⊠	15-23	9.45	162.05

Date ..October 2015.....  
W.P. ..2074-13-00.....

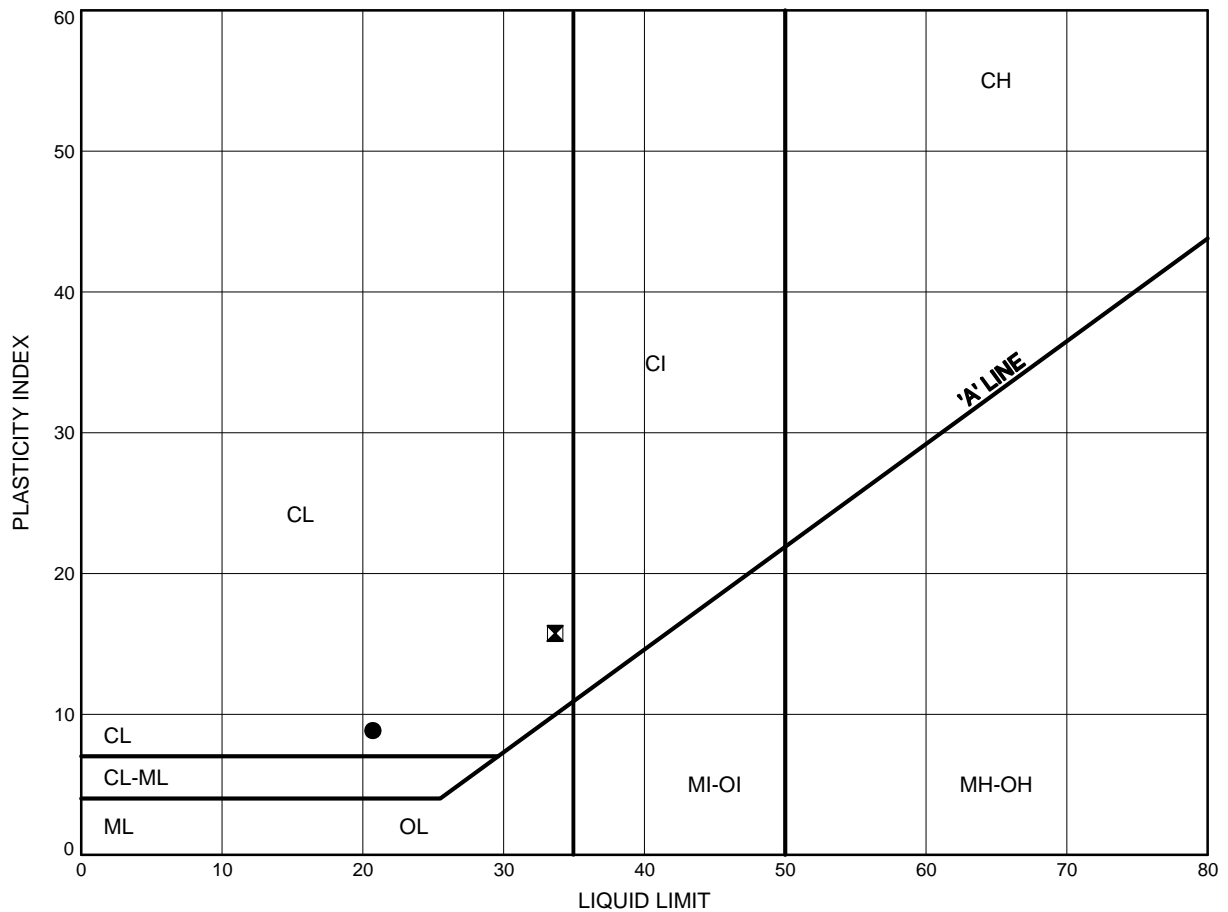


Prep'd .....AN.....  
Chkd. ....RPR.....

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE E6

Silty CLAY TILL



**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-23	4.88	166.62
⊠	15-24	6.32	163.58

Date October 2015  
W.P. 2074-13-00



Prep'd AN  
Chkd. RPR

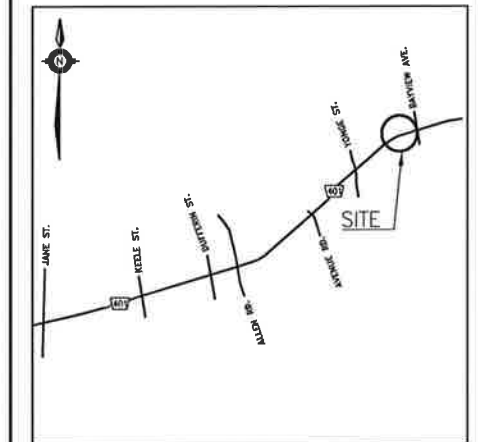
METRIC  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

