

**FOUNDATION INVESTIGATION REPORT
HIGH MAST LIGHTING POLES
OVERHEAD SIGN SUPPORTS
HIGHWAY 8 WIDENING, KITCHENER
G.W.P. 277-97-00**

Geocres Number: 40P8-147

Report to

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Investigation Report FINAL.doc

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1 INTRODUCTION

This report presents the factual findings obtained from a foundation investigation carried out by Thurber Engineering Ltd. (Thurber) for the detailed design of high mast lighting (HML) poles and overhead sign (OHS) supports along the alignment of the future widening of Highway 8 from 1 km north of the Grand River to Sportsworld Drive in Kitchener, Ontario.

The purpose of the investigation was to explore the subsurface conditions along the alignment of Highway 8, in the general vicinities of the proposed HML poles and OHS supports and, based on the data obtained, to provide a borehole location plan, records of boreholes, laboratory test results and a written description of the subsurface conditions.

Thurber carried out the investigation as a sub-consultant to Morrison Hershfield, under the Ministry of Transportation Ontario (MTO) Agreement Number 3005-E-0035.

2 SITE DESCRIPTION

The HML poles and OHS supports are to be located throughout the Highway 8 alignment between 1 km north of the Grand River and Sportsworld Drive. The existing grades along Highway 8 within the project area range from approximate elevations 288.0 m to 318.0 m, with the ground surface generally sloping from the north and south towards the Grand River.

Geologically, the site area is located within the physiographic region known as the Waterloo Hills, which is characterized by sandy hills consisting of ridges of sandy till as well as kames and kame moraines, with outwash sands occupying the intervening hollows. The surficial soils of this region overly Silurian bedrock of the Guelph Formation.

3 SITE INVESTIGATION AND FIELD TESTING

The site investigation and field testing for this project were carried out between the period of May 23 to September 28, 2006. Eight boreholes numbered 06-52 to 06-59 pertaining to the HML poles and

4 boreholes numbered 06-64 to 06-67 pertaining to the OHS supports and HML poles were drilled to depths ranging from 6.6 m to 11.1 m. Borehole 06-2, drilled for the north abutment of the proposed Grand River SBL crossing structure, Boreholes 06-14 and 06-24, drilled for the approach embankments of the proposed widened King Street overpass structures and Boreholes 06-70 and 06-72, drilled at the locations of two proposed culvert extensions have been included in this report as they also pertain to the HML poles. At the time of writing, the proposed locations of the HML poles were not available. The locations of Boreholes 06-64 to 06-67 were selected based on the locations of the proposed overhead signs provided by Morrison Hershfield (see Table 3.1 below). All boreholes were drilled on the shoulders of the existing Highway 8, except for Boreholes 06-2 and 06-64, which were drilled at the Highway 8 SBL ditch and at the base of the Highway 8 SBL embankment respectively. The approximate locations of the boreholes are shown on the attached Borehole Location Plan Drawings in Appendix D.

Table 3.1 – Proposed Overhead Sign Locations

| Overhead Sign Location (Hwy. 8 Construction Chainage) | Reference Borehole |
|--|---------------------------|
| 13+950 | 06-64 |
| 14+640 | 06-65 |
| 15+100 | 06-66 |
| 16+000 | 06-67 |

Note: All overhead signs are located along Highway 8 SBL.

Thurber located the borehole locations in the field with reference to the Highway 8 construction chainages, which were marked in the field by Callon Dietz Inc. The approximate geodetic coordinates and elevations of the boreholes were subsequently determined from the digital base plan and existing profile information provided by Morrison Hershfield. Morrison Hershfield also provided Thurber with underground utility clearances prior to drilling.

The boreholes were advanced using hollow-stem auger drilling techniques. Samples were obtained at selected intervals using a split spoon sampler in conjunction with Standard Penetration Testing (SPT) in the overburden soils.

Groundwater conditions in the open boreholes were observed throughout the drilling operations. At selected boreholes, a standpipe piezometer consisting of 25 mm PVC pipe (19 mm PVC pipe at Borehole 06-64) with a slotted screen was installed and enclosed in filter sand to permit longer term groundwater level monitoring. The locations and completion details of the piezometers are shown in Table A-1 in Appendix A. The borehole completion details are also shown in Table A-1.

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.

4 LABORATORY TESTING

The recovered soil samples were subjected to Visual Identification (VI) and to natural moisture content determination. The results of this testing are shown on the Record of Borehole sheets in Appendix A. Selected samples were also subjected to gradation analysis and Atterberg Limit tests and the results of this testing program are shown on the Record of Borehole sheets in Appendix A and on the figures contained in Appendix B.

5 DESCRIPTION OF SUBSURFACE CONDITIONS

Reference is made to the Record of Borehole sheets in Appendix A. An overall description of the stratigraphy 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 site stratigraphy encountered in the boreholes consists of asphalt and/or granular fill, cohesive silty clay glacial till, deposits of sand, silt and gravel, and non-cohesive glacial till.

5.1 Asphalt, Topsoil and Fill

The boreholes that were drilled on the paved shoulders of the existing Highway 8 encountered asphalt that ranged in thickness from approximately 25 mm to 190 mm. Underlying the asphalt, and where boreholes were drilled on unpaved highway shoulders, sand and gravel fill was encountered. The fill extended to depths of 0.8 m to 2.4 m or to elevations ranging from 286.9 m to 315.7 m. The sand and gravel fill had a compact to very dense relative density, based on SPT 'N' values ranging from 15 to greater than 50 blows per 0.3 m penetration. Moisture contents in the fill ranged from approximately 2% to 8%. Selected samples of the sand and gravel fill were subjected to grain size distribution tests and the results are presented in Figures B8 and B9 in Appendix B.

At Borehole 06-52, a layer of silt fill with trace to some sand and trace gravel was encountered underlying the sand and gravel to a depth of 1.5 m (elevation 308.0 m). The silt fill was compact (SPT 'N' value of 15 blows per 0.3 m penetration), with a moisture content of approximately 21%.

At Boreholes 06-54 and 06-72, the sand and gravel was underlain by silty clay fill to depths ranging from 3.0 m to 4.1 m or to elevations from 284.6 m to 285.3 m. The silty clay fill is considered to be very stiff, based on SPT 'N' values of 15 to 24 blows per 0.3 m penetration. The moisture content of the material ranged from approximately 10% to 20%. A sample of

the silty clay fill was subjected to grain size distribution testing and the results are present in Figure B3 in Appendix B. The result of an Atterberg Limit test on this sample is presented in Figure B10 and indicates that the clay has low plasticity.

Borehole 06-2 was drilled in the ditch adjacent to the existing Highway 8 SBL. This borehole encountered 125 mm of topsoil, underlain by silty clay fill with trace sand and gravel. The fill layer extends to a depth of 0.8 m or to an elevation of 294.1 m. The fill is considered to have a stiff consistency based on a Standard Penetration Test 'N' value of 8 blows per 0.3 m penetration. The moisture content of a sample of this material was 19%.

At Borehole 06-64, at the base of the existing highway embankment, a 150 mm thick layer of topsoil was encountered, which was underlain by a topsoil stained silty clay to a depth of 1.4 m (elevation 283.1 m). The silty clay is considered to be firm to stiff (SPT 'N' values of 5 to 13 blows per 0.3 m penetration), with the moisture content ranging from approximately 20% to 30%.

5.2 Silty Clay Till

Layers of silty clay glacial till with some sand and trace gravel were encountered in the boreholes. The majority of this material was found in the boreholes located north of the King Street overpass (Boreholes 06-2, 06-52, 06-53, 06-54, 06-55, 06-65, 06-70 and 06-72), however the material was also encountered at the bottom of Borehole 06-59 near Sportsworld Drive. The layers ranged in thickness from 1.5 m to greater than 9.6 m and were sometimes encountered in upper and lower layers. The upper layers extended to depths of 3.0 m to 4.6 m or to elevations of 284.1 to 304.9 m. The lower layers were encountered to depths of 7.6 m to 15.2 m or to elevations of 277.2 m to 303.9 m.

Selected samples from this material were subjected to grain size distribution tests and the results are illustrated in Figures B1 and B2 in Appendix B. The results of Atterberg Limit tests conducted on selected samples from this material are shown in Figures B10 and B11 in Appendix B and indicate that the material has low to intermediate plasticity.

SPT 'N' values in this material ranged from 11 to more than 50 blows for 0.3 m penetration, indicating a stiff to hard relative density. Glacial tills inherently contain cobbles and boulders and some of the high SPT 'N' values may represent tests conducted on cobbles and boulders.

The moisture content of samples from this material ranged from approximately 7% to 23%.

5.3 Sand

Occasional sand zones with trace to some silt and gravel were encountered in Boreholes 06-2, 06-56, 06-57, 06-64, 06-66, 06-67, and 06-70. The thickness of the sand deposits

ranged from 1.4 m to 8.6 m, and the material extends to depths of 4.6 m to greater than 11.1 m, or to elevations of less than 275.4 m to 307.5 m. Standard penetration tests in these deposits gave 'N' values from 14 to greater than 50 blows per 0.3 m penetration, indicating that the relative density of the material varies from compact to very dense.

Selected samples of this material were subjected to grain size distribution tests and the results are presented in Figure B6 in Appendix B.

The moisture content of samples from this material ranged from approximately 2% to 15%.

5.4 Silt

Boreholes 06-70 and 06-72 encountered zones of silt ranging from sandy silt to sand and silt. The silt deposit was approximately 1.3 m to 1.5 m thick and was encountered to depths ranging from 4.3 m to 6.1 m or to elevations from 284.0 m to 299.7 m. The silt is considered to be loose, based on SPT 'N' values of 7 to 9 blows per 0.3 m penetration. The moisture content of this material was approximately 18% to 19%. The results of a grain size distribution test conducted on a sample of this material is presented in Figure B5 in Appendix B.

5.5 Sand and Gravel

Several of the boreholes (06-14, 06-54, 06-58, 06-59, 06-64, 06-66, 06-67 and 06-72) encountered layers of granular material ranging in thickness from 1.4 m to greater than 9.6 m. The material ranged in composition from gravelly sand to gravel with some sand, but can mainly be classified as sand and gravel. The material also contained trace to some silt and occasional cobbles. The granular material extends to depths of 4.4 m to greater than 11.1 m or to elevations of 278.5 m to 309.7 m.

Selected samples of this material were subjected to grain size distribution tests and the results are presented in Figure B7 in Appendix B.

Standard penetration tests in this material gave 'N' values from 8 to greater than 50 blows per 0.3 m penetration indicating that the relative density of the material varies from loose to very dense.

The moisture content of samples from this deposit ranged from approximately 3% to 17%.

5.6 Silty Sand to Silt and Sand Till

A deposit of glacial till ranging in composition from silty sand to silt and sand was encountered in Boreholes 06-2, 06-24, 06-52 to 06-56, 06-64 and 06-70. The till also contains trace to some clay, trace gravel and occasional cobbles and boulders. The thickness of the deposit ranges from 1.0 m to greater than 8.0 m, and it extends to depths ranging from

6.7 m to greater than 19.9 m or to elevations ranging from less than 274.9 m to 310.2 m. Glacial tills inherently contain cobbles and boulders.

Selected samples from this deposit were subjected to grain size distribution tests and the results are presented in Figures B4 and B5 in Appendix B.

SPT 'N' values ranged from 8 to greater than 50 blows per 0.3 m penetration, indicating that the material has a loose to very dense relative density. Some of the SPT 'N' values may represent tests conducted on cobbles and boulders.

The moisture content of samples from this deposit ranged from approximately 4% to 19%.

5.7 Groundwater Conditions

A standpipe piezometer was installed in selected boreholes. Water levels were measured on a separate visit made after the completion of drilling. Some piezometers were not locatable during the monitoring visits and were likely destroyed. The water level readings are presented in Table 5.1.

Table 5.1: Water Level Measurements

| Borehole | Water Level Depth (m) | Water Level Elevation (m) | Date of Reading |
|-----------------|--------------------------------------|--|---------------------------------------|
| 06-2 | 9.9 | 284.9 | January 4, 2007 |
| 06-52 | 7.0 Piezometer Destroyed | 302.6 - | May 28, 2006 September 26, 2006 |
| 06-53 | 5.5 | 295.6 | September 26, 2006 |
| 06-54 | 5.2 4.1 | 283.5 284.6 | May 31, 2006 September 26, 2006 |
| 06-55 | 6.2 6.5 | 288.6 288.3 | May 25, 2006 September 26, 2006 |
| 06-56 | Piezometer Destroyed | - | September 26, 2006 |
| 06-57 | Piezometer Destroyed | - | September 26, 2006 |
| 06-58 | Piezometer Destroyed | - | September 26, 2006 |
| 06-59 | 10.1 | 304.8 | September 26, 2006 |
| 06-64 | 1.5 1.4 | 283.1 283.2 | August 16, 2006 September 29, 2006 |
| 06-65 | Dry | - | September 26, 2006 |

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| | | | |
|-------|----------------------|-------|--------------------|
| 06-66 | Piezometer Destroyed | - | September 26, 2006 |
| 06-67 | Dry | - | May 27, 2006 |
| 06-70 | 7.3 | 298.5 | May 29, 2006 |
| | 10.5 | 295.4 | September 26, 2006 |
| 06-72 | 6.0 | 282.3 | May 31, 2006 |
| | 3.9 | 284.4 | September 26, 2006 |

Based on these observations, local groundwater levels exist at Elevations 282.3 m to 304.8 m. All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

6 MISCELLANEOUS

All-Terrain Drilling Limited of Waterloo, Ontario supplied track and truck mounted CME 75 drill rigs and conducted the drilling, sampling and in-situ testing operations.

The drilling and sampling operations in the field were supervised on a full time basis by Mr. George Azzopardi, Mr. Stephane Loranger, C.E.T. and Mr. Warren Wunderlick of Thurber.

Mr. Alastair E. Gorman, P.Eng. and Mr. Mark E. Farrant, P.Eng. directed the field operations and prepared the report.

Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations projects, reviewed the report.

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Appendix A
Record of Borehole Sheets

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

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

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

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

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

| DESCRIPTIVE TERM | UNDRAINED SHEAR STRENGTH (kPa) | APPROXIMATE SPT ⁽¹⁾ 'N' VALUE |
|------------------|--------------------------------|--|
| Very Soft | 12 or less | Less than 2 |
| Soft | 12 to 25 | 2 to 4 |
| Firm | 25 to 50 | 4 to 8 |
| Stiff | 50 to 100 | 8 to 15 |
| Very Stiff | 100 to 200 | 15 to 30 |
| Hard | Greater than 200 | Greater than 30 |

NOTE: Hierarchy of Soil Strength Prediction

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

4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

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

5. LEGEND FOR RECORDS OF BOREHOLES

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

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

\overline{W} Water Level

C_{pen} Shear Strength Determination by Pocket Penetrometer

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

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 |
| CLAY SHALE | | | |
| SANDSTONE | | | |
| SILTSTONE | | | |
| CLAYSTONE | | | |
| COAL | | | |

Table A-1 – Borehole Completion Details

| Location | Details | |
|----------|--|---|
| | Piezometer Tip Depth/ Elevation (m) | Completion Details |
| 06-2 | 19.9 / 274.9 | Piezometer with 1.5 m slotted screen installed with sand filter to 18.0 m, bentonite seal from 18.0 m to 17.4 m, grout from 17.4 m to 0.9 m and bentonite seal from 0.9 m to ground surface. |
| 06-14 | None Installed | Grouted with bentonite to ground surface. |
| 06-24 | None Installed | Grouted with bentonite to ground surface. |
| 06-52 | 10.7 / 298.8 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and sand and gravel from 0.3 m to ground surface. |
| 06-53 | 10.7 / 290.3 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and concrete from 0.3 m to ground surface. |
| 06-54 | 10.7 / 278.0 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and concrete from 0.3 m to ground surface. |
| 06-55 | 10.7 / 284.1 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 1.2 m, bentonite seal from 1.2 m to 0.3 m and concrete from 0.3 m to ground surface. |
| 06-56 | 10.7 / 307.1 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and sand and gravel from 0.3 m to ground surface. |
| 06-57 | 10.7 / 307.2 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and sand and gravel from 0.3 m to ground surface. |
| 06-58 | 10.7 / 306.0 | Piezometer with 1.5 m slotted screen installed with sand filter to 7.3 m, bentonite seal from 7.3 m to 6.9 m, grout from 6.9 m to 0.5 m and concrete from 0.5 m to ground surface. |
| 06-59 | 10.7 / 304.2 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.7 m, bentonite seal from 8.7 m to 8.1 m and grout from 8.1 m to ground surface. |
| 06-64 | 9.1 / 275.5 | Piezometer with 1.5 m slotted screen installed with sand filter to 7.0 m, bentonite seal from 7.0 m to 6.6 m, grout from 6.6 m to 0.3 m and bentonite seal from 0.3 m to ground surface. |
| 06-65 | 10.7 / 290.9 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and concrete from 0.3 m to |

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| | | ground surface. |
| 06-66 | 10.7 / 304.3 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and sand and gravel from 0.3 m to ground surface. |
| 06-67 | 6.1 / 308.0 | Piezometer with 1.5 m slotted screen installed with sand filter to 4.3 m, bentonite seal from 4.3 m to 3.7 m, grout from 3.7 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and concrete from 0.3 m to ground surface. |
| 06-70 | 10.7 / 295.1 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and concrete from 0.3 m to ground surface. |
| 06-72 | 10.7 / 277.6 | Piezometer with 1.5 m slotted screen installed with sand filter to 8.8 m, bentonite seal from 8.8 m to 8.2 m, grout from 8.2 m to 0.9 m, bentonite seal from 0.9 m to 0.3 m and concrete from 0.3 m to ground surface. |

RECORD OF BOREHOLE No 06-2

1 OF 3

METRIC

G.W.P. 277-97-00 LOCATION Grand River Overpass SBL N 4 809 407.87 E 230 460.97 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 2006-09-28 - 2006-09-28 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
|---------------|--|------------|---------|------|--------------|----------------------------|-------------------|--|--|--|--|---|------------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| | | | | | | | WATER CONTENT (%) | | | | | | | |
| | | | | | | | 20 40 60 | | | | | | | |
| 294.8 | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL (125 mm) | | | | | | | | | | | | | |
| 0.1 | Silty CLAY, trace to some sand, trace gravel, occasional cobbles | | 1 | SS | 8 | | | | | | | | | |
| 294.1 | Stiff Brown (FILL) | | | | | | | | | | | | | |
| 0.8 | SILT and SAND, some clay, trace gravel | | 2 | SS | 8 | | 294 | | | | | | | |
| | Loose to Very Dense | | | | | | | | | | | | | |
| | Brown Dry (TILL) | | 3 | SS | 50/ .100 | | 293 | | | | | | 4 38 42 16 | |
| | | | 4 | SS | 101/ .275 | | 292 | | | | | | | |
| | | | 5 | SS | 105/ .225 | | 291 | | | | | | | |
| 290.3 | | | | | | | | | | | | | | |
| 4.6 | SAND, medium to coarse grained | | 6 | SS | 100 | | 290 | | | | | | | |
| | Very Dense | | | | | | | | | | | | | |
| | Brown Moist | | | | | | 289 | | | | | | | |
| 288.8 | | | | | | | | | | | | | | |
| 6.0 | Sandy SILT, trace gravel | | 7 | SS | 101/ .200 | | 288 | | | | | | | |
| | Very dense | | | | | | | | | | | | | |
| | Brown Damp to dry (TILL) | | | | | | 287 | | | | | | | |
| 287.2 | | | 8 | SS | 104/ .050 | | | | | | | | | |
| | Silty CLAY, some sand to sandy, trace gravel | | | | | | 286 | | | | | | | |
| | Hard Grey (TILL)(CL) | | 9 | SS | 113 | | | | | | | | 1 20 40 39 | |
| | | | | | | | 285 | | | | | | | |

Continued Next Page

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

ONTMT4S 7938.GPJ 17/05/07

RECORD OF BOREHOLE No 06-2

2 OF 3

METRIC

G.W.P. 277-97-00 LOCATION Grand River Overpass SBL N 4 809 407.87 E 230 460.97 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 2006-09-28 - 2006-09-28 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|------------------------------|--|------------|---------|------|--------------|----------------------------|---|---|--|-------------------|--|---|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | PLASTIC LIMIT NATURAL MOISTURE LIQUID LIMIT CONTENT W _P — W — W _L | | | WATER CONTENT (%) | | | | | |
| | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | |
| Continued From Previous Page | | | | | | | | | | | | | | | |
| | | | 10 | SS | 100/ .150 | | 284 | | | | | | | | |
| | | | 11 | SS | 109/ .150 | | 283 | | | | | | | | |
| | | | 12 | SS | 103/ .250 | | 281 | | | | | | | | |
| 279.6 | | | 13 | SS | 100/ .150 | | 279 | | | | | | | | |
| 15.2 | Sandy SILT, some clay, trace gravel Very Dense Brown (TILL) | | 14 | SS | 100/ .225 | | 278 | | | | | | | | |
| | | | 15 | SS | 100/ .275 | | 277 | | | | | | | | |
| 274.9 | | | 16 | SS | 100/ .275 | | 276 | | | | | | | | |

Continued Next Page

+ 3, × 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-2

3 OF 3

METRIC

G.W.P. 277-97-00 LOCATION Grand River Overpass SBL N 4 809 407.87 E 230 460.97 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 2006-09-28 - 2006-09-28 CHECKED BY MEF

| 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 | | | | | | |
| | Continued From Previous Page | | | | | | | | | | | | | |
| 19.9 | END OF BOREHOLE AT 19.89 m Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 04.01.07 9.89 284.9 | | | | .075 | | | | | | | | kN/m ³ | GR SA SI CL |

RECORD OF BOREHOLE No 06-14

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION King Street Overpass N 4 808 713.1 E 231 485.9 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 27.05.06 - 27.05.06 CHECKED BY MRA

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|-------------|----------------------------|-----------------|---|-----------------|-----------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | 20 40 60 80 100 | | |
| 309.4 | | | | | | | | | | | | |
| 0.0 | ASPHALT: (100 mm) | | | | | | | | | | | |
| 0.1 | SAND and GRAVEL, trace to some silt Very Dense Brown Dry (FILL) | | 1 | SS | 85 | | 309 | | | | | |
| | | | 2 | SS | 50/ .150 | | | | | | | |
| 307.9 | | | | | | | 308 | | | | | |
| 1.5 | SAND and GRAVEL, some silt Very Dense to Dense Brown Dry | | 3 | SS | 50/ .150 | | | | | | | |
| | | | 4 | SS | 76 | | 306 | | | | | |
| | | | 5 | SS | 43 | | 305 | | | | | |
| | | | 6 | SS | 36 | | 303 | | | | | |
| | | | 7 | SS | 35 | | 302 | | | | | |
| | | | 8 | SS | 41 | | 300 | | | | | |

Continued Next Page

+³ ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-14

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION King Street Overpass N 4 808 713.1 E 231 485.9 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 27.05.06 - 27.05.06 CHECKED BY MRA

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|--|--|--|--|--|--|--|---|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 298.3 | | | 9 | SS | 35 | | 299 | | | | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.13 m. BOREHOLE OPEN TO 11.13 m AND DRY UPON COMPLETION. BOREHOLE GROUTED TO SURFACE. | | | | | | | | | | | | | | | | |

ONTMT4S 7938-2.GPJ 06/03/07

RECORD OF BOREHOLE No 06-24

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION King Street Overpass N 4 808 714.5 E 231 550.0 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 24.05.06 - 24.05.06 CHECKED BY MRA

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|-------------|----------------------------|-----------------|---|----|----|----|-----|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | 60 | 80 | 100 | | |
| 311.1 | | | | | | | | | | | | | | |
| 0.0 | ASPHALT: (190 mm) | | | | | | | | | | | | | |
| 0.2 | SAND and GRAVEL crusher run limestone Very Dense Brown Dry (FILL) | | 1 | SS | 50/ .150 | | 311 | | | | | | | 42 47 11 (SI+CL) |
| | | | 2 | SS | 50 | | 310 | | | | | | | |
| 309.6 | | | | | | | | | | | | | | |
| 1.5 | Silty SAND, trace gravel, trace clay Dense to Very Dense Brown Dry to Damp | | 3 | SS | 33 | | 309 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 4 | SS | 60 | | 308 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | 307 | | | | | | | |
| | | | 5 | SS | 14 | | 306 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 6 | SS | 8 | | 305 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | 304 | | | | | | | |
| | | | 7 | SS | 25 | | 303 | | | | | | | 3 63 25 9 |
| | | | | | | | | | | | | | | |
| 302.0 | | | | | | | | | | | | | | |
| 9.1 | SILT, some clay, some sand to sandy, trace gravel Very Dense Brown Dry (TILL) | | 8 | SS | 53 | | 302 | | | | | | | |

Continued Next Page

+ 3 . X 3: Numbers refer to Sensitivity
 20
 15 5
 10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-24

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION King Street Overpass N 4 808 714.5 E 231 550.0 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 24.05.06 - 24.05.06 CHECKED BY MRA



| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 300.0 | | | 9 | SS | 102 | | 301 | | | | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.13 m. BOREHOLE OPEN TO 11.13 m AND DRY UPON COMPLETION. BOREHOLE GROUTED TO SURFACE. | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 06-52

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 622.85 E 230 083.71 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 28.05.06 - 28.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT Y kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|---|---------|------|------------|---|-----------------|---|---|---|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | WATER CONTENT (%) | | | | |
| | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | W P | W | W L | | | | |
| 298.4 | Hard Brown (TILL) |  | 9 | SS | 40 |  | 299 | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.13 m. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 29.05.06 6.95 302.55 26.09.06 Piezometer destroyed | | | | | | | | | | | | | |

UNIM14S 7938-2.GPJ 06/03/07

RECORD OF BOREHOLE No 06-53

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 510.02 E 230 308.12 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 29.05.06 - 29.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|--------------|----------------------------|-----------------|---|------------------|--------------------------------|---|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | | |
| 301.1 | | | | | | | | | | | | |
| 0.0 | ASPHALT: (75 mm) | | | | | | | | | | | |
| 0.1 | SAND and GRAVEL, some silt Dense to Compact Brown Dry (FILL) | | 1 | SS | 43 | | 301 | | | | | 35 52 13 (SI+CL) |
| | | | 2 | SS | 16 | | 300 | | | | | |
| 299.6 | | | | | | | | | | | | |
| 1.5 | Silty CLAY, some sand, trace gravel Very Stiff Brown (TILL) | | 3 | SS | 29 | | 299 | | | | | |
| | | | | | | | | | | | | |
| 298.0 | | | | | | | | | | | | |
| 3.0 | SILT and SAND, some clay, trace gravel Very Dense Brown (TILL) | | 4 | SS | 50/ .150 | | 298 | | | | | |
| | | | | | | | | | | | | |
| | | | 5 | SS | 58/ .100 | | 297 | | | | | |
| | | | | | | | | | | | | |
| | | | 6 | SS | 108 | | 296 | | | | | |
| | | | | | | | | | | | | |
| | | | 7 | SS | 112 | | 295 | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | 294 | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | 293 | | | | | |
| | | | | | | | | | | | | |
| | | | 8 | SS | 100/ .150 | | 292 | | | | | 2 43 45 10 |