CONT No  
GWP No 2074-13-00



HWY 401 WBL COLLECTORS  
NOISE BARRIER WALL (SEGMENTS 5 & 6)  
WEST OF BAYVIEW AVENUE  
BOREHOLE LOCATIONS PLAN

SHEET



### KEYPLAN

### LEGEND

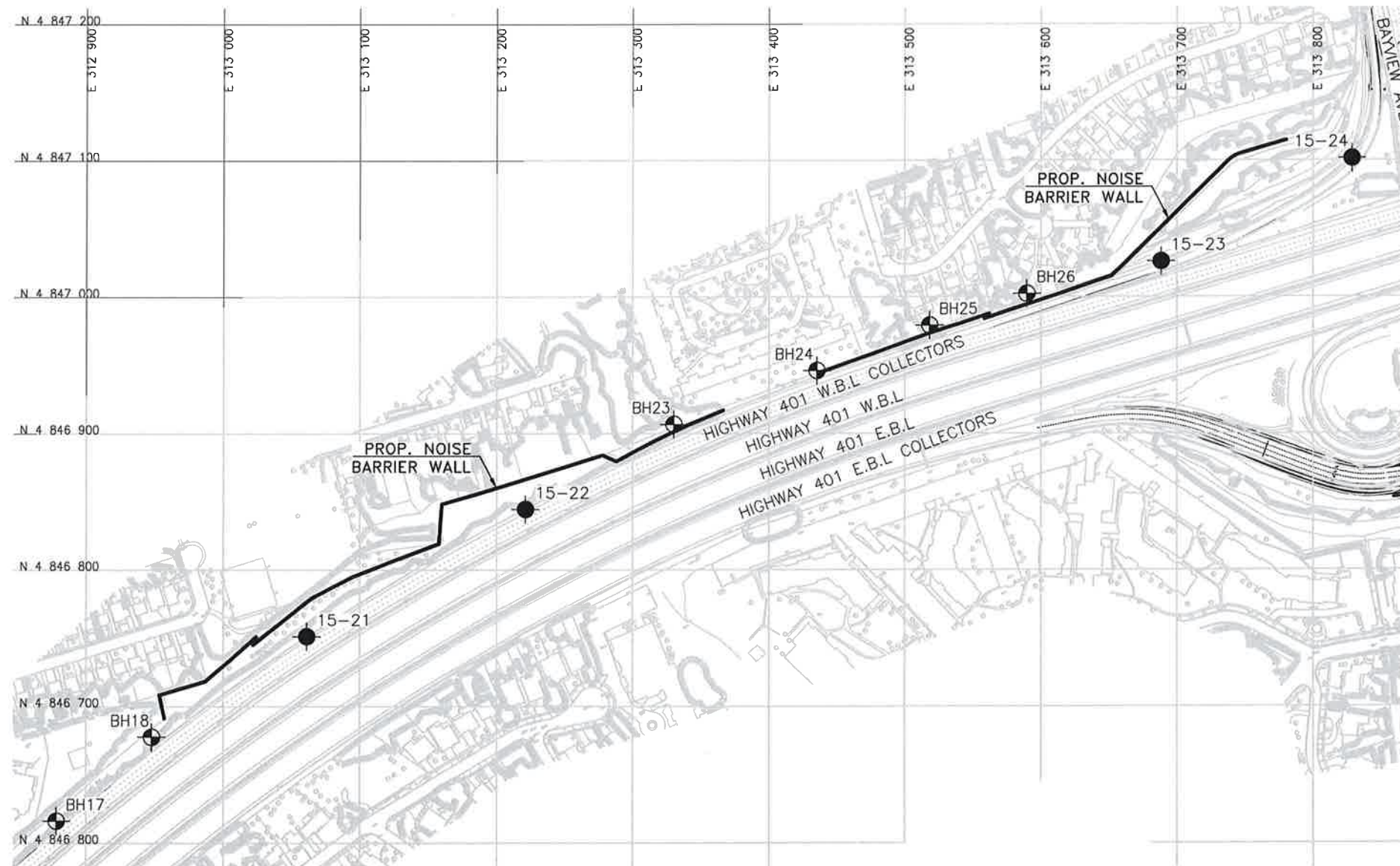
●	Borehole (By Thurber)
◆	Borehole (By Others)
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level
↑	Head Artesian Water
—	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
15-21	167.3	4 846 751.3	313 061.2
15-22	167.6	4 846 844.4	313 220.9
15-23	171.5	4 847 026.0	313 688.3
15-24	169.9	4 847 101.5	313 828.7
BH17*	167.0	4 846 616.3	312 878.4
BH18*	166.1	4 846 677.7	312 947.7
BH23*	166.1	4 846 906.7	313 330.4
BH24*	166.8	4 846 946.0	313 435.4
BH25*	167.3	4 846 979.2	313 518.3
BH26*	168.6	4 847 002.3	313 589.8

### 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) \* Estimated coordinates.

GEOCRES No. 30M11-259



### PLAN



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# RECORD OF BOREHOLE NO. 17

FOUNDATION SECTION

JOB 64-F-40 LOCATION Ret. Wall on Hwy 401 N. Side Bown Yonge & Bayview ORIGINATED BY B.M.G.  
W.P. 252-61-2 BORING DATE Ch. 37/85 @ 85' It. May 20, 1964. COMPILED BY W.W.K.  
OATUM 548.0 BOREHOLE TYPE Pennsylvania Drill CHECKED BY M.D.

ELEV. DEPTH	SOIL PROFILE DESCRIPTION	SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — W.L. PLASTIC LIMIT — W.P. WATER CONTENT — W		REMARKS
		NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	W.P.	W.L.	
<u>548.0</u>	<u>Groundlevel</u>								
<u>0.5</u>	<u>Black org. topsoil.</u>								
	<u>Clayey silt with</u>	<u>1</u>	<u>SS 16</u>						
	<u>sand.</u>	<u>2</u>	<u>SS 24</u>	<u>540</u>					
	<u>(Silt layer from</u>	<u>3</u>	<u>SS 30</u>						
	<u>El. 536 to El. 534)</u>	<u>4</u>	<u>for 4"</u>						
	<u>Very stiff to hard.</u>	<u>5</u>	<u>SS 103</u>	<u>530</u>					
			<u>for 11"</u>						
<u>527.3</u>		<u>6</u>	<u>SS 10</u>	<u>520</u>					
<u>20.7</u>	<u>End of borehole.</u>		<u>for 3"</u>						

W.L.

El. 533.5

Observed in  
borehole.

BULK  
DENSITY  
PCF

WATER CONTENT %

# RECORD OF BOREHOLE NO. 18

FOUNDATION SECTION

JOB 64-F-40 LOCATION Ret. Wall on Hwy 401 N. Side Bwn Yonge & Bayview ORIGINATED BY B.M.G.  
W.P. 252-61-2 BORING DATE Ch. 40/65 @ 95' Lt. May 20, 1964. COMPILED BY W.V.K.  
DAYUM 545.0 BOREHOLE TYPE Pennsylvania Drill CHECKED BY M.D.

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PLOT	SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT PLASTIC LIMIT WATER CONTENT		REMARKS
			NUMBER	TYPE			W.P.	W.L.	
545.0	Groundlevel								
0.0	Sandy silt. (layer of clayey silt from El. 533 to El. 531).		1	SS 101 for 11"	540				
			2	SS 100 for 6"					
			3	SS 107 for 6"					
			4	SS 63 for 6"	530				
			5	SS 62 for 6"					
524.5	Very dense.		6	SS 100 for 6"	520				
20.5	End of borehole.								

# RECORD OF BOREHOLE NO. 23

FOUNDATION SECTION

JOB 64-F-40 LOCATION Ret. Wall on Hwy 401 N. Side Bwn Yonge & Bayview ORIGINATED BY B.M.G.  
W.P. 252-61-2 BORING DATE Ch. 49/65 @ 105' Lt. COMPILED BY W.W.K.  
DATUM 545.0 BOREHOLE TYPE Pennsylvania Drill CHECKED BY M.D.

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PLOT	SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT PLASTIC LIMIT WATER CONTENT		BULK DENSITY P.C.F.	REMARKS
			NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	WL	WP		
545.0	Ground level		1	SS 102 for 9"	540						
0.0	Silty Sand.		2	SS 71							
			3	SS 100 for 4"							
			4	SS 30	530						
			5	SS 44							
523.5			6	SS 55	520						
21.5	End of borehole.				510						

W.L.  
El. 534.6  
Observed in  
borehole.



# RECORD OF BOREHOLE NO. 24

FOUNDATION SECTION

JOB 64-F-40 LOCATION Ret. Wall on Hwy 401 N. Side Bwn Yonge & Bayview ORIGINATED BY B.M.G.  
W P 252-61-2 BORING DATE May 21, 1964. COMPILED BY W.W.K.  
DATUM 547.1 BOREHOLE TYPE Pennsylvania Drill CHECKED BY M.D.

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PLOT	SAMPLES		ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH P.S.F.	LIQUID LIMIT PLASTIC LIMIT WATER CONTENT			BULK DENSITY $\gamma$ P.C.F.	REMARKS
			NUMBER	TYPE				WL	WP	W		
547.1	Groundlevel		1	SS 48 for 6"	540							
0.0	Silty Sand.		2	SS 59 for 6"								
			3	SS 50 for 5 1/2"								
			4	SS 95 for 3"								
			5	SS 40 for 3"	530							
527.1					520							
20.0	End of borehole.											