Continued Next Page

+ 3, X 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-53

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 510.02 E 230 308.12 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 29.05.06 - 29.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----------------|---|----------------|-------------------|---|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | W _P | W | W _L | WATER CONTENT (%) | | |
| | | | | | | | 20 40 60 80 100 | | | | 20 40 60 | | | |
| | | | | | | | 20 40 60 80 100 | | | | 20 40 60 | | | |
| 290.1 | | | 9 | SS | 118 | | | | | | | | | |
| 11.0 | END OF BOREHOLE AT 10.97 m. BOREHOLE OPEN TO 10.97 m AND DRY UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 26.09.06 5.50 295.59 | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 06-54

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 070.88 E 230 949.61 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 31.05.06 - 31.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|-------------|----------------------------|-----------------|---|------------------|--------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | |
| 288.7 | ASPHALT: (25 mm) SAND and GRAVEL, trace silt Compact Brown Dry (FILL) | | 1 | SS | 28 | | 288 | | | | | |
| 287.3 | Silty CLAY, some sand Very Stiff Brown (FILL)(CL) | | 2 | SS | 18 | | 287 | | | | | |
| 1.4 | | | 3 | SS | 17 | | 286 | | | | | |
| | | | 4 | SS | 15 | | 285 | | | | | |
| 284.6 | GRAVEL, some sand, trace silt Very Dense Brown Wet | | 5 | SS | 50/ .150 | | 284 | | | | | |
| 283.2 | Silty CLAY, some sand, trace gravel Stiff Brown (TILL) | | 6 | SS | 11 | | 283 | | | | | |
| 281.1 | SILT and SAND, some clay, trace gravel, occasional cobbles and boulders Very Dense Brown (TILL) | | 7 | SS | 90 | | 282 | | | | | |
| | | | 8 | SS | .50 | | 281 | | | | | |
| | | | | | | | 280 | | | | | |
| | | | | | | | 279 | | | | | |

Continued Next Page

+ 3, x 3: Numbers refer to
Sensitivity

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10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-54

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 070.88 E 230 949.61 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 31.05.06 - 31.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|--|----|-----|----|----|------------------|--------------------------------|-----------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | | | | | | | | | |
| | | | | | | 20 | 40 | 60 | 80 | 100 | 20 | 40 | 60 | 20 | 40 | 60 | |
| 277.9 | | | 9 | SS | 50/ | | | | | | | | | | | | |
| 10.8 | END OF BOREHOLE AT 10.82 m. BOREHOLE OPEN TO 10.82 m AND WATER LEVEL AT 8.08 m UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 31.05.06 5.24 283.46 26.09.06 4.10 284.60 | | | | .150 | | | | | | | | | | | | |

ONTMT4S 7938-2.GPJ 06/03/07

RECORD OF BOREHOLE No 06-55

1 OF 2

METRIC

G.W.P. 277-97-00

LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 944.02 E 231 123.89

ORIGINATED BY GA

HWY 8

BOREHOLE TYPE Hollow Stem Augers

COMPILED BY WM

DATUM Geodetic

DATE 25.05.06 - 25.05.06

CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|------------------------------------|-------------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | |
| 294.8 | | | | | | | | | | | | |
| 0.0 | ASPHALT (100 mm) | | | | | | | | | | | |
| 0.1 | SAND and GRAVEL, trace silt Very Dense to Dense Brown Dry (FILL) | | 1 | SS | 63 | | 294 | | | | | 44 48 8 (SH+CL) |
| | | | 2 | SS | 35 | | | | | | | |
| 293.3 | | | | | | | | | | | | |
| 1.5 | Silty SAND, some gravel, trace clay Dense to Compact Brown Dry to Damp (TILL) | | 3 | SS | 30 | | 293 | | | | | |
| | | | | | | | | | | | | |
| | | | 4 | SS | 11 | | 292 | | | | | |
| | | | | | | | | | | | | |
| | | | 5 | SS | 18 | | 291 | | | | | |
| | | | | | | | | | | | | |
| | | | 6 | SS | 22 | | 290 | | | | | 12 57 25 6 |
| | | | | | | | | | | | | |
| | | | | | | | 289 | | | | | |
| | | | | | | | | | | | | |
| 288.1 | | | | | | | | | | | | |
| 6.7 | Silty CLAY, sandy, trace gravel Hard to Very Stiff Brown (TILL)(CL) | | | | | | 288 | | | | | |
| | | | | | | | | | | | | |
| | | | 7 | SS | 33 | | 287 | | | | | 1 28 44 27 |
| | | | | | | | | | | | | |
| | | | | | | | 286 | | | | | |
| | | | 8 | SS | 36 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | 285 | | | | | |

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-55

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 944.02 E 231 123.89 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 25.05.06 - 25.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT Y kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|-------------------|------------------|--------------------------------|-----------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | WATER CONTENT (%) | | | | | |
| 283.7 | | | 9 | SS | 27 | | 284 | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.13 m. BOREHOLE OPEN TO 11.13 m AND WATER LEVEL AT 6.4 m UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 25.05.06 6.20 288.60 26.09.06 6.50 288.30 | | | | | | | | | | | | | |

METRIC

| | | | | | |
|--------|------------------|---------------|--|---------------|------------|
| G.W.P. | <u>277-97-00</u> | LOCATION | <u>Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 583.69 E 231 944.24</u> | ORIGINATED BY | <u>GA</u> |
| HWY | <u>8</u> | BOREHOLE TYPE | <u>Hollow Stem Augers</u> | COMPILED BY | <u>WM</u> |
| DATUM | <u>Geodetic</u> | DATE | <u>27.05.06 - 27.05.06</u> | CHECKED BY | <u>MEF</u> |

[illegible]

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 06-56

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 583.69 E 231 944.24 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 27.05.06 - 27.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----------|------------------|--------------------------------|-----------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 20 40 60 | | | | | |
| 306.7 | | | 9 | SS | 36 | | | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.13 m. BOREHOLE OPEN TO 11.13 m AND DRY UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 26.09.06 Piezometer destroyed | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 06-57

1 OF 2

METRIC

G.W.P. 277-97-00

LOCATION

Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 468.18 E 232 111.91

ORIGINATED BY GA

HWY 8

BOREHOLE TYPE

Hollow Stem Augers

COMPILED BY WM

DATUM Geodetic

DATE

30.05.06 - 30.05.06

CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|-------------|----------------------------|-----------------|---|------------------------------------|-------------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | |
| 317.9 0.0 | SAND and GRAVEL, some silt Dense to Very Dense Brown Dry (FILL) | | 1 | SS | 33 | | | | | | | |
| | | | 2 | SS | 41 | | 317 | | | | | 34 54 12 (SI+CL) |
| | | | 3 | SS | 50/ .150 | | 316 | | | | | |
| 315.5 2.4 | SAND, some silt, trace gravel Dense to Very Dense Brown Dry to Moist | | 4 | SS | 37 | | 315 | | | | | |
| | | | 5 | SS | 46 | | 314 | | | | | 1 84 15 (SI+CL) |
| | | | 6 | SS | 59 | | 313 | | | | | |
| | | | 7 | SS | 65 | | 312 | | | | | |
| | | | 8 | SS | 73 | | 311 | | | | | |
| | | | | | | | 310 | | | | | |
| | | | | | | | 309 | | | | | |
| | | | | | | | 308 | | | | | |

Continued Next Page

+ 3 x 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-57

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 468.18 E 232 111.91 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 30.05.06 - 30.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|-------------|----------------------------|-----------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 306.9 | | | 9 | SS | 100/ 225 | | | | | | | | | | | | |
| 11.0 | END OF BOREHOLE AT 11.05 m. BOREHOLE OPEN TO 10.67 m AND DRY UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH 26.09.06 Piezometer destroyed | | | | | | | | | | | | | | | | |

ONTMT4S 7938-2.GPJ 06/03/07

RECORD OF BOREHOLE No 06-58

1 OF 2

METRIC

G.W.P.: 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 419.89 E 232 272.59 ORIGINATED BY WRW
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 23.05.06 - 23.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|-----------------|---|-------------------|--------------------|---------------------------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | W _p W W _L | WATER CONTENT (%) | 20 40 60 | | |
| 316.7 0.0 | SAND and GRAVEL, some silt Very Dense to Dense Brown Dry (FILL) | | 1 | SS | 56 | | 316 | | | | | | 35 49 16 (SI+CL) | |
| | | | 2 | SS | 34 | | 315 | | | | | | | |
| | | | 3 | SS | 88 | | | | | | | | | |
| 314.3 2.4 | Sandy GRAVEL, trace silt Compact to Very Dense Brown Dry | | 4 | SS | 23 | | 314 | | | | | | | |
| | | | | | | | 313 | | | | | | | |
| | | | | | | | 312 | | | | | | | |
| | | | 5 | SS | 20 | | 311 | | | | | | | |
| | | | | | | 310 | | | | | | | | |
| | | | 6 | SS | 26 | 309 | | | | | | | | |
| | | | | | | 308 | | | | | | | | |
| | | | 7 | SS | 38 | 307 | | | | | | | | |
| | | | | | | | | | | | | 62 32 6 (SI+CL) | | |

Continued Next Page

+³ × 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-58

2 OF 2

METRIC

G.W.P. 277-97-00

LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 419.89 E 232 272.59

ORIGINATED BY WRW

HWY 8

BOREHOLE TYPE Hollow Stem Augers

COMPILED BY WM

DATUM Geodetic

DATE 23.05.06 - 23.05.06

CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|-------------------|------------------|--------------------------------|-----------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | WATER CONTENT (%) | | | | | |
| 305.7 | | | 9 | SS | 50 | | 306 | | | | | | | |
| 11.0 | <p>END OF BOREHOLE AT 10.97 m. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.</p> <p>WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 26.09.06 Piezometer destroyed</p> | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 06-59

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 314.78 E 232 454.55 ORIGINATED BY WRW
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 23.05.06 - 23.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|--|------------------------------------|-------------------------------------|-----------------------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 314.9 | ASPHALT: (50 mm) SAND and GRAVEL, trace silt Very Dense Brown Dry (FILL) | | 1 | SS | 73 | | | | | | | | | |
| 312.5 | Gravelly SAND, trace silt and clay Compact to Very Dense Brown Dry | | 2 | SS | 50/ 100 | | | | | | | | | |
| 2.4 | | | 3 | SS | 22 | | | | | | | | | |
| | | | 4 | SS | 40 | | | | | | | | | |
| | | | 5 | SS | 31 | | | | | | | | | |
| | | | 6 | SS | 39 | | | | | | | | | |
| | | | 7 | SS | 98 | | | | | | | | | |

Continued Next Page

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

RECORD OF BOREHOLE No 06-59

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 314.78 E 232 454.55 ORIGINATED BY WRW
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 23.05.06 - 23.05.06 CHECKED BY MEF





| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT Y kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----------|------------------|--------------------------------|-----------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 20 40 60 | | | | | |
| 304.8 10.1 | Silty CLAY, some sand, trace gravel Hard Brown (TILL)(CL) | | 8 | SS | 67 | | | | | | | | | 0 14 48 38 |
| 303.9 11.0 | END OF BOREHOLE AT 10.97 m. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 29.09.06 10.10 304.80 | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 06-64

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr. N 4 809 235.31 E 230 718.37 ORIGINATED BY SLL
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY JHL
 DATUM Geodetic DATE 10.08.06 - 10.08.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | |
|---------------|---|---|---------|------|-------------|----------------------------|-----------------|---|----|----|--|---|-------------------------------------|-----------------------------------|-------------------|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | | |
| | | | | | | | | ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | WATER CONTENT (%) | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | 20 | 40 | 60 | | | | | |
| 284.6 | | | | | | | | | | | | | | | | | | | |
| 0.0 0.1 | TOPSOIL: (150 mm) Silty CLAY, trace sand, topsoil stained Firm to Stiff Dark Brown |  | 1 | SS | 5 | | | | | | | | | ○ | | | | | |
| | | | 2 | SS | 13 | | | | | | | | | ○ | | | | | |
| 283.1 | | | | | | | | | | | | | | | | | | | |
| 1.4 | SAND and GRAVEL, trace silt, occasional cobbles Loose Brown Moist Becoming Very Dense occasional cobbles and boulders |  | 3 | SS | 8 | | | | | | | | | | | | | | |
| | | | 4 | SS | 70 | | | | | | | | | ○ | | | | | |
| | | | 5 | SS | 92/ .275 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 88 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 278.5 | | | | | | | | | | | | | | | | | | | |
| 6.0 | Sandy SILT, trace gravel, occasional cobbles Very Dense Grey Moist to Wet (TILL) |  | 7 | SS | 50/ .125 | | | | | | | | | ○ | | | | | |
| 277.6 | | | | | | | | | | | | | | | | | | | |
| 7.0 | SAND, some silt, trace gravel, occasional cobbles Very Dense Grey Wet |  | 8 | SS | 50/ .100 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 275.4 | | | | | | | | | | | | | | | | | | | |
| 9.2 | END OF BOREHOLE AT 9.19 m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. | | 9 | SS | 50/ .050 | | | | | | | | | ○ | | | | | |