W.L.

El. 537.1  
Observed in  
borehole.

# RECORD OF BOREHOLE NO. 25

FOUNDATION SECTION

JOB 64-F-40

LOCATION Ret. Wall on Hwy 401 N. Side Btwn Yonge & Bayview

ORIGINATED BY B.M.G.

W.P. 252-61-2

BORING DATE May 21, 1964

Ch. 55-60 E 105' Lt.

COMPILED BY W.W.K.

DATUM 549.0

BOREHOLE TYPE Pennsylvania Drill

CHECKED BY M.D.

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES		DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT PLASTIC LIMIT WATER CONTENT	WATER CONTENT %	BULK DENSITY P.C.F.	REMARKS
			NUMBER	TYPE					
549.0	Ground level								
0.0	Clayey silt with sand.		1	SS 63 for 6"					
			2	SS 108					
			3	SS 40 for 3"					
			4	SS 100 for 9"					
			5	SS 104 for 10"					
527.9			6	SS 115 for 8"					
21.1	End of borehole.								

W.L.  
El. 539.9  
Observed in  
borehole.

# RECORD OF BOREHOLE NO. 26

FOUNDATION SECTION

JOB 64-F-40 LOCATION Ret. Wall on Hwy 401 N. Side Etan Yonge & Bayview ORIGINATED BY B.M.G.  
W.P. 252-61-2 BORING DATE Ch. 5860 @ 150' Lt. May 21, 1964. COMPILED BY W.W.K.  
DATUM 553.1 BOREHOLE TYPE Pennsylvania Drill CHECKED BY M.D.

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PLAT	SAMPLES		ELEV SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT PLASTIC LIMIT WATER CONTENT		REMARKS
			NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	W.P.	W.L.	
553.1	Groundlevel									
0	Silty sand.		1	SS	61					
	Very dense.		2	SS	60					
			3	SS	63					
542.0										
11.0	Clayey silt with sand.		4	SS	60					
	Hard.			for 3"						
20.9	End of borehole.		5	SS	40					
				for 5"						

W.L.  
El. 536.6  
Observed  
in borehole

## **Appendix F**

### **Noise Barrier Wall, Segment 7, East of Bayview Borehole 15-25 (Current investigation) Boreholes 8, 19, 20 (Previous investigation)**

- Record of Borehole Sheets
- Laboratory Test Results
- Drawing titled “Borehole Locations”

# RECORD OF BOREHOLE No 15-25

1 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 7 N 4 847 226.5 E 314 384.1 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.25 - 2015.08.25 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
170.8	GROUND SURFACE							20	40	60	80	100		
0.0	ASPHALT:(300mm)							20	40	60	80	100		
170.5														
0.3	SAND, trace silt and gravel Brown Moist (FILL)		1	GS			170							
170.0														
0.8	Silty CLAY, trace sand and gravel Very Stiff Brown Moist (FILL)		1	SS	28									
169.3														
1.5	Silty CLAY, with sand, trace gravel Very Stiff to Hard Brown Moist (TILL)		2	SS	28		169							
			3	SS	50/ 0.075		168							Resistance to augering at 2.4m
	Oxidized stains		4	SS	46									0 37 36 27
							167							
	Grey		5	SS	60		166							
			6	SS	22		165							
							164							
163.5														
7.3	SAND and SILT, some gravel, some clay Dense to Very Dense Grey Moist (TILL)		7	SS	42		163							12 47 30 11
	Wet		8	SS	50/ 0.100		162							
161.0														
9.8	END OF BOREHOLE AT 9.8m.													

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity 20  
15 10  
(%) STRAIN AT FAILURE



# RECORD OF BOREHOLE No 15-25

2 OF 2

METRIC

W.P. 2074-13-00 LOCATION Noise Barrier Wall Segment 7 N 4 847 226.5 E 314 384.1 ORIGINATED BY AHF  
 HWY 401 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN  
 DATUM Geodetic DATE 2015.08.25 - 2015.08.25 CHECKED BY RPR

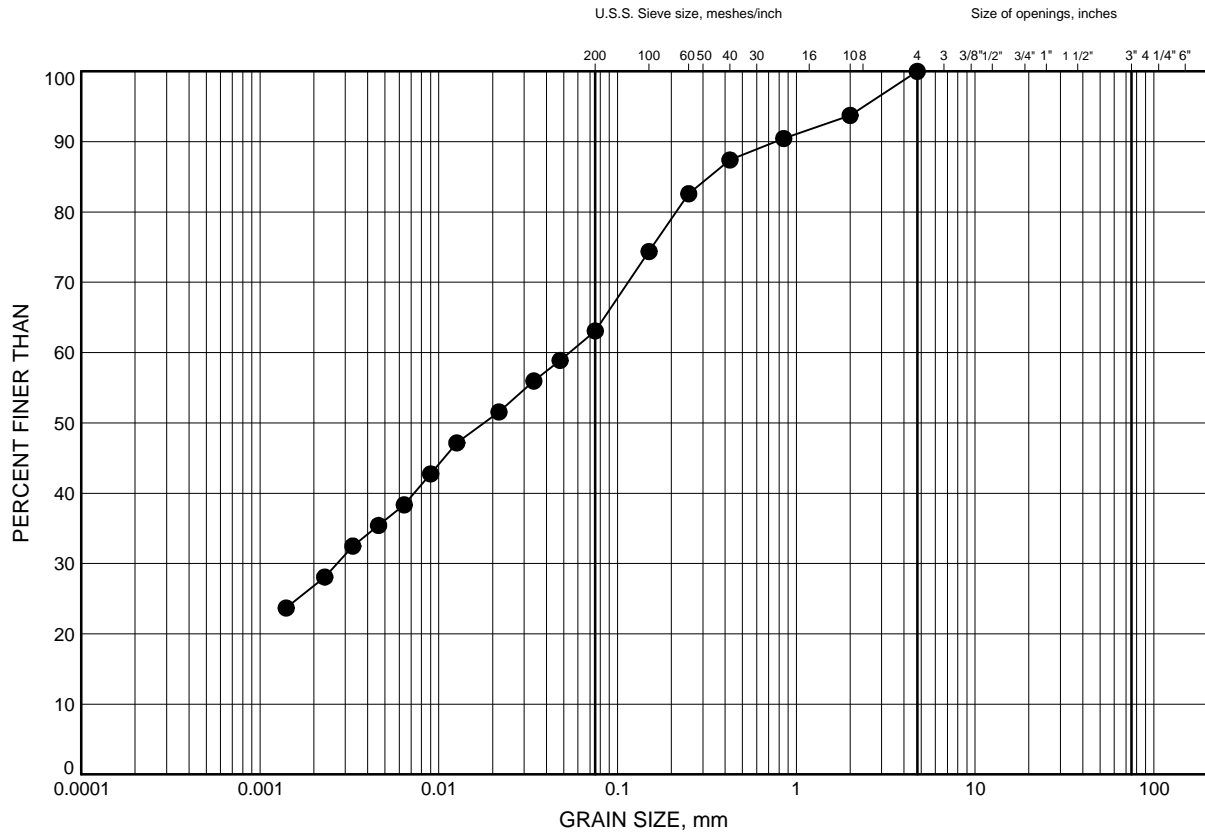
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
	Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 3.04m slotted screen.  WATER LEVEL READINGS: DATE      DEPTH (m)      ELEV. (m)  Aug 25/ 15      7.9      162.9 Oct26/2015      6.0      164.8																

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE F1

### Silty CLAY TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-25	3.35	167.45

Date ..October 2015.....  
W.P. ....2074-13-00.....



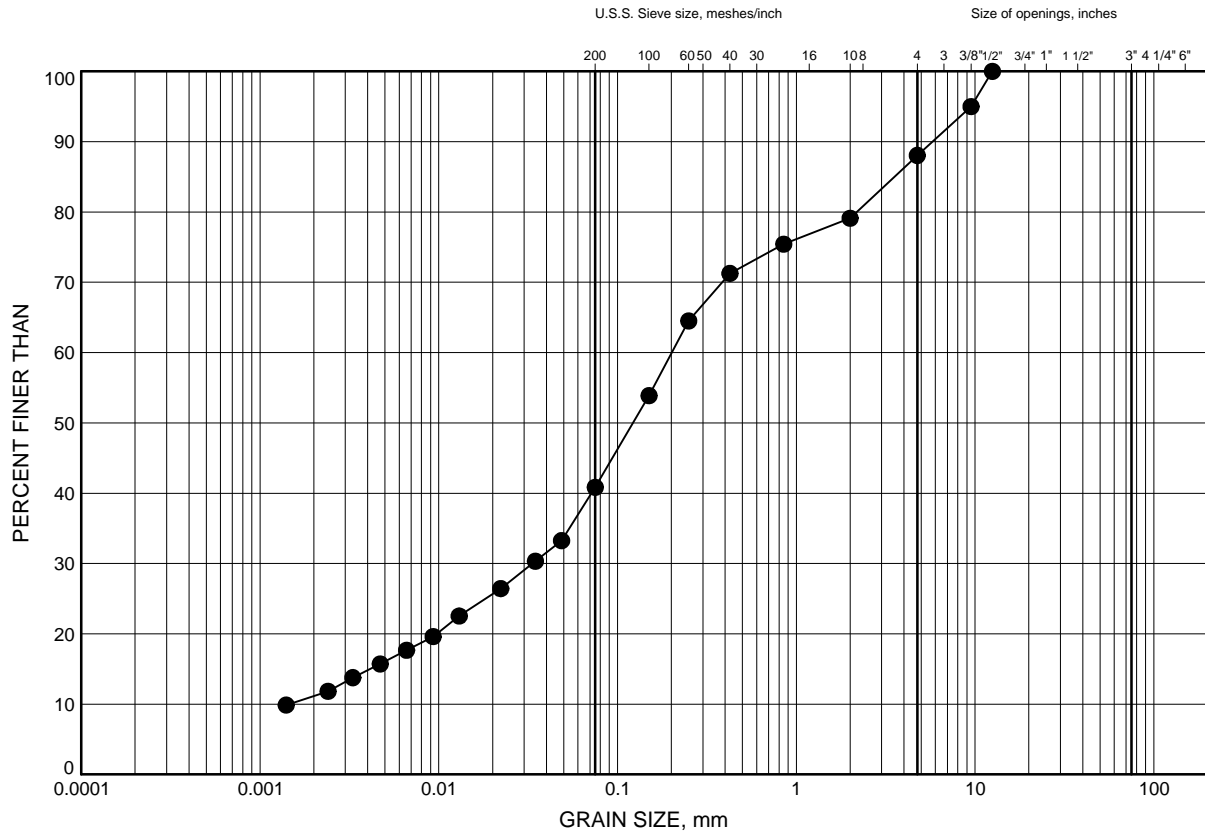
Prep'd .....AN.....  
Chkd. ....RPR.....