Continued Next Page

+ 3. x 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

METRIC

[illegible]

RECORD OF BOREHOLE No 06-65

1 OF 2

METRIC

G.W.P. 277-97-00

LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 818.97 E 231 273.96

ORIGINATED BY GA

HWY 8

BOREHOLE TYPE Hollow Stem Augers

COMPILED BY WM

DATUM Geodetic

DATE 26.05.06 - 26.05.06

CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|-----------------|---|----------|--|---------------------------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | W _P W W _L | 20 40 60 | | | |
| 301.6 | ASPHALT: (50 mm) | | | | | | | | | | | | | |
| 0.0 | SAND and GRAVEL, trace silt Dense to Compact Brown Dry (FILL) | | 1 | SS | 57 | | | | | | | | | 47 43 10 (SI+CL) |
| 300.1 | | | 2 | SS | 30 | | | | | | | | | |
| 1.5 | Silty CLAY, trace sand, trace gravel Hard to Very Stiff Brown Dry (TILL)(CL-CI) | | 3 | SS | 38 | | | | | | | | | |
| | | | 4 | SS | 31 | | | | | | | | | 1 1 60 38 |
| | | | 5 | SS | 43 | | | | | | | | | |
| | | | 6 | SS | 35 | | | | | | | | | |
| | | | 7 | SS | 55 | | | | | | | | | |
| | | | 8 | SS | 20 | | | | | | | | | 0 1 37 62 |

Continued Next Page

+ 3, x 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-65

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 818.97 E 231 273.96 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 26.05.06 - 26.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT Y kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|-----|----|------------------|--------------------------------|-----------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | 20 | 40 | 60 | | | |
| 290.5 | | | 9 | SS | 36 | | | | | | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.13 m. BOREHOLE OPEN TO 11.13 m AND DRY UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 26.09.06 Dry | | | | | | | | | | | | | | | | |

ONTMT4S 7938-2.GPJ 06/03/07

RECORD OF BOREHOLE No 06-66

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 626.79 E 231 711.79 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 30.05.06 - 30.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|-------------|----------------------------|-----------------|---|------------------------------------|-------------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | |
| 315.0 | | | | | | | | | | | | |
| 0.0 | SAND and GRAVEL, trace silt Compact Brown Dry (FILL) | | 1 | SS | 15 | | 315 | | | | | |
| | | | 2 | SS | 26 | | 314 | | | | | |
| 313.5 | | | | | | | | | | | | |
| 1.5 | Gravelly SAND, some silt Compact to Very Dense Brown Dry to Moist | | 3 | SS | 32 | | 313 | | | | | |
| | | | 4 | SS | 25 | | 312 | | | | | |
| | | | 5 | SS | 72/ .150 | | 311 | | | | | |
| | | | | | | | 310 | | | | | |
| | | | | | | | 309 | | | | | |
| 308.9 | | | | | | | | | | | | |
| 6.1 | SAND, trace silt, trace gravel Compact to Dense Brown Moist | | 6 | SS | 14 | | 308 | | | | | |
| | | | 7 | SS | 17 | | 307 | | | | | |
| | | | 8 | SS | 26 | | 306 | | | | | |

Continued Next Page

+³ ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-66

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 626.79 E 231 711.79 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 30.05.06 - 30.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 303.9 | | | 9 | SS | 34 | | | | | | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.13 m. BOREHOLE OPEN TO 11.13 m AND DRY UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 29.09.06 Piezometer destroyed | | | | | | | | | | | | | | | | |

+³ ×³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-67

1 OF 1

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 808 259.99 E 232 510.57 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 27.05.06 - 27.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|--|------------|---------|------|------------|----------------------------|---|---|--|--|--|---|-------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | | | | | | |
| | | | | | | | W _P W W _L | | | | | | | | |
| | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | | | | |
| 314.1 | | | | | | | | | | | | | | | |
| 0.0 | | | | | | | | | | | | | | | |
| 0.1 | ASPHALT: (88 mm) | | | | | | | | | | | | | | |
| | SAND and GRAVEL, trace silt | | 1 | SS | 50/ | | | | | | | | | | |
| | Very Dense | | | | .150 | | | | | | | | | | |
| | Brown | | 2 | SS | 50/ | | | | | | | | | | |
| | Dry | | | | .150 | | | | | | | | | | |
| | (FILL) | | | | | | | | | | | | | | |
| 312.6 | | | | | | | | | | | | | | | |
| 1.5 | Gravelly SAND, trace silt | | 3 | SS | 50/ | | | | | | | | | | |
| | Very Dense | | | | .125 | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | |
| | Dry | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 4 | SS | 50/ | | | | | | | | | | |
| | | | | | .075 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 309.7 | | | | | | | | | | | | | | | |
| 4.4 | SAND, trace silt | | 5 | SS | 25 | | | | | | | | | | |
| | Compact to Dense | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | |
| | Dry | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 307.5 | | | 6 | SS | 42 | | | | | | | | | | |
| 6.6 | END OF BOREHOLE AT 6.55 m. BOREHOLE OPEN TO 6.55 m AND DRY UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 27.05.06 Dry | | | | | | | | | | | | | | |

ONTMT4S 7938-2.GPJ 06/03/07

RECORD OF BOREHOLE No 06-70

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 565.36 E 230 184.39 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 30.05.06 - 30.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
|---------------|---|------------|---------|------|-------------|----------------------------|------------------------------------|---|-----------------------------------|-------------------|--|---|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | WATER CONTENT (%) | | | | |
| 305.8 | | | | | | 20 40 60 80 100 | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | | | | | |
| 0.0 0.1 | ASPHALT: (75 mm) SAND and GRAVEL, some silt Dense to Very Dense Brown Dry (FILL) | | 1 | SS | 40 | | | | | | 42 47 11 (SI+CL) | | | |
| | | | 2 | SS | 50/ .150 | | | | | | | | | |
| 304.3 | | | | | | | | | | | | | | |
| 1.5 | SAND, trace to some silt, trace to some gravel Dense to Compact Brown Dry | | 3 | SS | 42 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 4 | SS | 24 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 301.2 | | | | | | | | | | | | | | |
| 4.6 | Sandy SILT, trace clay Loose Brown Mottled Wet | | 5 | SS | 9 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 299.7 | | | | | | | | | | | | | | |
| 6.1 | SAND and SILT, some clay, trace gravel Compact Brown Wet (TILL) | | 6 | SS | 28 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 7 | SS | 27 | | | | | | 4 52 34 10 | | | |
| | | | | | | | | | | | | | | |
| 296.7 | | | | | | | | | | | | | | |
| 9.1 | Silty CLAY, some sand, trace gravel Hard Brown (TILL) | | 8 | SS | 36 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

Continued Next Page

+ 3, x 3: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 06-70

2 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 565.36 E 230 184.39 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 30.05.06 - 30.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|-------------|----------------------------|-----------------|---|-------------------|------------------|--------------------------------|-----------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | WATER CONTENT (%) | | | | | |
| 294.7 | | | 9 | SS | 100/ 250 | | 295 | | | | | | | |
| 11.1 | END OF BOREHOLE AT 11.07 m. BOREHOLE OPEN TO 11.07 m AND WATER LEVEL AT 7.92 m UPON COMPLETION. Piezometer installation consists of 25 mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 29.05.06 7.28 298.52 26.09.06 10.45 295.35 | | | | | | | | | | | | | |

ONTM14S 7938-2.GPJ 06/03/07

RECORD OF BOREHOLE No 06-72

1 OF 2

METRIC

G.W.P. 277-97-00 LOCATION Hwy 8 Widening, Grand River to Sportsworld Dr N 4 809 160.74 E 230 842.65 ORIGINATED BY GA
 HWY 8 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
 DATUM Geodetic DATE 30.05.06 - 30.05.06 CHECKED BY MEF

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|-------------|----------------------------|-----------------|---|------------------|--------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | |
| 288.3 | | | | | | | | | | | | |
| 0.0 | ASPHALT (100 mm) | | | | | | | | | | | |
| 0.1 | SAND and GRAVEL, some silt Dense Brown Dry (FILL) | | 1 | SS | 42 | | 288 | | ○ | | | 41 46 13 (SI+CL) |
| | | | 2 | SS | 38 | | | | ○ | | | |
| 286.9 | | | | | | | 287 | | | | | |
| 1.4 | Silty CLAY, some sand, trace gravel Very Stiff Brown (FILL) | | 3 | SS | 24 | | | | ○ | | | |
| | | | | | | | 286 | | | | | |
| 285.3 | | | | | | | | | | | | |
| 3.0 | SAND and SILT, trace clay, trace gravel, trace organics, occasional cobbles Loose Brown Moist | | 4 | SS | 7 | | 285 | | ○ | | | 1 56 36 7 |
| | | | | | | | | | | | | |
| 284.0 | | | | | | | 284 | | | | | |
| 4.3 | GRAVEL, some sand, trace silt Very Dense Brown Wet | | 5 | SS | 52 | | | | ○ | | | |
| | | | | | | | 283 | | | | | |
| | | | 6 | SS | 50/ .150 | | 282 | | ○ | | | |
| | | | | | | | | | | | | |
| 281.0 | | | | | | | 281 | | | | | |
| 7.3 | Silty CLAY, some sand, trace gravel Hard Brown (TILL) | | 7 | SS | 62/ .150 | | | | ○ | | | |
| | | | | | | | 280 | | | | | |
| | | | 8 | SS | 59 | | 279 | | ○ | | | |
| | | | | | | | | | | | | |

Continued Next Page

+³ ×³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

METRIC

+ 3, X 3: Numbers refer to Sensitivity

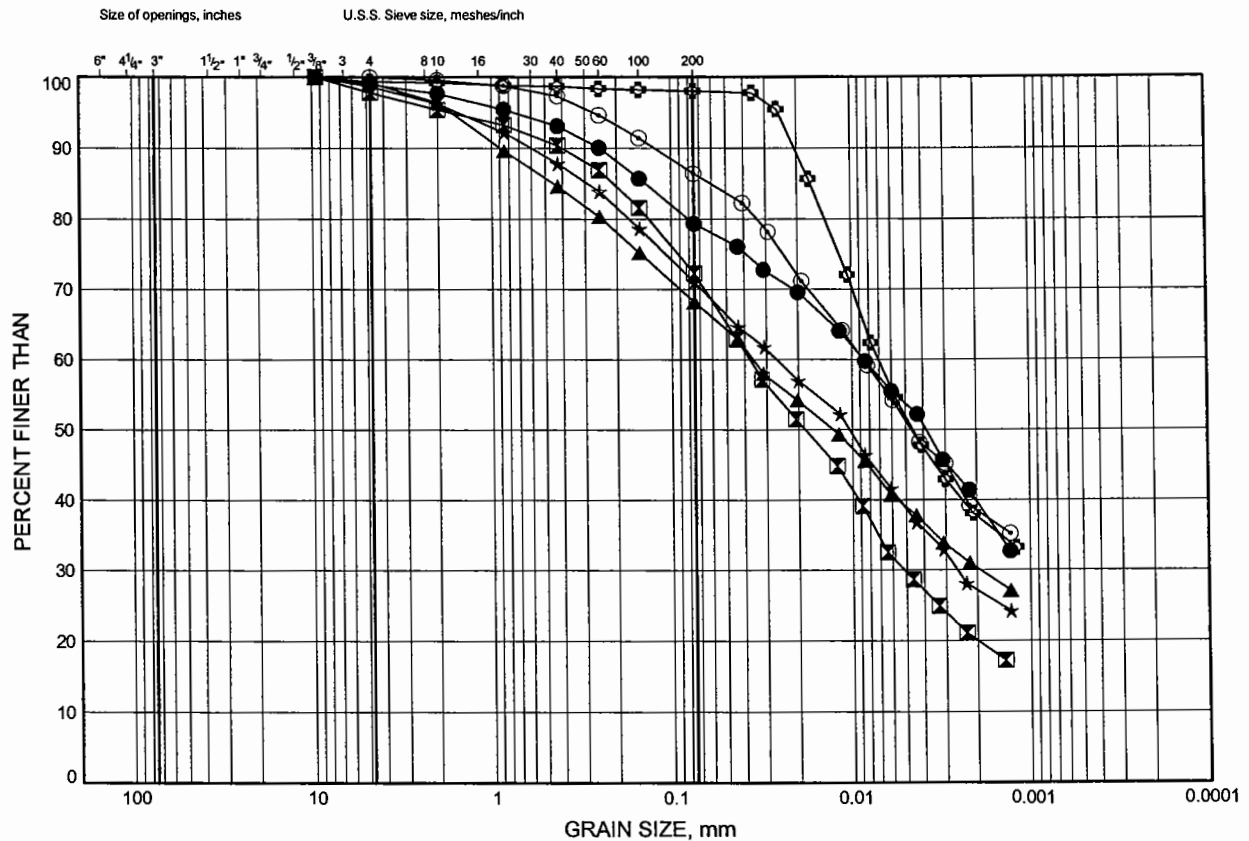
Appendix B

Laboratory Test Results

Highway 8 Widening Over Grand River GRAIN SIZE DISTRIBUTION

FIGURE B1

SILTY CLAY TILL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-2 | 9.30 | 285.53 |
| ⊠ | 06-2 | 12.50 | 282.33 |
| ▲ | 06-52 | 1.83 | 307.67 |
| ★ | 06-55 | 7.85 | 286.95 |
| ⊙ | 06-59 | 10.67 | 304.23 |
| ⊕ | 06-65 | 3.35 | 298.25 |