# Hwy 401 WBL Coll Rehab Bayview to Jane

## GRAIN SIZE DISTRIBUTION

FIGURE F2

### SAND & SILT TILL



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-25	7.92	162.88

Date ..October 2015.....  
W.P. ..2074-13-00.....

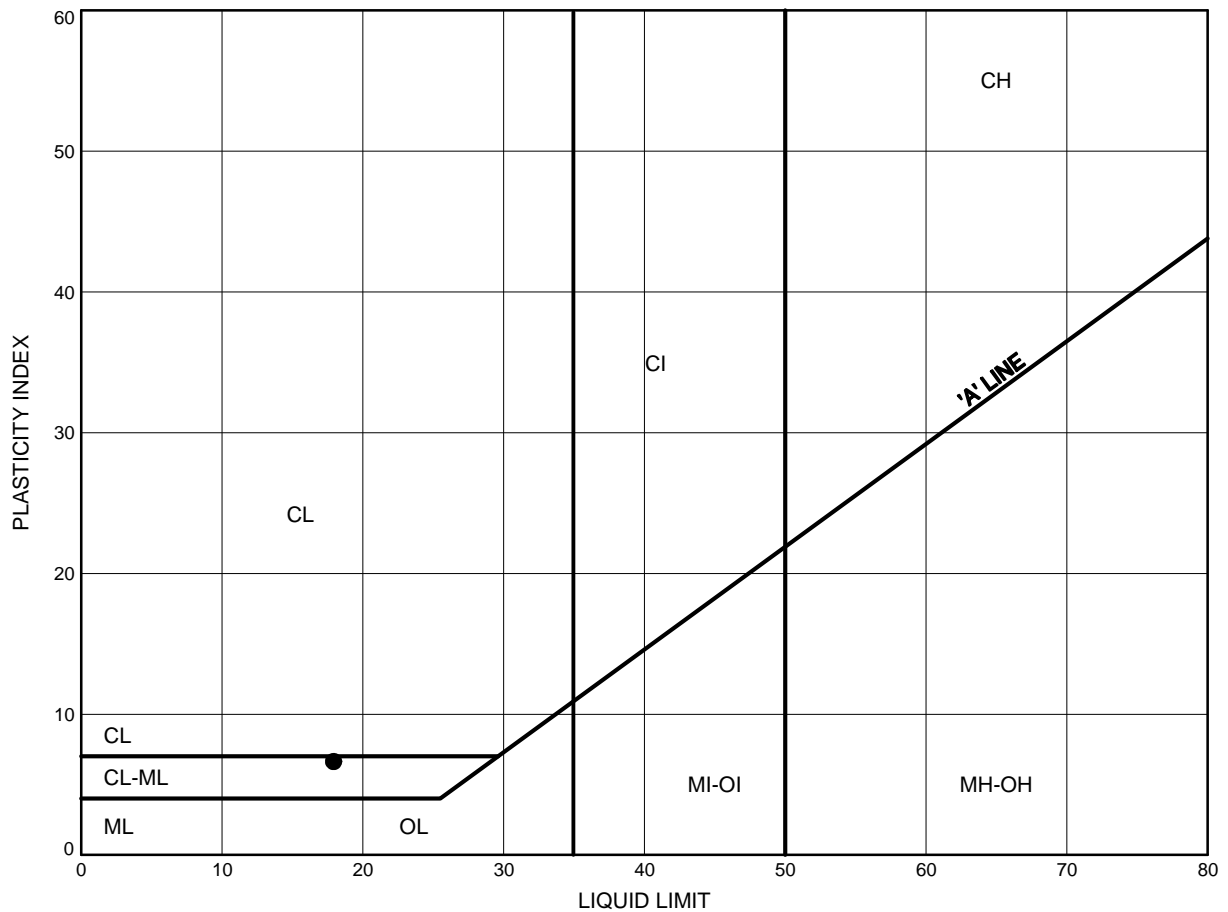


Prep'd .....AN.....  