Date May 2007

Project 277-97-00



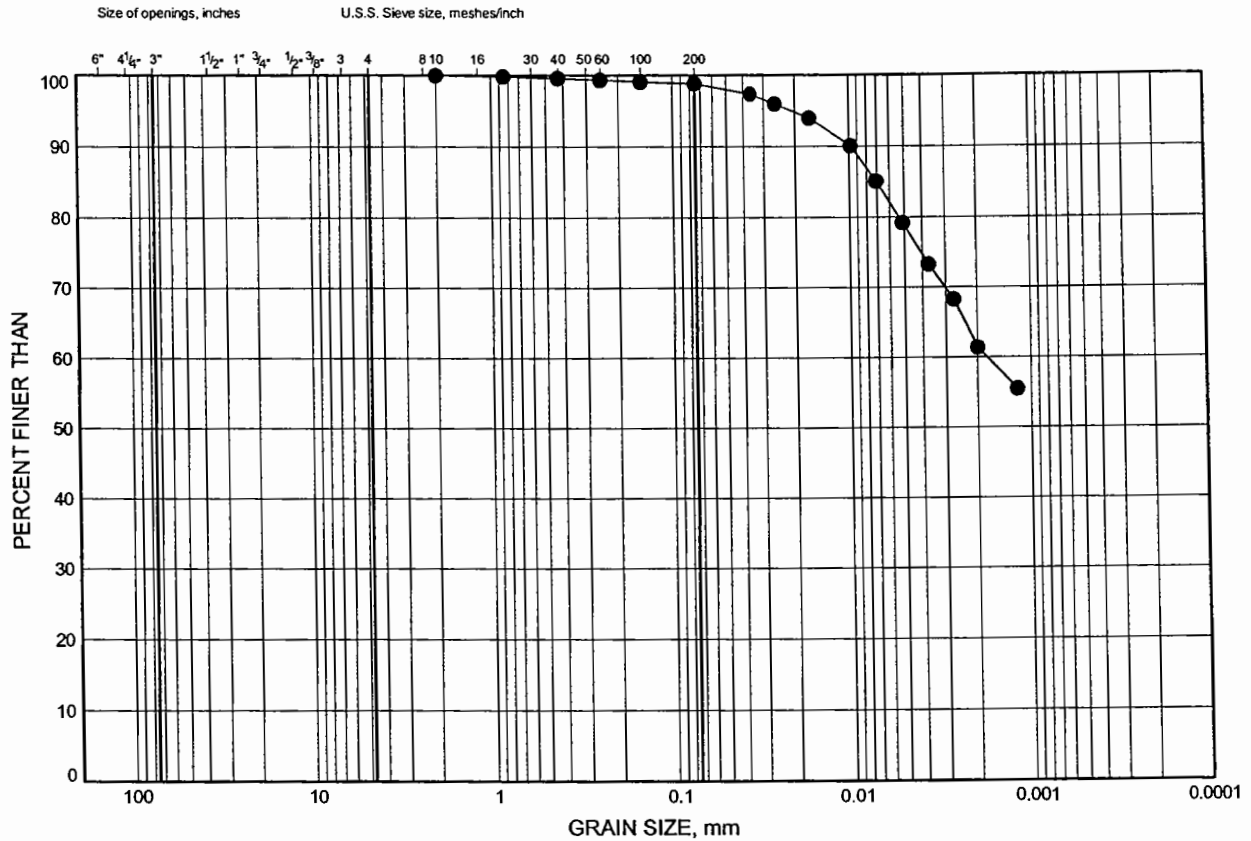
Prep'd MFA

Chkd. MEF

Geotechnical Investigation GRAIN SIZE DISTRIBUTION

FIGURE B2

SILTY CLAY TILL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-65 | 9.37 | 292.23 |

Date March 2007
Project 277-97-00

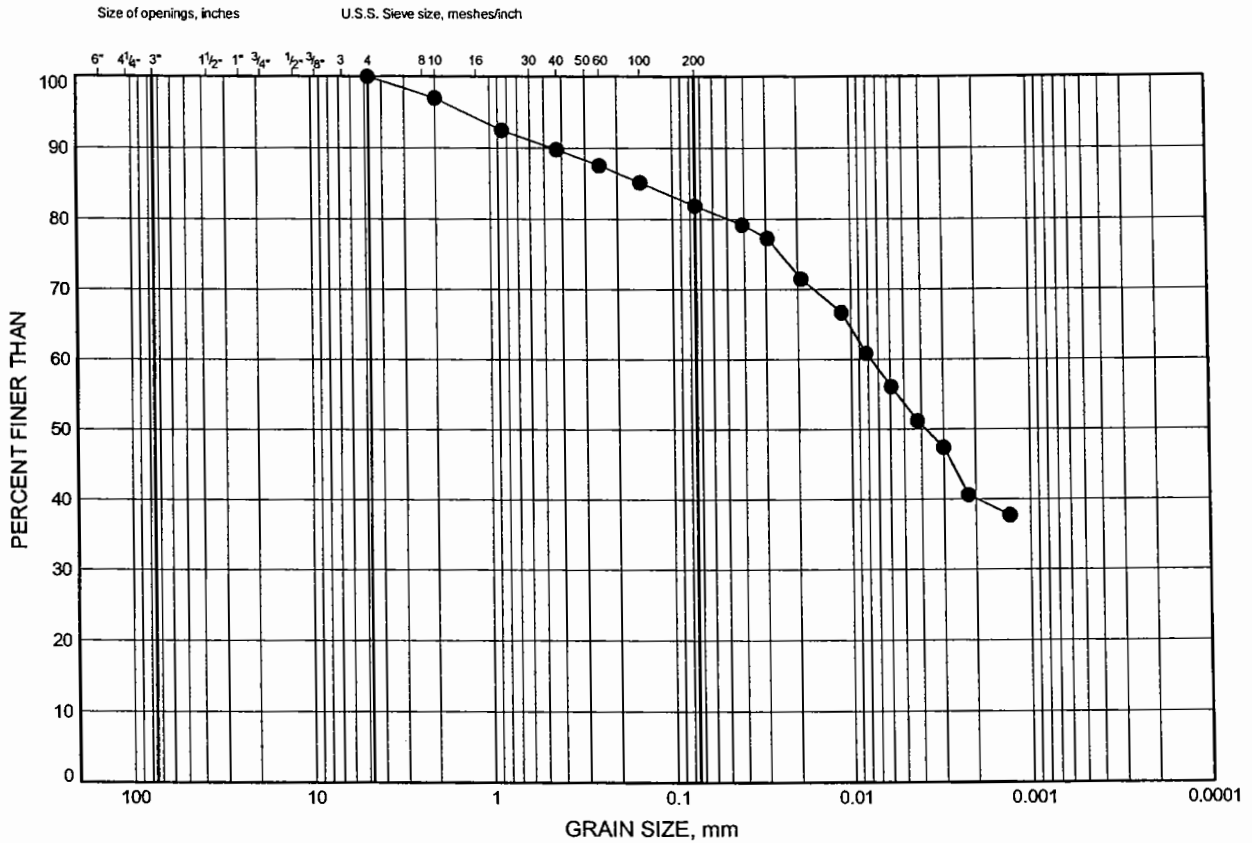


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Chkd. MEF

Geotechnical Investigation GRAIN SIZE DISTRIBUTION

FIGURE B3

SILTY CLAY FILL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-54 | 1.83 | 286.87 |

Date March 2007
Project 277-97-00



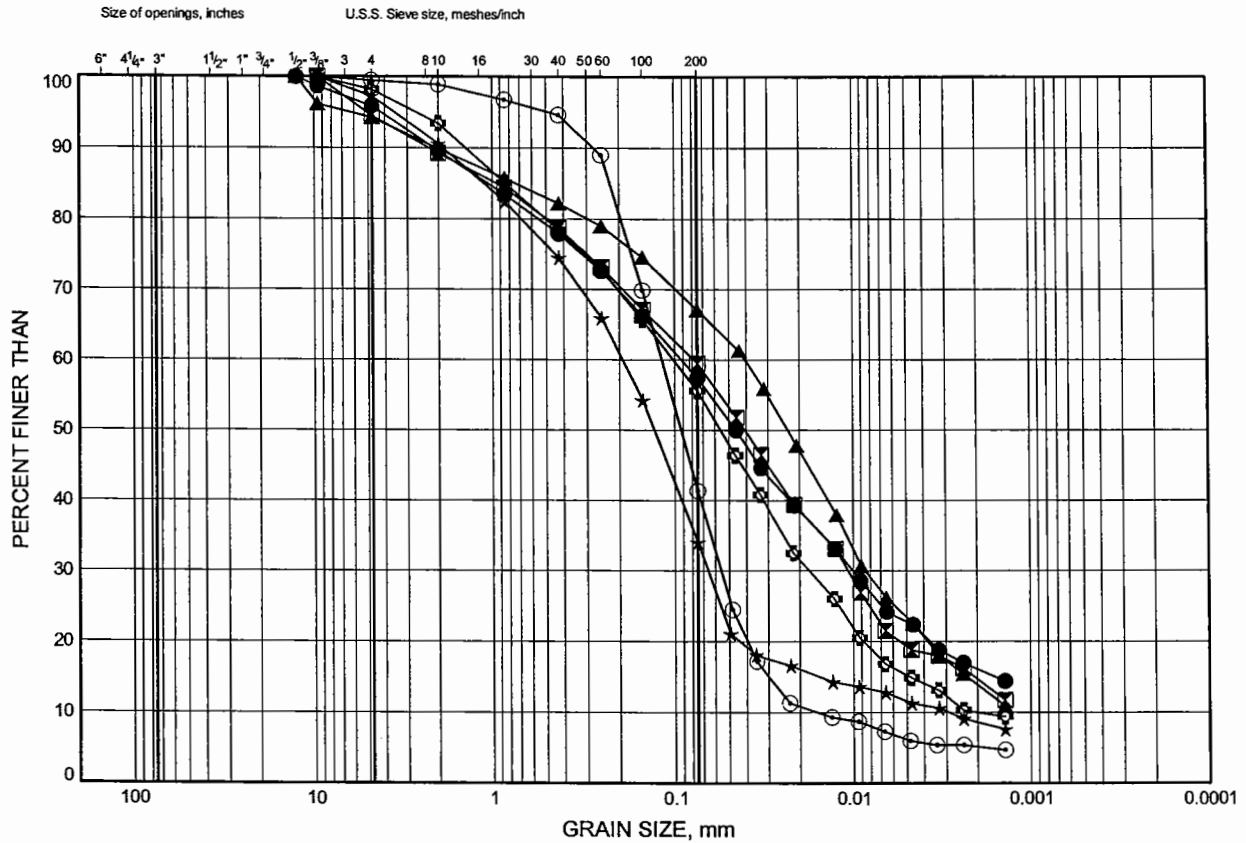
Prep'd MFA
Chkd. MEF

Highway 8 Widening Over Grand River

GRAIN SIZE DISTRIBUTION

FIGURE B4

SILTY SAND TO SILT AND SAND TILL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-2 | 1.83 | 293.00 |
| ⊠ | 06-2 | 17.07 | 277.76 |
| ▲ | 06-2 | 18.34 | 276.49 |
| ★ | 06-24 | 7.85 | 303.25 |
| ⊙ | 06-52 | 4.80 | 304.70 |
| ⊗ | 06-53 | 9.37 | 291.72 |