Chkd. ....RPR.....

Hwy 401 WBL Coll Rehab Bayview to Jane  
**ATTERBERG LIMITS TEST RESULTS**

FIGURE F3

Silty CLAY TILL



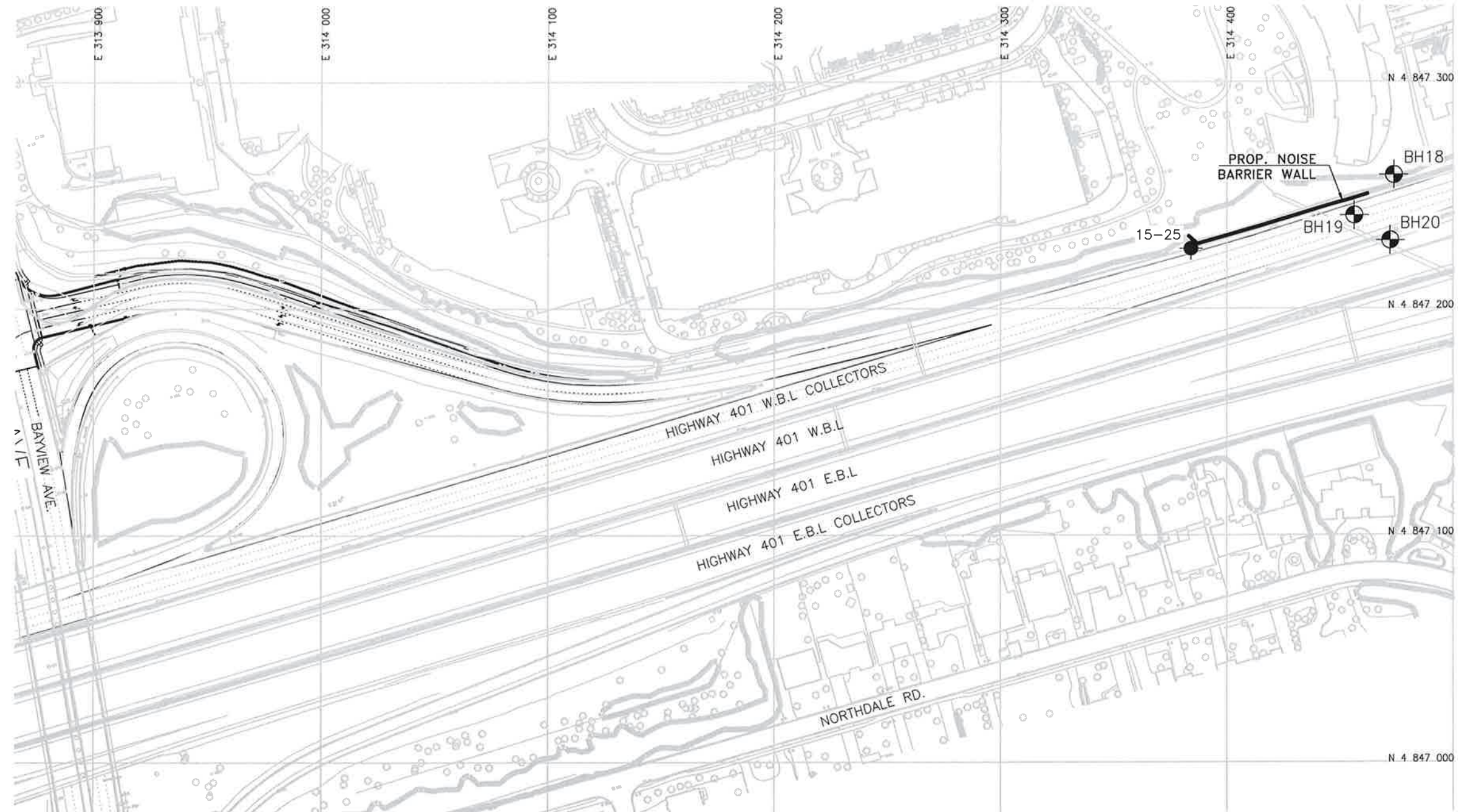
**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15-25	3.35	167.45

Date ..October 2015.....  
W.P. ..2074-13-00.....