Date May 2007

Project 277-97-00



Prep'd MFA

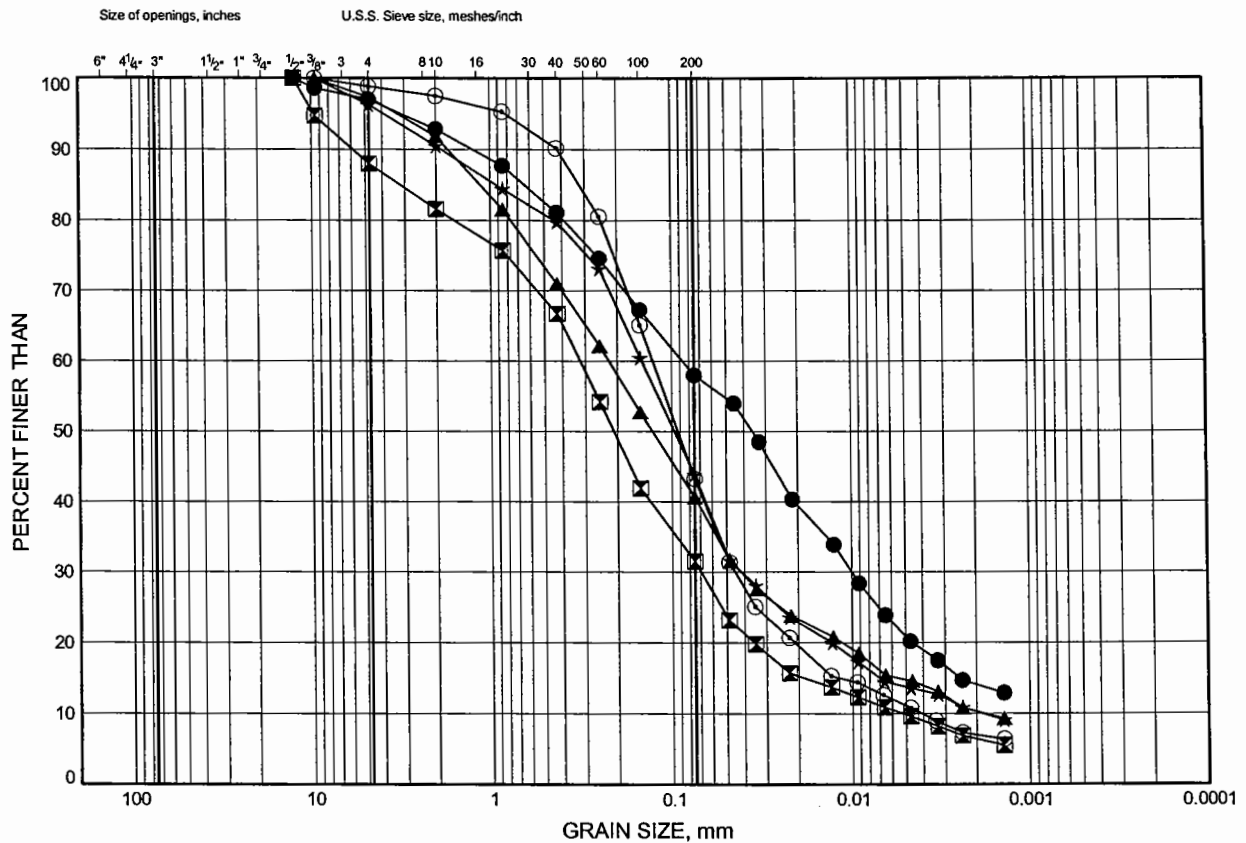
Chkd. MEF

Highway 8 Widening Over Grand River

GRAIN SIZE DISTRIBUTION

FIGURE B5

SILTY SAND TO SILT AND SAND TILL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-54 | 7.85 | 280.85 |
| ⊠ | 06-55 | 4.80 | 290.00 |
| ▲ | 06-56 | 3.35 | 314.45 |
| ★ | 06-70 | 7.85 | 297.95 |
| ⊙ | 06-72 | 3.35 | 284.95 |

Date May 2007

Project 277-97-00



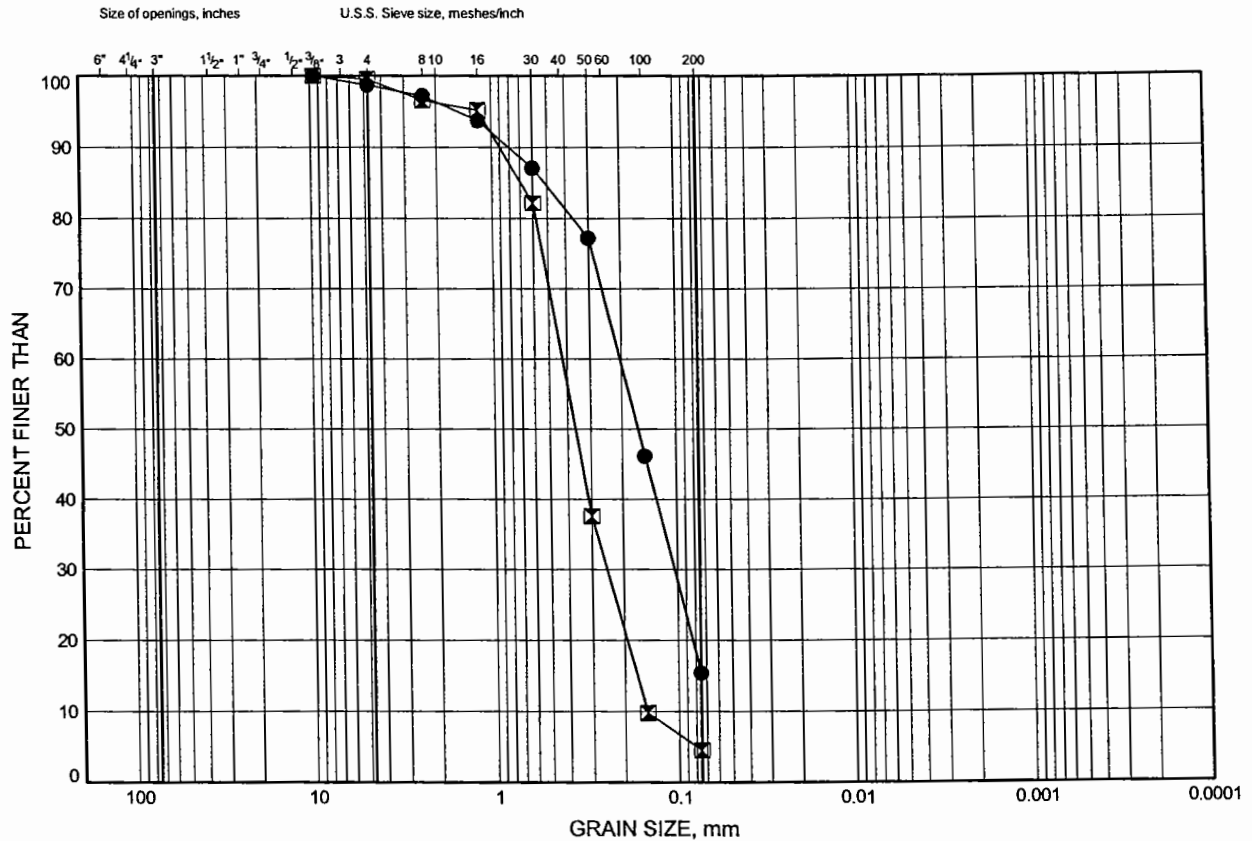
Prep'd MFA

Chkd. MEF

Geotechnical Investigation GRAIN SIZE DISTRIBUTION

FIGURE B6

SAND



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-57 | 4.80 | 313.10 |
| □ | 06-67 | 4.80 | 309.30 |

Date March 2007
Project 277-97-00

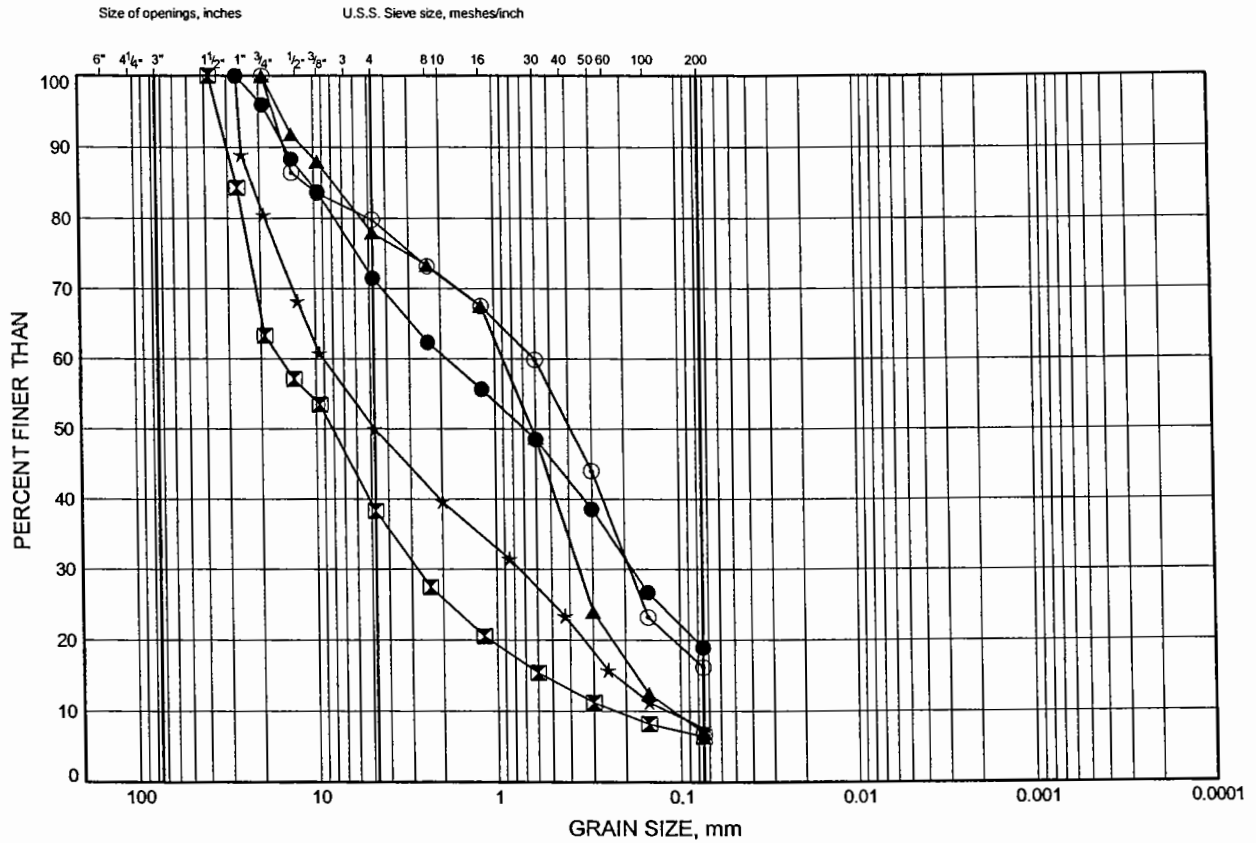


Prep'd MFA
Chkd. MEF

Geotechnical Investigation GRAIN SIZE DISTRIBUTION

FIGURE B7

SAND AND GRAVEL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-14 | 4.80 | 304.60 |
| ⊠ | 06-58 | 6.10 | 310.60 |
| ▲ | 06-59 | 7.62 | 307.28 |
| ★ | 06-64 | 3.25 | 281.33 |
| ⊙ | 06-66 | 3.35 | 311.65 |

Date March 2007

Project 277-97-00



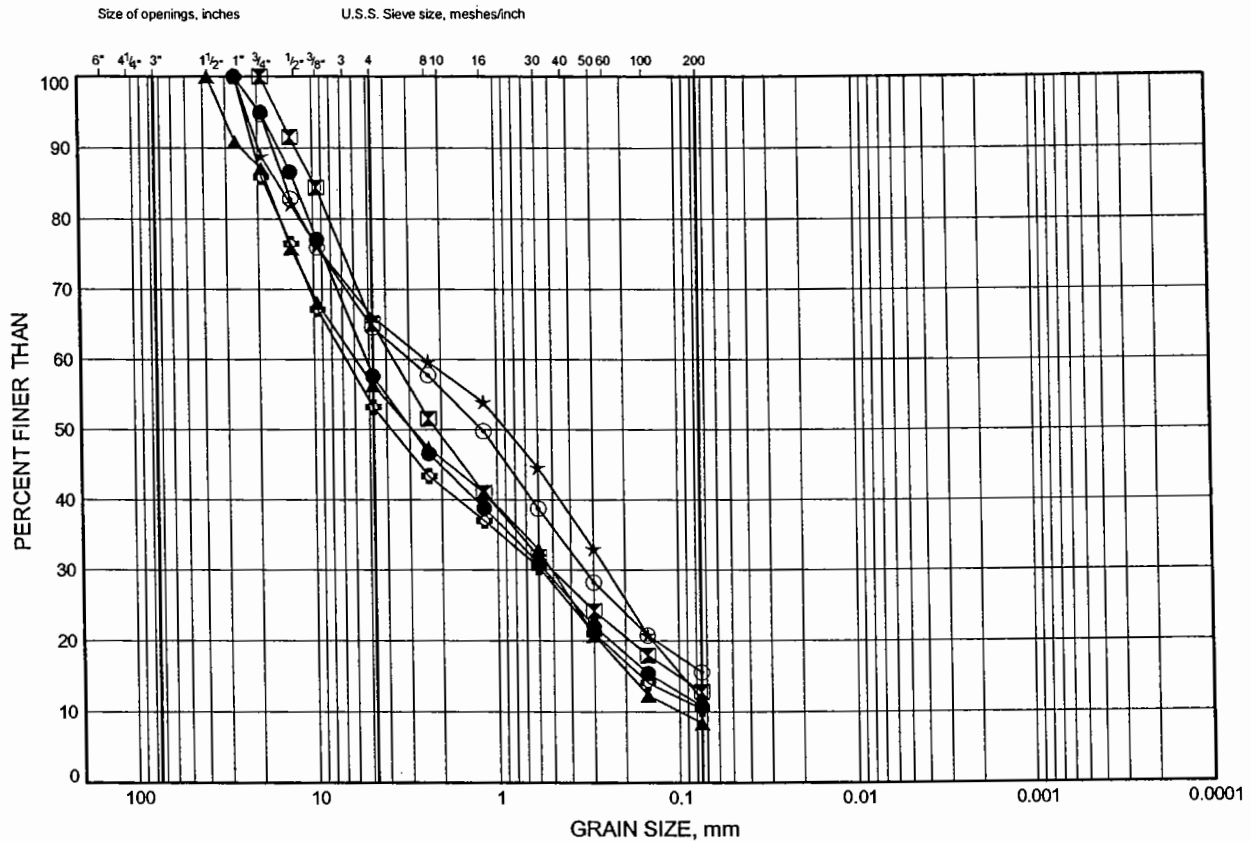
Prep'd MFA

Chkd. MEF

Geotechnical Investigation
GRAIN SIZE DISTRIBUTION

FIGURE B8

SAND AND GRAVEL FILL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-24 | 0.23 | 310.87 |
| ⊠ | 06-53 | 0.46 | 300.63 |
| ▲ | 06-55 | 0.46 | 294.34 |
| * | 06-57 | 1.07 | 316.83 |
| ⊙ | 06-58 | 0.91 | 315.79 |
| ⊗ | 06-65 | 0.46 | 301.14 |

Date March 2007

Project 277-97-00



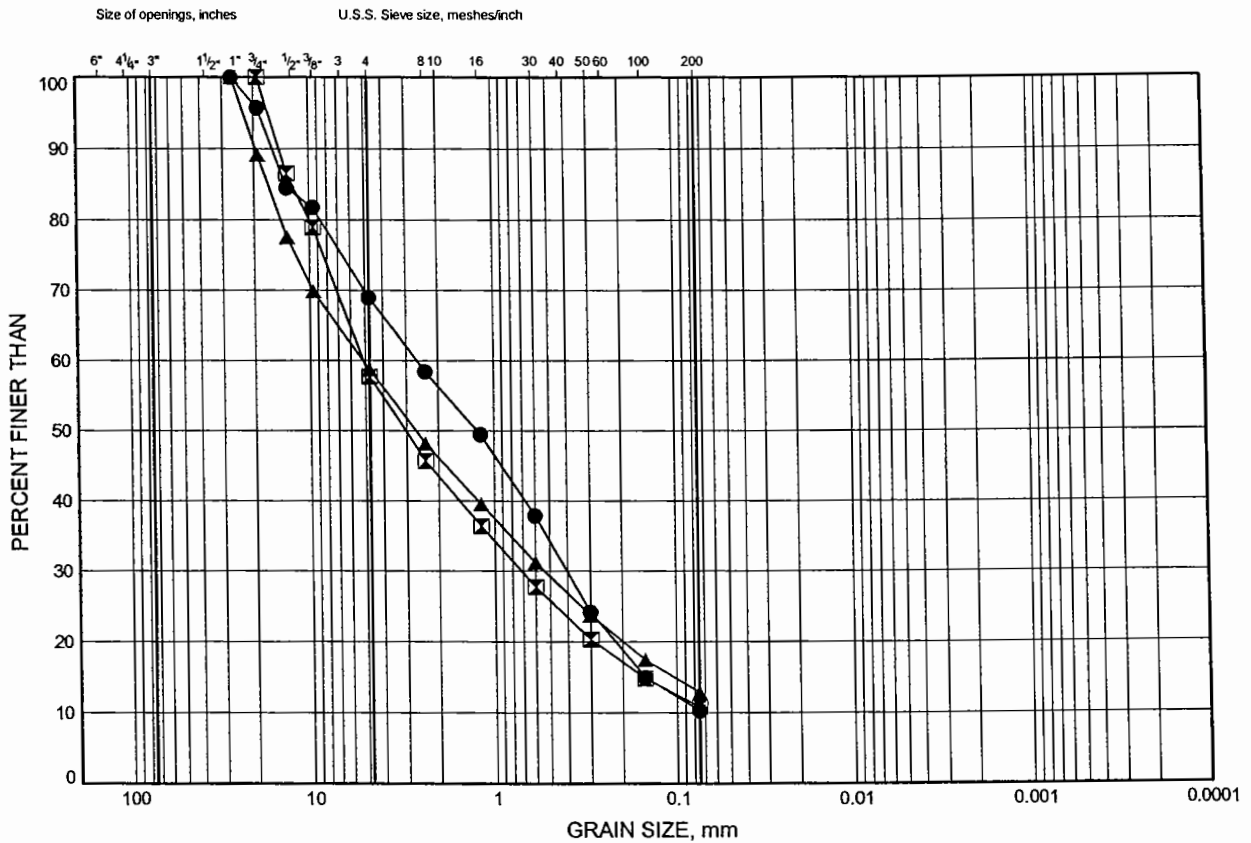
Prep'd MFA

Chkd. MEF

Geotechnical Investigation GRAIN SIZE DISTRIBUTION

FIGURE B9

SAND AND GRAVEL FILL



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

| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-67 | 1.07 | 313.03 |
| ◻ | 06-70 | 0.46 | 305.34 |
| ▲ | 06-72 | 0.46 | 287.84 |

Date March 2007

Project 277-97-00

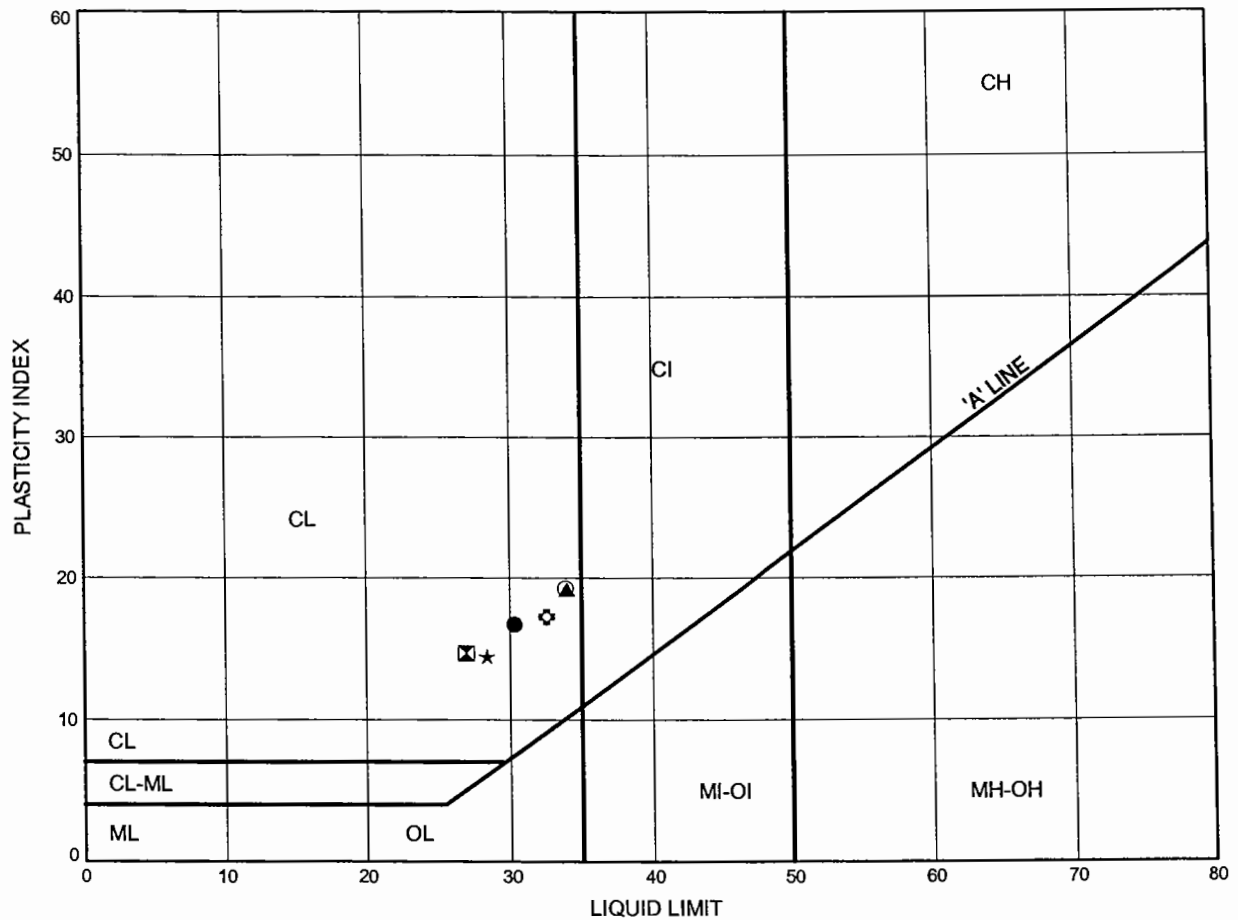


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Geotechnical Investigation
ATTERBERG LIMITS TEST RESULTS

FIGURE B10



| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-2 | 9.30 | 285.53 |
| ⊠ | 06-52 | 1.83 | 307.67 |
| ▲ | 06-54 | 1.83 | 286.87 |
| ★ | 06-55 | 7.85 | 286.95 |
| ⊙ | 06-59 | 10.67 | 304.23 |
| ⊕ | 06-65 | 3.35 | 298.25 |

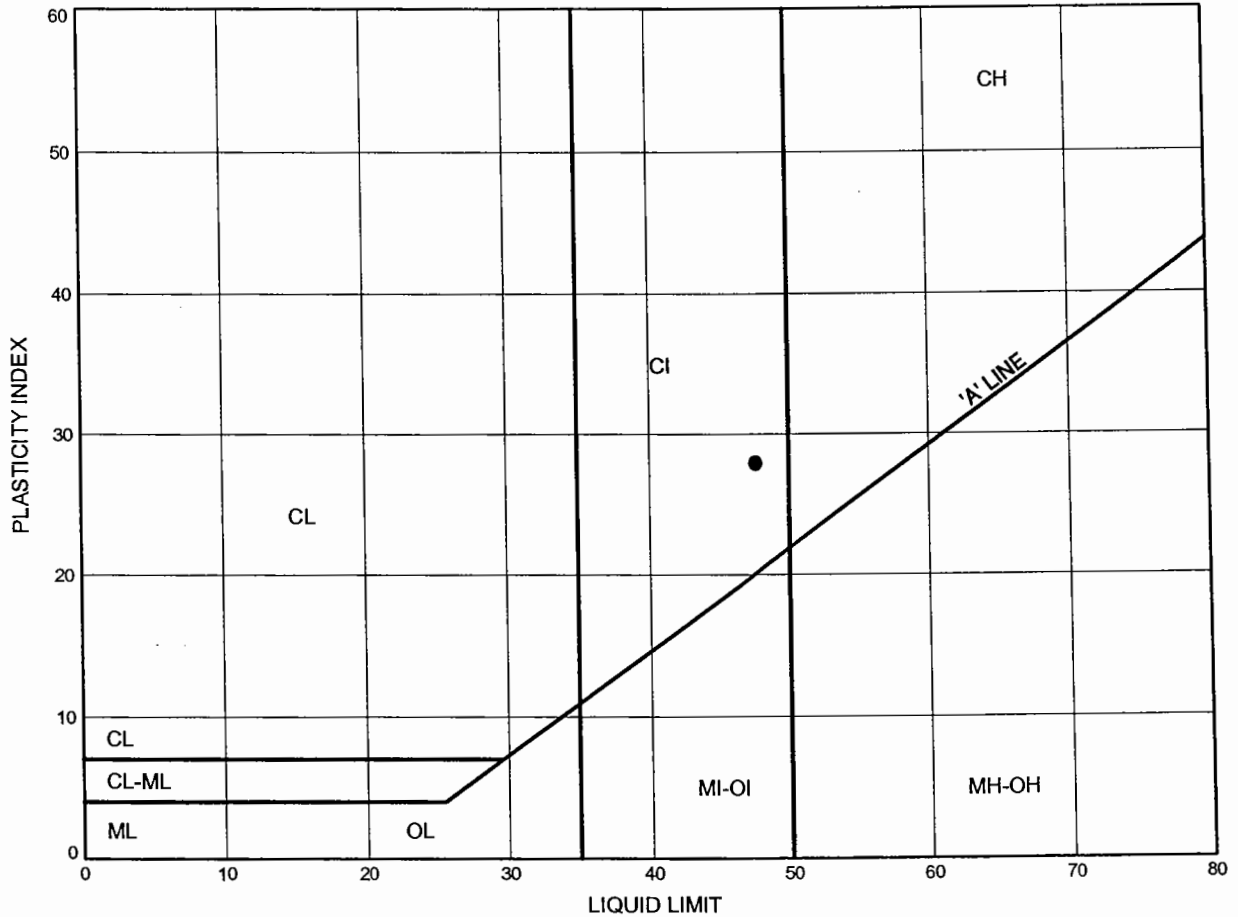
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Project 277-97-00



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Geotechnical Investigation
ATTERBERG LIMITS TEST RESULTS