Prep'd .....AN.....  
Chkd. ....RPR.....



PLAN

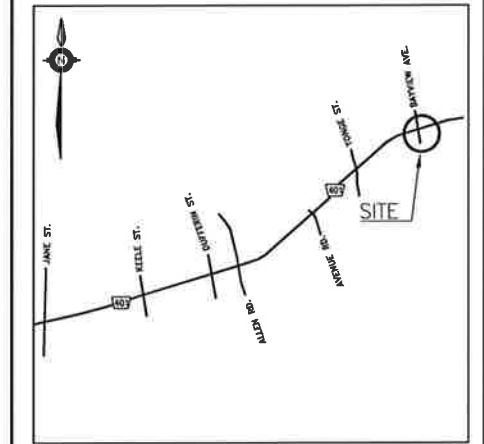
METRIC  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

CONT No  
GWP No 2074-13-00

HWY 401 WBL COLLECTORS  
NOISE BARRIER WALL (SEGMENT 7)  
EAST OF BWAYVIEW AVENUE  
BOREHOLE LOCATIONS PLAN



SHEET



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
15-25	170.8	4 847 226.5	314 384.2
BH18*	167.8	4 847 258.9	314 473.9
BH19*	163.3	4 847 241.1	314 456.5
BH20*	163.4	4 847 230.0	314 472.4

NOTES

- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.
- \* Estimated coordinates.

GEOCRES No. 30M11-259



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JOB 64-F-8

LOCATION Retaining Wall on Hwy. 401 near Leslie St.

ORIGINATED BY B.M.G.

W.P. -

BORING DATE February 20, 1964.

COMPILED BY B.M.G.

DATUM G.S.C.

BOREHOLE TYPE Pennsylvania Type Auger - 3 1/2" Ø

CHECKED BY A.G.S.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — W <sub>L</sub>		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — W <sub>P</sub>	WATER CONTENT — W		
550.5	Topsoil	22				550						
0.9	Clayey silt, silt, and trace of sand.  Loose to compact.  Brown.		1	SS	4	545						
			2	SS	13	540						
15.9	Glacial Till. (Heterogeneous mixt. of clayey silt and trace of gravel with silty fine sand).  V. dense and hard.  Brown changing to grey at El. 525.		3	SS	17	535						
			4	SS	52	530						
			5	SS	>100	525						
519.5			6	SS	>100	520						
31.0	End of borehole.											

Sand-90%  
Clay-silt-9%  
Gravel-1%

## RECORD OF BOREHOLE NO. 19

FOUNDATION SECTION

## MATERIALS &amp; TESTING DIVISION

JOB 64-F-8 LOCATION Hwy 401 North Retaining Wall ORIGINATED BY C.K.

W.P. 252-61-3 BORING DATE Feb. 1 & 2, 1965 COMPILED BY C.K.

DATUM G.S.C. BOREHOLE TYPE Washboring (using BX casing) CHECKED BY \_\_\_\_\_

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PLT	SAMPLES		ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W		REMARKS
			NUMBER	TYPE				WP	WL	
535.9										
0.0	Glacial Till Clayey silt with traces of sand. (Firm)		1	SS	535					
530.4										
5.5	Silty fine sand. (dense)		2	SS	530					
			3	SS						
523.4					525					
12.5	Clayey silt to silty clay with traces of sand. (Very stiff)		4	Lost SS						
			5	TW PM						
517.9			6	SS	520					
18.0	Sandy silt (Hard)									
514.4			7	SS	515					
21.5	End of borehole.									

BULK  
DENSITY

P.C.F.

WATER CONTENT %

## RECORD OF BOREHOLE NO. 20

## FOUNDATION SECTION

8-1-79

LOCATION Hwy. 401 North Retaining Wall

ORIGINATED BY C.K.

W. P. 252-61-3

BORING DATE Feb. 2, 1965.

COMPILED BY C.K.

DATUM G.S.C.

BOREHOLE TYPE Washboring. (using EX casing)

CHECKED BY

SOIL PROFILE		STRAT. PLOT	SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION		NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	WATER CONTENT %				
536.0	Glacial Till Clayey silt with traces of sand.  (Firm to Hard)					535							
0.0			1	SS	4								
528.0			2	SS	41		530						
8.0		Sandy silt  (Very Dense)											
525.0	Silty fine sand  (Very Dense)		3	SS	75		525						
11.0													
522.5	End of borehole.		4	SS	75								
13.5							520						