FIGURE B11



| SYMBOL | BH | DEPTH (m) | ELEV. (m) |
|--------|-------|-----------|-----------|
| ● | 06-65 | 9.37 | 292.23 |

Date March 2007
 Project 277-97-00



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 Chkd. MEF

Appendix C

Drawing

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

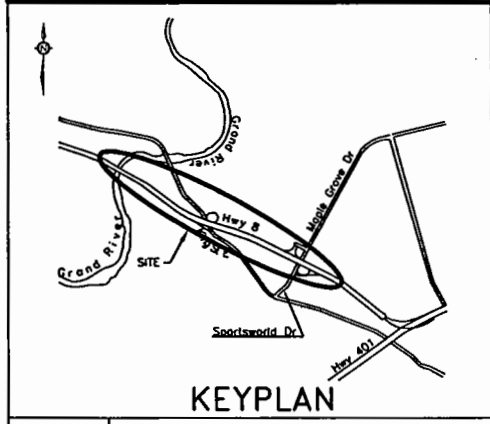
CONT No
GWP No.277-97-00

HWY 8 WIDENING, GRAND RIVER
TO SPORTSWORLD DRIVE
HML AND OH SIGNS
BOREHOLE LOCATION PLAN

SHEET

MORRISON
HERSHFIELD

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

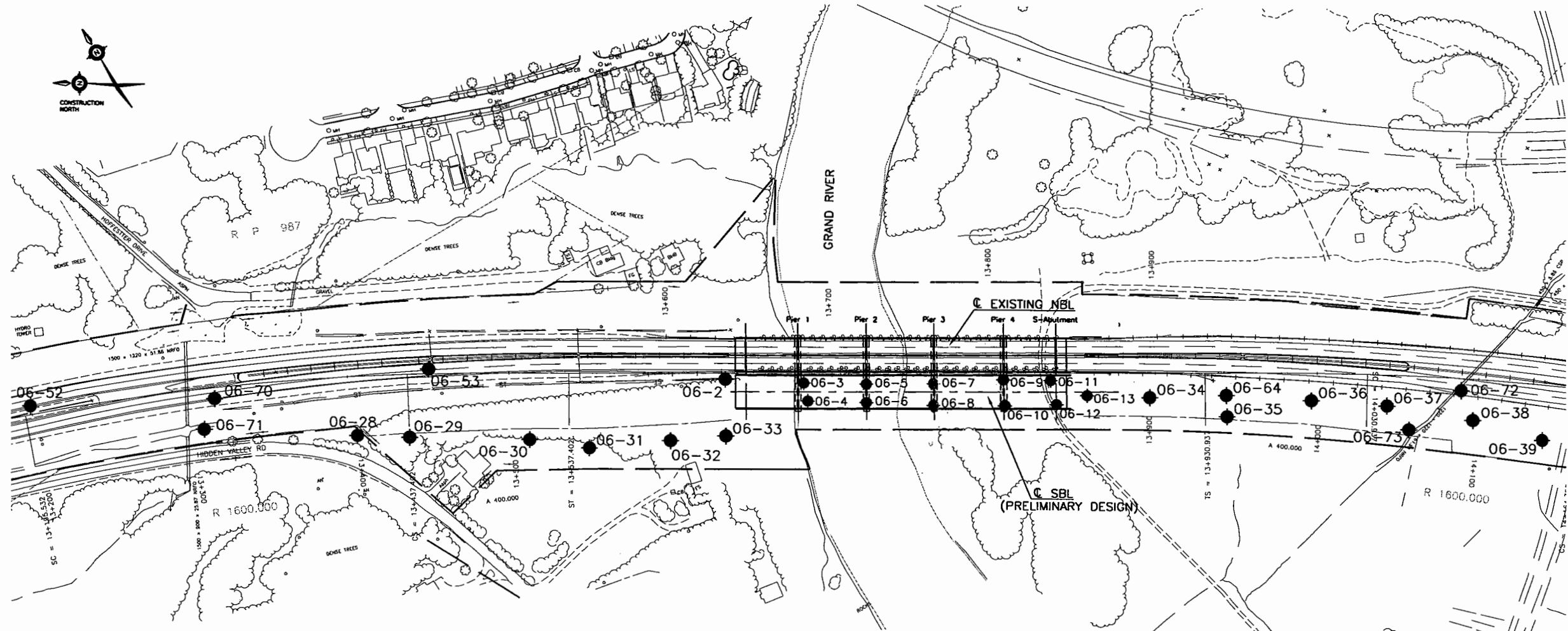


- LEGEND**
- BoreHole
 - BoreHole and Cone
 - N Blows /0.3m (Std Pen Test, 475J/blow)
 - CONE Blows /0.3m (60° Cone, 475J/blow)
 - PH Pressure, Hydraulic
 - Water Level
 - Head Artesian Water
 - Piezometer
 - 90% Rock Quality Designation (RQD)
 - A/R Auger Refusal

| NO | ELEVATION | NORTHING | EASTING |
|-------|-----------|-------------|-----------|
| 06-2 | 294.8 | 4 809 407.9 | 230 461.0 |
| 06-3 | 282.5 | 4 809 380.6 | 230 500.6 |
| 06-4 | 282.5 | 4 809 369.7 | 230 496.8 |
| 06-5 | 282.5 | 4 809 359.3 | 230 533.5 |
| 06-6 | 282.5 | 4 809 349.5 | 230 527.4 |
| 06-7 | 283.4 | 4 809 337.1 | 230 569.3 |
| 06-8 | 283.7 | 4 809 325.7 | 230 562.1 |
| 06-9 | 283.4 | 4 809 316.4 | 230 607.1 |
| 06-10 | 283.8 | 4 809 302.3 | 230 599.2 |
| 06-11 | 284.5 | 4 809 300.8 | 230 631.3 |
| 06-12 | 284.2 | 4 809 286.2 | 230 626.4 |
| 06-13 | 282.3 | 4 809 280.9 | 230 645.4 |
| 06-28 | 307.1 | 4 809 498.2 | 230 248.8 |
| 06-29 | 308.2 | 4 809 480.4 | 230 275.7 |
| 06-30 | 310.5 | 4 809 440.1 | 230 337.9 |
| 06-31 | 310.0 | 4 809 416.0 | 230 366.9 |
| 06-32 | 309.2 | 4 809 393.0 | 230 412.3 |
| 06-33 | 308.0 | 4 809 377.7 | 230 442.3 |

- 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.

GEOCRES No. 40P8-147



PLAN
SCALE 1:3,000

LICENSED PROFESSIONAL ENGINEER
M.E. FARRANT
100053767
May 30, 2007
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P.K. CHATTERJI
May 30, 2007
PROVINCE OF ONTARIO

| NO | ELEVATION | NORTHING | EASTING |
|-------|-----------|-------------|-----------|
| 06-34 | 284.5 | 4 809 259.4 | 230 677.7 |
| 06-35 | 284.4 | 4 809 223.9 | 230 711.7 |
| 06-36 | 284.8 | 4 809 204.8 | 230 761.0 |
| 06-37 | 284.9 | 4 809 177.3 | 230 798.6 |
| 06-38 | 285.2 | 4 809 141.3 | 230 838.7 |
| 06-39 | 284.9 | 4 809 107.5 | 230 869.0 |
| 06-52 | 309.5 | 4 809 622.9 | 230 083.7 |
| 06-53 | 301.1 | 4 809 510.0 | 230 308.1 |
| 06-64 | 284.6 | 4 809 235.3 | 230 718.4 |
| 06-70 | 305.8 | 4 809 565.4 | 230 184.4 |
| 06-71 | 304.0 | 4 809 552.6 | 230 168.7 |
| 06-72 | 288.3 | 4 809 160.7 | 230 842.7 |
| 06-73 | 285.1 | 4 809 157.6 | 230 802.1 |

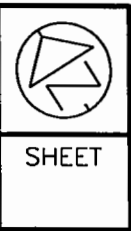
DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

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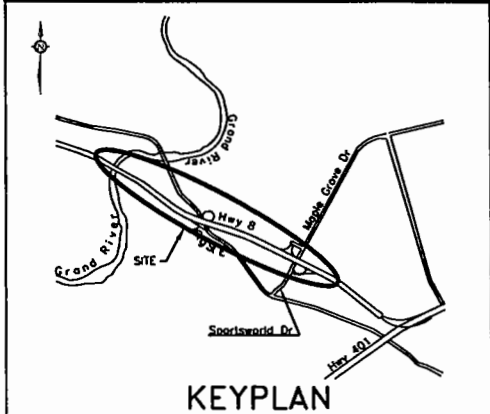
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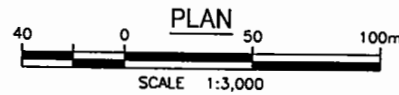
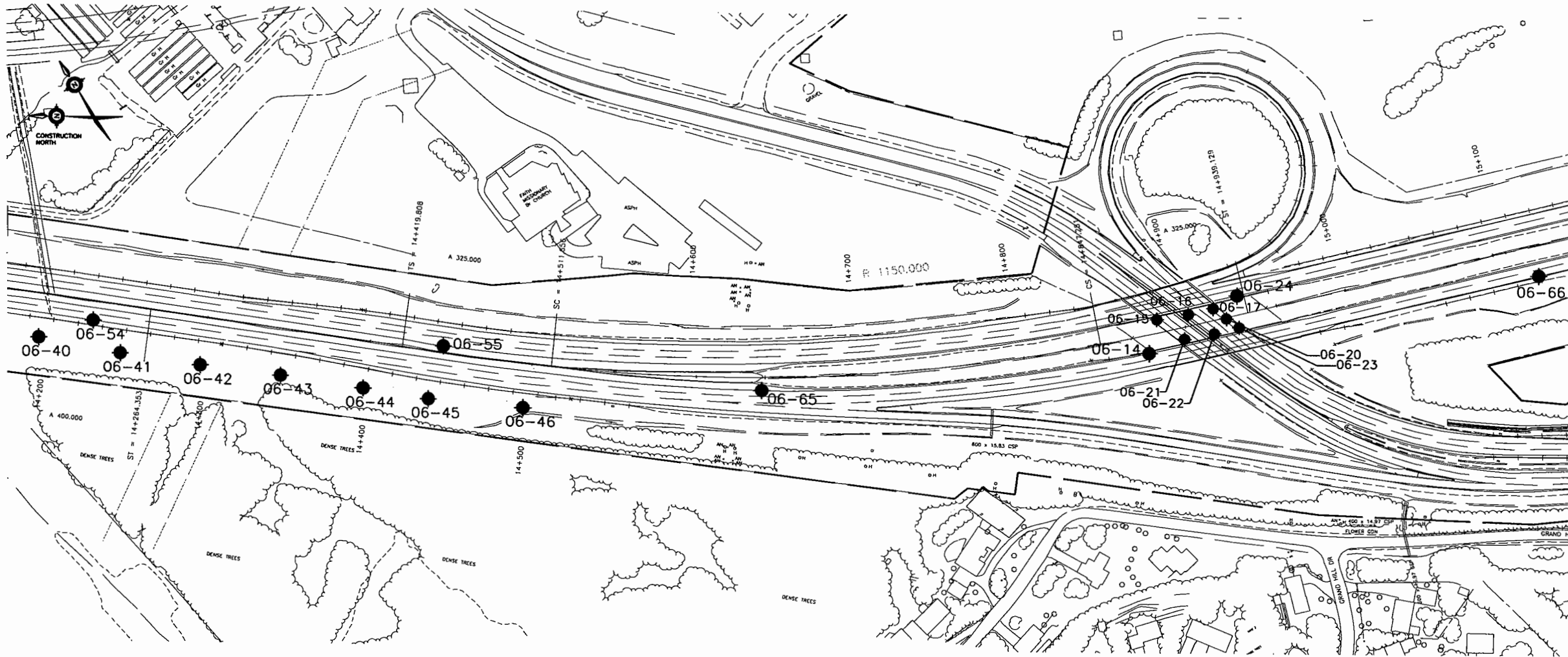
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- PH Pressure, Hydraulic
- W Water Level
- HA Head Artesian Water
- PZ Piezometer
- 90% Rack Quality Designation (RQD)
- A/R Auger Refusal

| NO | ELEVATION | NORTHING | EASTING |
|-------|-----------|-------------|-----------|
| 06-14 | 309.4 | 4 808 713.1 | 231 485.9 |
| 06-15 | 302.3 | 4 808 728.1 | 231 500.9 |
| 06-16 | 302.9 | 4 808 720.6 | 231 518.7 |
| 06-17 | 302.9 | 4 808 715.6 | 231 533.5 |
| 06-20 | 303.2 | 4 808 706.1 | 231 537.0 |
| 06-21 | 302.9 | 4 808 709.1 | 231 508.7 |
| 06-22 | 303.5 | 4 808 702.3 | 231 525.8 |
| 06-23 | 303.5 | 4 808 697.3 | 231 540.7 |
| 06-24 | 311.1 | 4 808 714.5 | 231 550.0 |
| 06-40 | 287.2 | 4 809 080.1 | 230 915.9 |
| 06-41 | 287.5 | 4 809 045.3 | 230 953.1 |
| 06-42 | 288.4 | 4 809 012.8 | 230 991.3 |
| 06-43 | 289.9 | 4 808 981.6 | 231 029.5 |
| 06-44 | 291.7 | 4 808 948.5 | 231 068.1 |
| 06-45 | 293.7 | 4 808 921.4 | 231 098.8 |
| 06-46 | 295.3 | 4 808 886.6 | 231 145.2 |
| 06-54 | 288.7 | 4 809 070.9 | 230 949.6 |
| 06-55 | 294.8 | 4 808 944.0 | 231 123.9 |

- 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.

GEOCREs No. 40P8-147




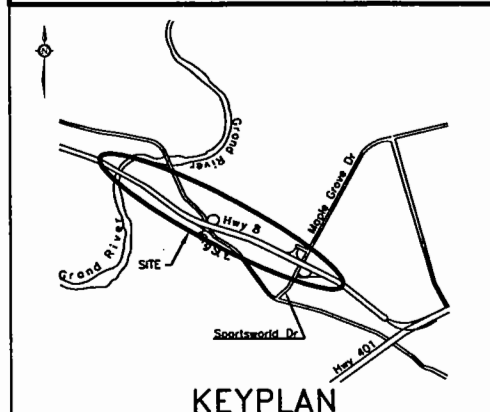
| NO | ELEVATION | NORTHING | EASTING |
|-------|-----------|-------------|-----------|
| 06-65 | 301.6 | 4 808 819.0 | 231 274.0 |
| 06-66 | 315.0 | 4 808 626.8 | 231 711.8 |

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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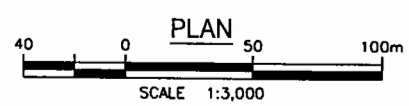
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-NOTES-

- 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.

GEOCRES No. 40P8-147



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